



Safety Benefits of Turn Lanes

Victor Lund, PE, PTOE
Traffic Engineer
St. Louis County, MN

Minnesota County Engineers Association Annual Conference, January 17, 2024



S A I N T
LOUIS ♦
COUNTY
MINNESOTA

Poll the Audience...

- Go to menti.com
- Enter code 3572 4030



What is St. Louis County's Turn Lane Policy?



What are the benefits of turn lanes?

- Reduce intersection conflicts.
- Add intersection capacity.
- Support access management.
- Improve traffic safety.



Help traffic flow safer and more efficiently.

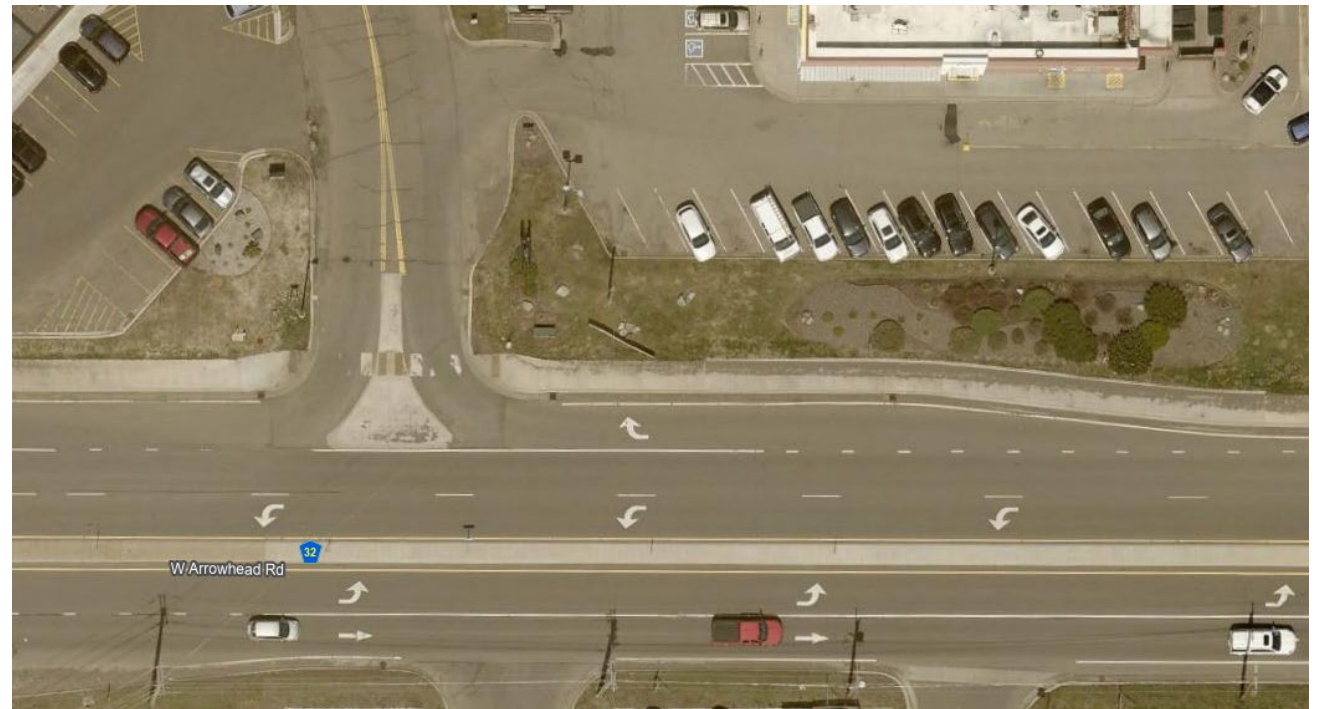
When should turn lanes be considered?

- New development that generates significant traffic (especially turning traffic in conflict with mainline existing traffic).
- Change in intersection control strategy (e.g. traffic signal).
- Managing access on a suburban or urban corridor.
- Improving safety at rural side-street stop control intersections.

- If you had to pick, which would you pick?
 - Left-Turn Lane
 - Right-Turn Lane

Types of turn lane treatments...

- Channelized in suburban/urban corridors to support access management.



Source: FHWA

Source: St. Louis County

Types of turn lane treatments...

- Serving private development.



Source: St. Louis County

Types of turn lane treatments...

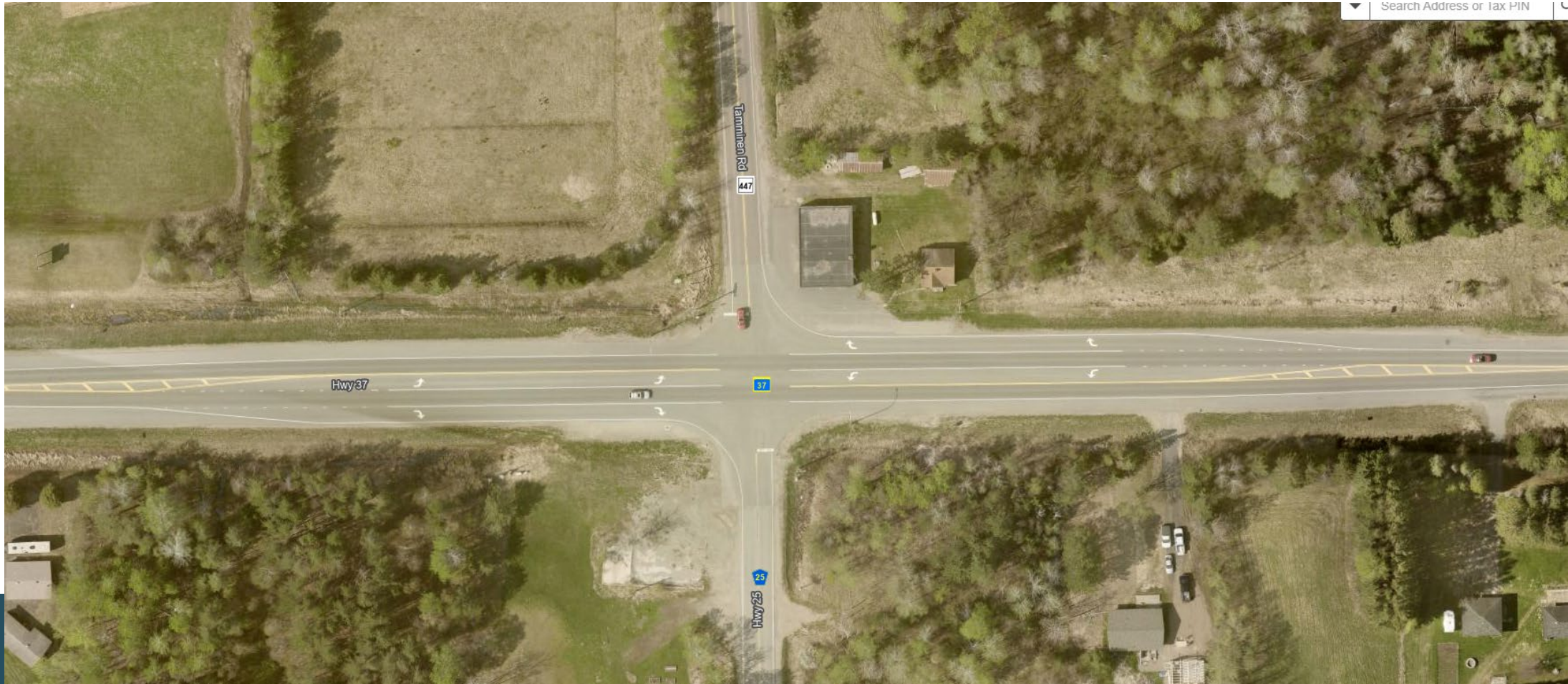
- Adding capacity at signalized intersections.



Source: St. Louis County

Types of turn lane treatments...

- Improve safety of rural side-street stop intersections.



Source: St. Louis County

Types of turn lane treatments...

- Improve visibility through offset turn lanes.

Source: St. Louis County



Safety performance of turn lanes.

- Turn lanes are considered a proven safety strategy by FHWA.
- Estimated 28-48% reduction in total crashes.
- Installation of left-turn lanes on both major approaches has an estimated reduction of 48% for all crashes (CMF = 0.52). See CMF Clearinghouse CMF ID 268.
- See the FHWA Proven Safety Countermeasures.



Safety Benefits:

Left-Turn Lane

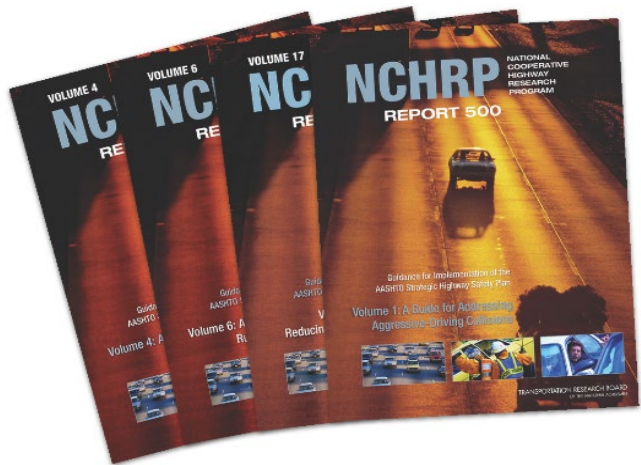
28-48%

reduction in total crashes.¹

Source: FHWA

Effectiveness of Safety Strategies

- Decisions to implement a safety strategy should consider effectiveness.
- National Cooperative Highway Research Program (NCHRP) produces reports documenting effectiveness of various traffic safety strategies.



Proven

- Supported by rigorous academic study.

Tried

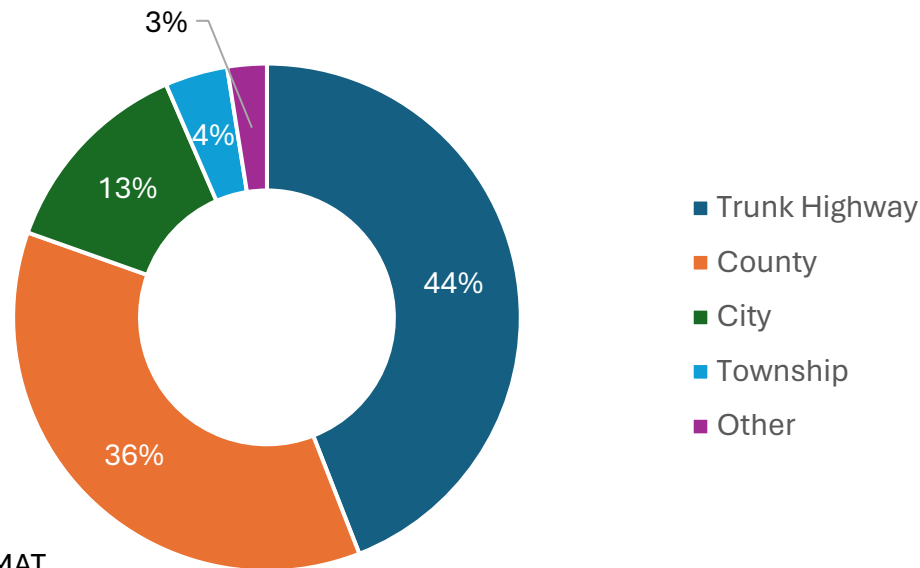
- Some evaluations.
- Conflicting experience and results

Experimental

- New idea.
- Limited to no formal evaluation.
- Limited deployments.

How can turn lanes help us with TZD?

2017-2021
Fatal Crashes on All Roads in
Minnesota
By System Type



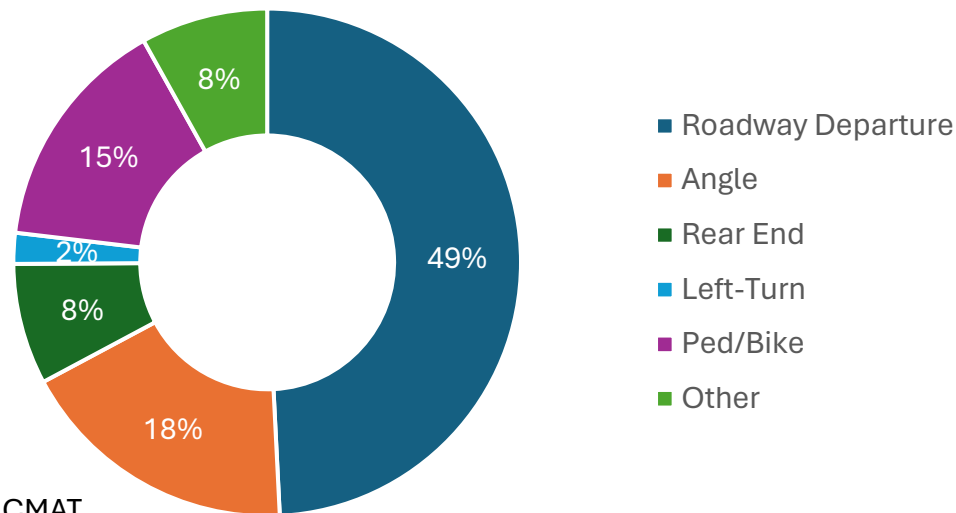
Source: Minnesota CMAT

- 80% of all fatal crashes occur on the state and county systems.
- 53% of all fatal crashes are in rural Minnesota*.
- 60% of fatal crashes on the state and county systems are in rural Minnesota*.

*Located outside of a city boundary.

How can turn lanes help us with TZD?

2017-2021
Fatal Crashes on All Roads in
Minnesota
By Crash Type



Source: Minnesota CMAT

- Roadway departure type crashes generate the most fatal crashes.
- Roadway departure and angle type crashes represent 67% of all fatal crashes.

How can turn lanes help us with TZD?

- Our toolbox for improving intersection safety...
 - Roundabouts
 - J-Turns (Reduced Conflict Intersections)
 - Left-Turn/Right-Turn Lanes
 - Continuous Green-T intersection
 - Intersection lighting
 - Enhanced markings and signing (e.g. STOP AHEAD pavement message)



How can turn lanes help us with TZD?

- Turn lanes are a key strategy for the Safe System approach.
- If given the opportunity, drivers will avail themselves by placing themselves and others in an unsafe or high-risk position within an intersection.
- <https://vimeo.com/346982825>

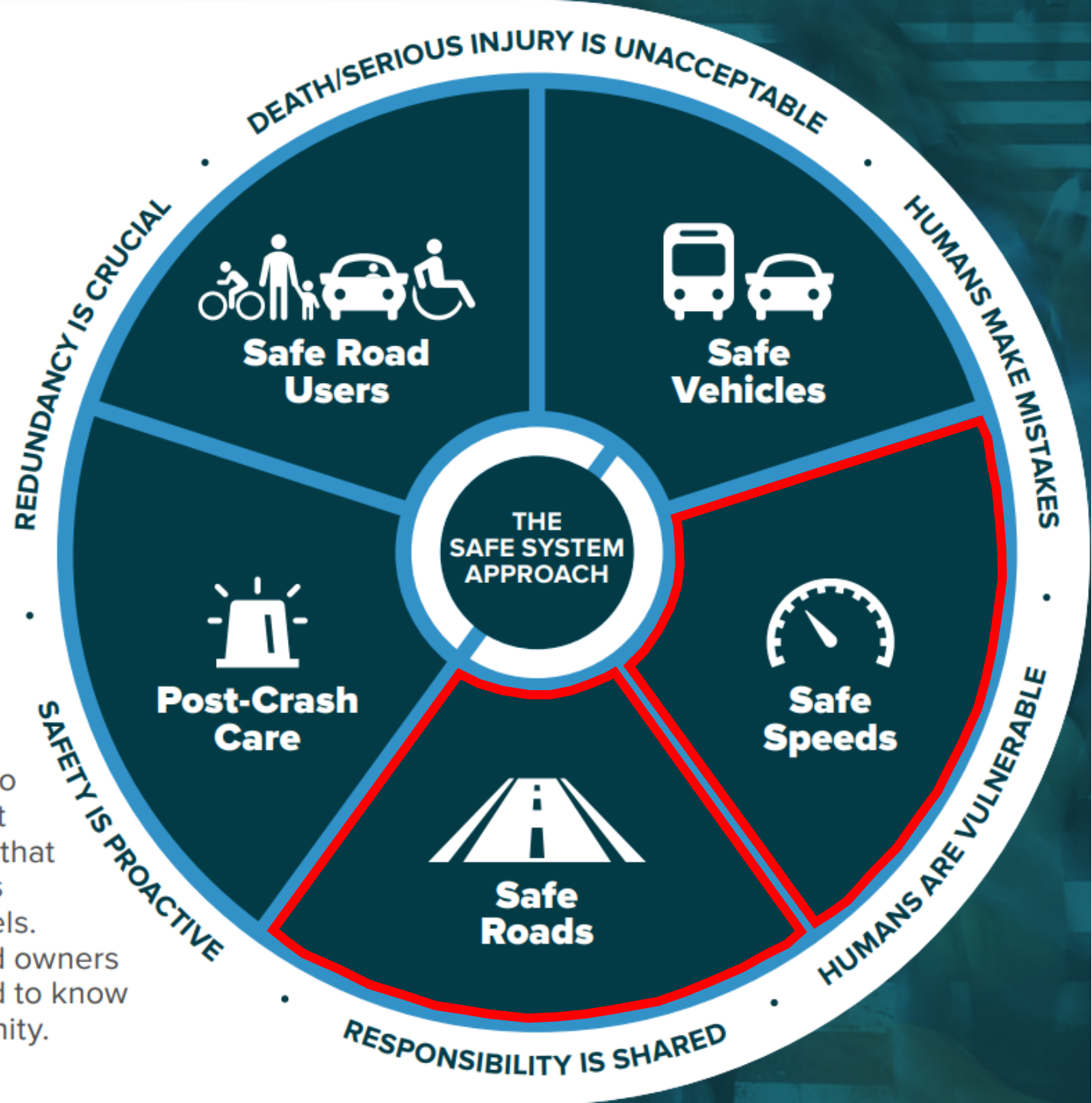


SAFE SYSTEM

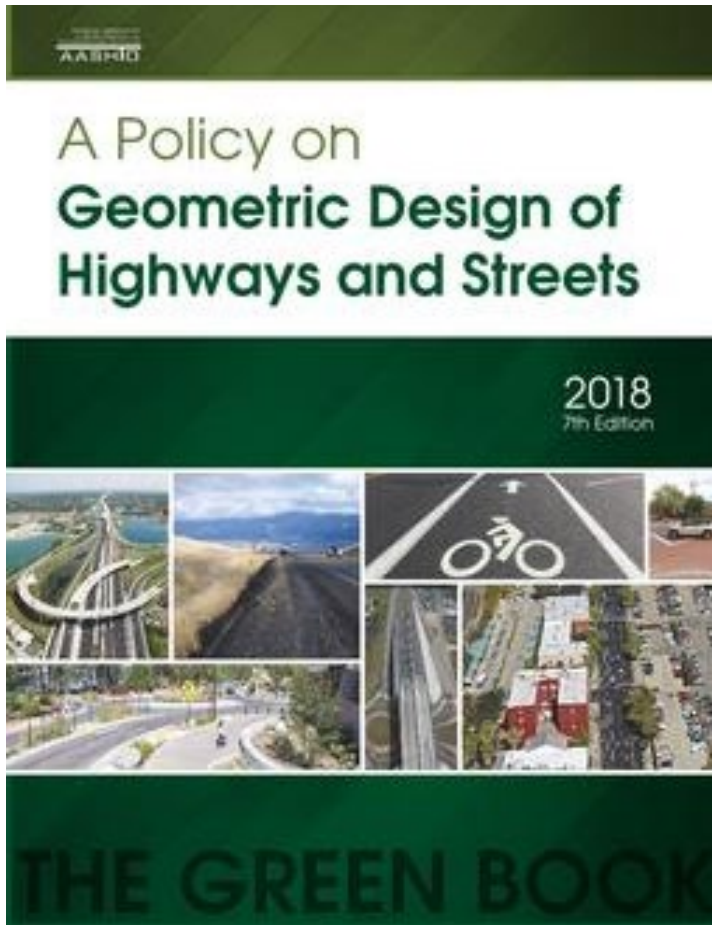
APPROACH

Zero is our goal. A Safe System is how we will get there.

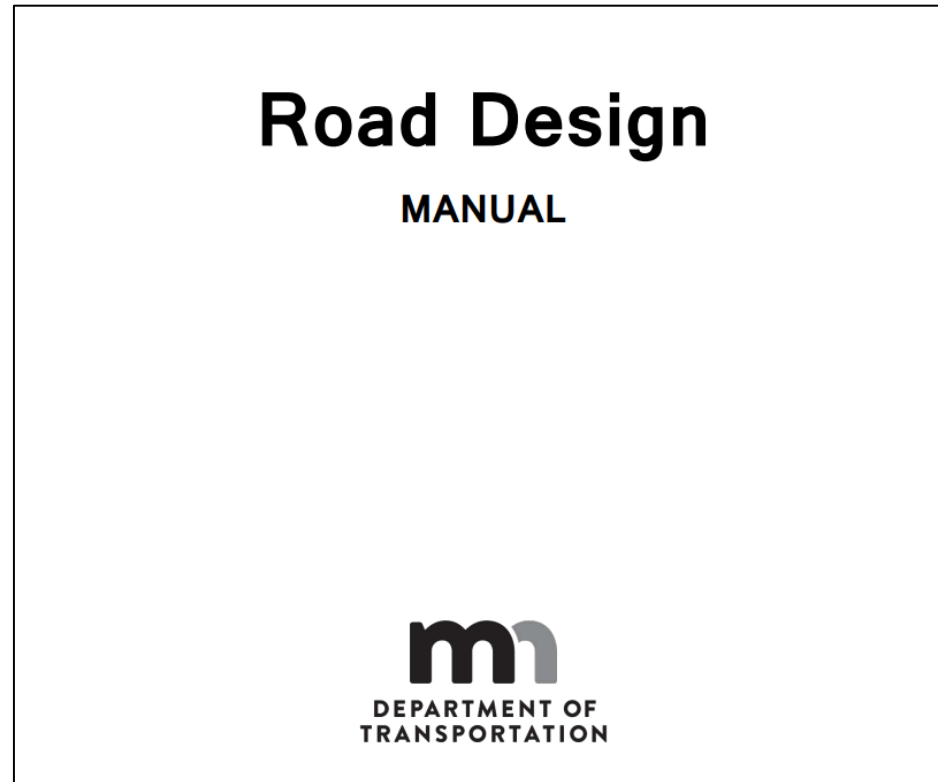
Imagine a world where nobody has to die from vehicle crashes. The Safe System approach aims to eliminate fatal & serious injuries for all road users. It does so through a holistic view of the road system that first anticipates human mistakes and second keeps impact energy on the human body at tolerable levels. Safety is an ethical imperative of the designers and owners of the transportation system. Here's what you need to know to bring the Safe System approach to your community.



Intersection Design Philosophy Questions

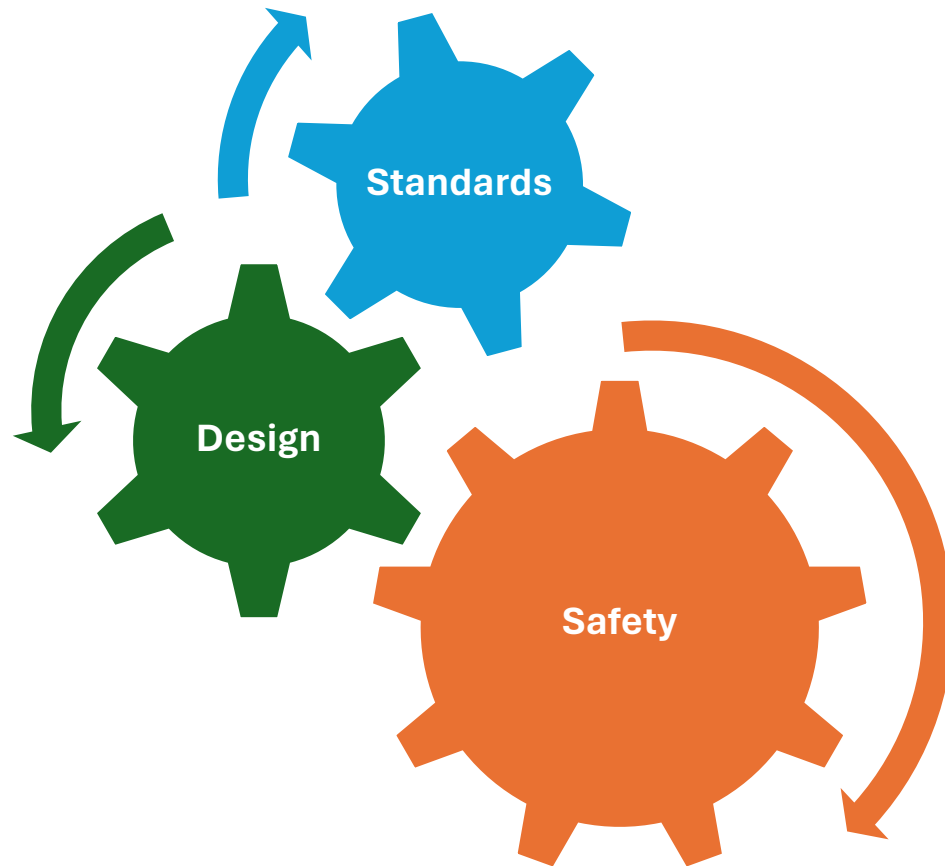


+



= Safe Design?

Intersection Design Philosophy Questions



- Do design standards (minimums) equal maximum safety?
- If we are not achieving desired safety performance, what are the implications (if any) for design standards?
- Is there a missing gear between standards and design?

How can turn lanes help us with TZD?

- Recommended focus to implement left-turn/right-turn lanes...
 - State/County intersections (particular attention to TH/CSAH)
 - CSAH/CSAH intersections
 - County Road Safety Plan recommendations
 - Sustained, high crash locations
- Factors that might distinguish intersections for turn lanes from other treatments...
 - Major/Minor ADT ratio ($\sim < 60/40$).
 - A need to maintain mobility on the major road.
 - Limited/non-existent pedestrian activity or facilities (rural context).

How can turn lanes help us with TZD?

- Some words of wisdom...
 - Be proactive, not reactive. You don't need to wait for crash events to do something. Leverage your County Road Safety Plan.
 - Justification for left-turn/right-turn lanes can be based solely on presence of risk factors.
 - Employ a “systematic” approach in addition to a “systemic” approach.
 - Systemic = Treat locations based on presence of risk factors.
 - Systematic = Treat an entire system (e.g. TH/CSAH intersections).
 - The County Engineer should be the leading safety advocate for State/County intersections. Take the lead by leveraging the LPP.

Funding sources to construct turn lanes.

- Highway Safety Improvement Program (HSIP). Look at your County Road Safety Plan.
- Local Road Improvement Program (LRIP). Utilize the Rural Road Safety Account within LRIP by focusing on CSAH routes.
- Local Partnership Program (LPP). Look for State/County intersections.
- Your own funding sources?
- Estimated construction cost range = \$700,000 to \$900,000.

St. Louis County's Experience

St. Louis County Left-Turn Lane Projects			
Intersection	Project Year	Funding Type	Construction Cost
MNTH 37 at Hwy 25 (CSAH 25)/Tamminen Rd (CR 447), Cherry	2020	LPP	\$446,000
US 2 at Morris Thomas Rd (CSAH 56), City of Hermantown	2021	LPP	\$848,000
US 2 at Canosia Rd (CSAH 98), Solway Township (Munger)	2022	LPP	\$690,000
MNTH 194 at Canosia Rd (CSAH 98), Solway Township (Saginaw)	2023	LPP	\$856,000
Midway Rd (CSAH 13) at West Arrowhead Rd, City of Hermantown	2023	HSIP	\$773,000
Midway Rd (CSAH 13) at Stark Rd (CSAH 11/CR 894), Midway Township	2023	HSIP	\$802,000
US 2 at Munger Shaw Rd (CR 223), Solway Township (Munger)	2024	LPP	Yet to be bid



1581F5FHD237N00D9T71
2023-10-19 12:10:11
46.747458°N 92.279436°W 1559.410ft

Midway Rd (CSAH 13) at West Arrowhead Rd



1581F5FHD237N00D9T71
2023-10-19 17:03:29
46.820011° N 92.279512° W 1725.763ft



1581F5FHD237N00D9T71

2023-10-02 15:24:18

46.843122°N 92.362103°W 1716.548ft



1581F5FHD237N00D9T71
2023-09-20 13:32:15
47.402014°N 92.703864°W 1627.310ft

Lessons Learned

- Intersection conflict points are king.
- Don't lose focus of intersection context.
- Design standards do not necessarily equal safe intersections.
- Focus on a programmatic improvements across a regional transportation network.
- Leverage Intersection Control Evaluation (ICE) studies. They help float good ideas to the surface and get funding.
- You will likely encounter resistance. Don't run from it and don't dismiss it. Rather, work through it with your eye focused on a safer intersection.

Questions?

Victor Lund, PE, PTOE

Traffic Engineer

St. Louis County

218-625-3873

lundv@stlouiscountymn.gov

