How Complete Streets Create a Safe System

Sonja Piper, Active Transportation Safety Engineer

Minnesota Department of Transportation

DEPARTMENT OF TRANSPORTATION

May 23, 2024

Presentation Topics

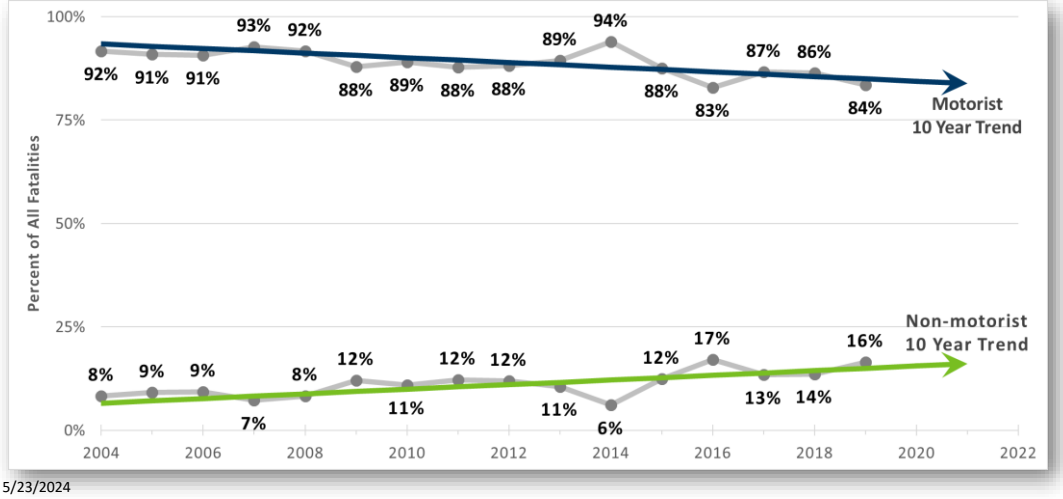
- Complete Streets: Why?
- Complete Streets at MnDOT
- Safe System Approach
- Safe System Application
- Designing for the Results We Want

Complete Streets: Why?

5/23/2024

Disproportionate trend of non-motorist fatalities

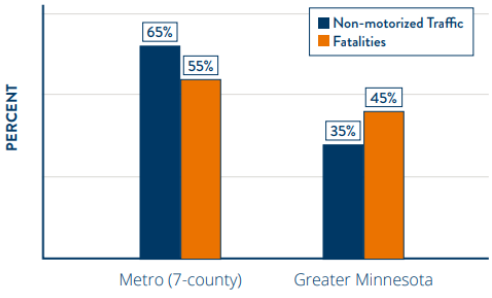
Traffic Fatalities in Minnesota (2004-2019)



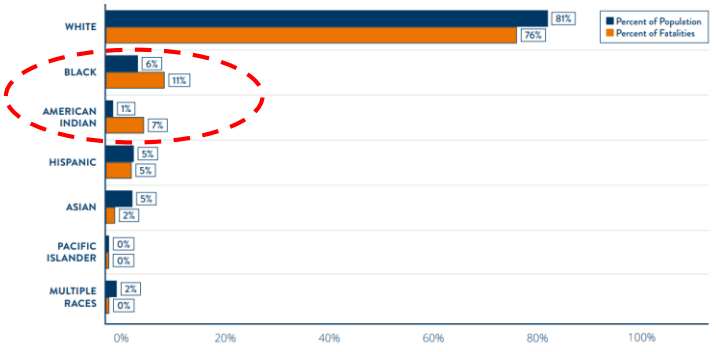
5/23/2024

Disproportionate trend of non-motorist fatalities

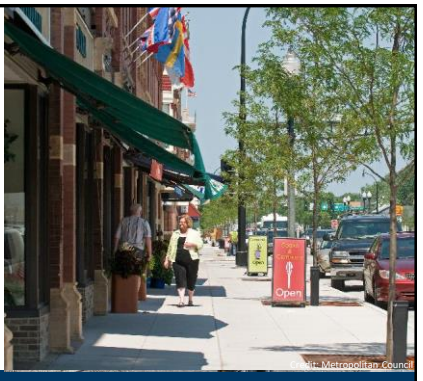
MN Non-Motorist Fatalities by Geography (2015-2019)



MN Non-Motorist Fatalities by Race, Statewide (2015-2019)



5/23/2024



Complete Streets at MnDOT

Sonja Piper | Active Transportation Safety Engineer

DEPARTMENT OF TRANSPORTATION

What are Complete Streets?

- Address safety and access needs for users of all ages and abilities
- A multi-modal approach
- Flexible approach for any transportation project, any context

5/23/2024

Hwy 4 in St. James, MN, 2018

MnDOT's commitment to Complete Streets

- One of the first DOTs to develop a statewide Complete Streets Policy (2013)
- Compliance with Minnesota Statutes §174.75
- Operationalizes MnDOT's mission, vision, and statewide planning efforts
- Updated Policy to provide implementation tools and performance measures (2022)

5/23/2024

Hwy 61 in Lake City, MN, 2020

Grounding in relative vulnerability

User	Relative Vulnerability
	High. Due to the speed and mass of vehicles, people walking are the most vulnerable. Safety of the most vulnerable users must be priority, as they are most at risk.
	Medium-high. Less vulnerable than people walking, but more vulnerable than people driving due to their speed and mass. The range of age and experience for bicyclists varies broadly, which affects the needs and designs for projects.
	High. People taking transit have a similar level of vulnerability as people walking or biking.
	Low. Because of the relative safety provided by a vehicle (e.g., seatbelts, airbags), people driving are less vulnerable than people walking and biking.
	Low. Because of the relative safety provided by a vehicle, people driving freight vehicles are less vulnerable than people walking and biking.

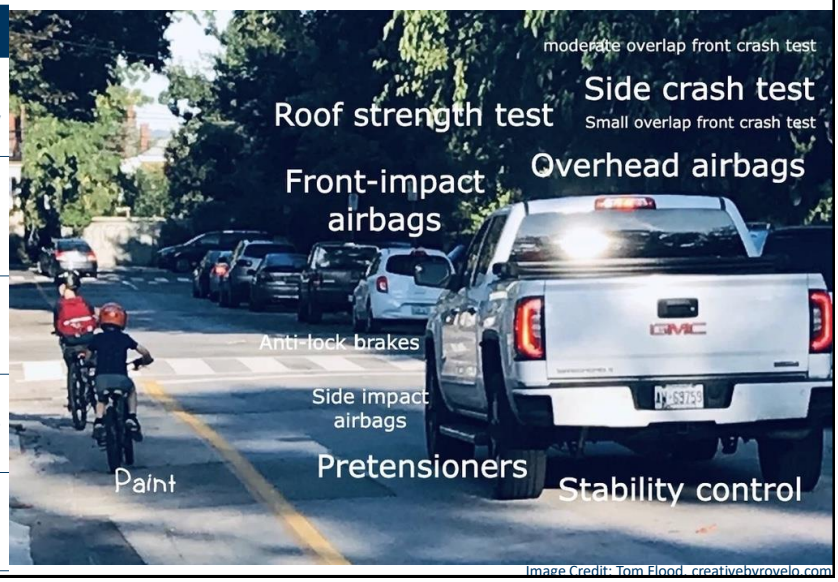


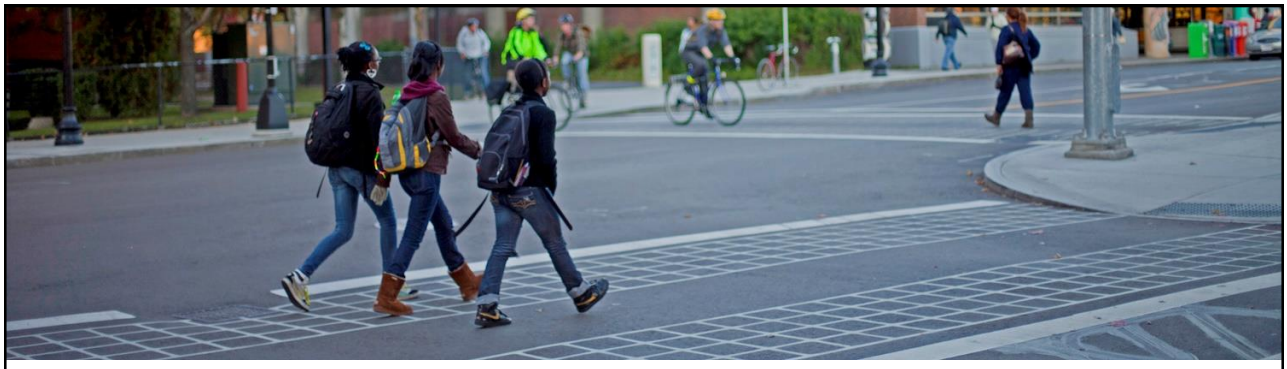
Image Credit: Tom Flood, creativebyrovelo.com

Sensitive to context

Baseline Transportation Hierarchy

Relative vulnerability and expected volume by context provides a baseline hierarchy as a starting point, for iteration with partners and stakeholders

5/23/2024



Safe System Approach

DEPARTMENT OF TRANSPORTATION

THE SAFE SYSTEM APPROACH

5/23/2024

Where are You on the Safe System Journey?

Traditional approach		Safe System approach
Prevent crashes	→	Prevent death and serious injuries
Improve human behavior	→	Design for human mistakes/limitations
Control speeding	→	Reduce system kinetic energy
Individuals are responsible	→	Share responsibility
React based on crash history	→	Proactively identify and address risks

5/23/2024

Complete Streets Supports a Safe System Approach

Eliminate fatal and serious injuries for all road users by:

- **Accommodating human mistakes**
- **Keeping impacts on the human body at tolerable levels**

Complete Streets is an implementation strategy:

- **Safer Roads**
- **Safer Speeds**

5/23/2024
Image Credit: https://www.transportation.gov/NRSS/SafeSystem

Safer Roads

- Separate people in space and time
- If not possible to separate, then try to manage kinetic energy
- Increase visibility and awareness

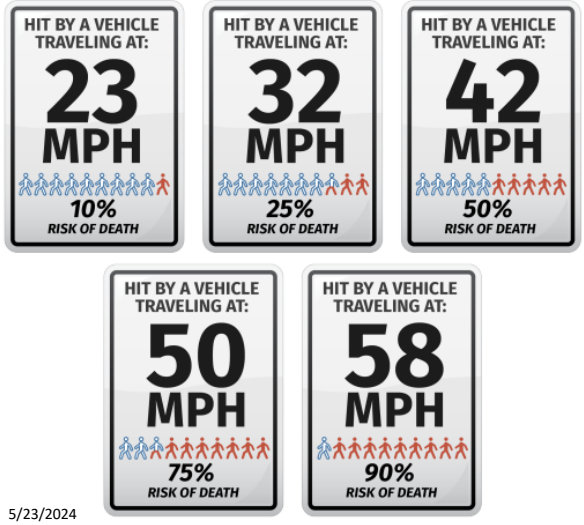
Create predictable behaviors


St. Paul, MN (2020)


Kasson, MN (2019)

5/23/2024

Safer Speeds



- Proactive road design to slow speed:
  - improve visibility
  - Provide additional time for drivers to stop
  - Keep impacts on the human body at tolerable levels
- Design streets for desired speed
- Prioritize lower speeds when people walking/biking are mixing with drivers

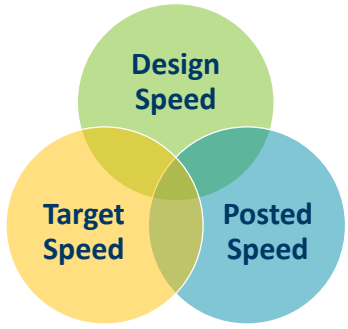
5/23/2024

Image credit: https://highways.dot.gov/sites/fhwa.dot.gov/files/2020-11/FHWA_PedSafety_ActionPlan_Nov2020.pdf

Target Speed vs. Design Speed

Speed is a choice:

- Design speed: The selected speed used to determine the various geometric design features of the roadway.
- Operating speed: Speed at which vehicles are operating during free flow conditions
- Target speed: The desired operating speed



Performance-Based Practical Design guidance document

- Treat speed as a design outcome rather than input
- Forthcoming direction in the new Facilities Design Guide

5/23/2024

Self-Enforcing Roadway

- **Self-enforcing roadways focus on managing driving speeds through design.**
- **Drivers use clues from roadway design and environment to choose their driving speed.**
  - "Friction" from narrow lanes or curb extensions
  - Horizontal deflection
  - Vertical deflection
  - Reduced turning radii
- **Use the design to achieve "Safe Speeds"**

5/23/2024

"You cannot have a safe system if you do not provide safe mobility for pedestrians, bicyclists, and motorcyclists."

Wes Kumfer, Collaborative Sciences Center for Road Safety, Nov 4, 2020

Safe System Application

DEPARTMENT OF TRANSPORTATION

Active Transportation Project Scoping

Collect Background Information

- Discuss with District Staff
- Traffic and Safety Data
- Past Plans and Studies
- Equity Data

Listen

- Field Walk
- Drone Walk
- Other Stakeholders

Develop Recommendations

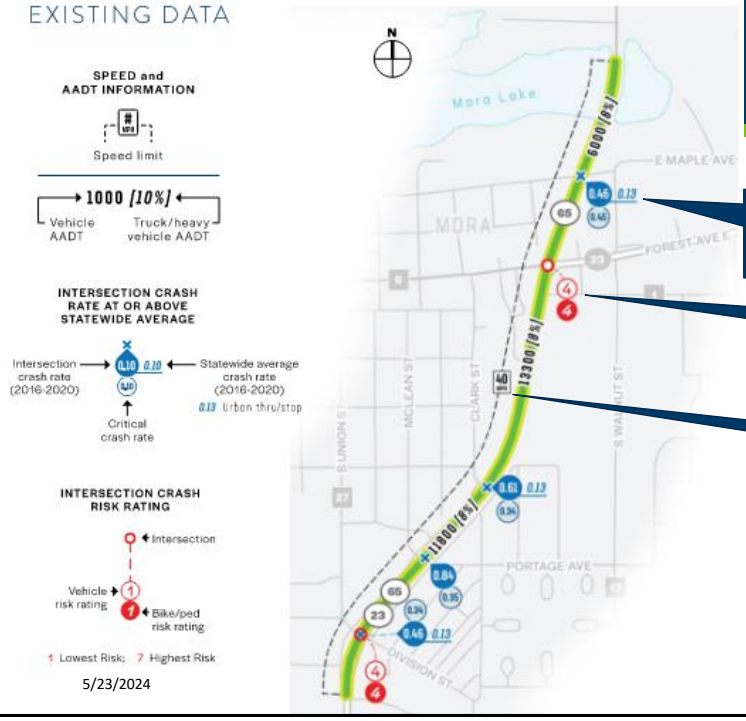
- Comprehensive View
- Mode of Travel Similar to Vehicles
- Provide Report to Project Manager

Example Project

- TH 65 through Mora
- Planned as FY 2030 Urban Reconstruction

*** Disclaimer: The project and recommendations we discuss may not be part of the final project and is for discussion purposes only ***

Background Information in SSA Concepts



- Prevent death and serious injury
- Design for human mistakes/ limitations

- Proactively identify and address risks

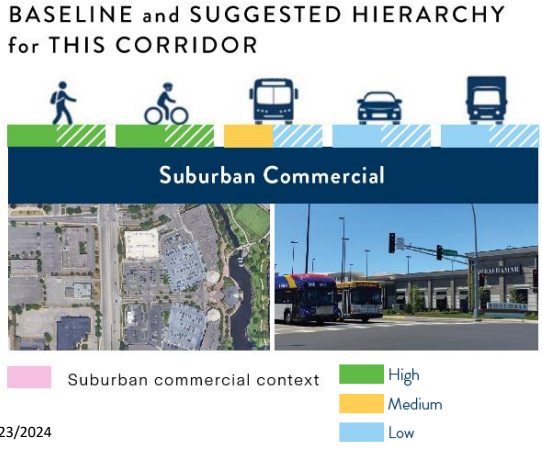
- Traffic volumes

- Reduce system kinetic energy

- Speed limits

Project Specific Modal Hierarchy

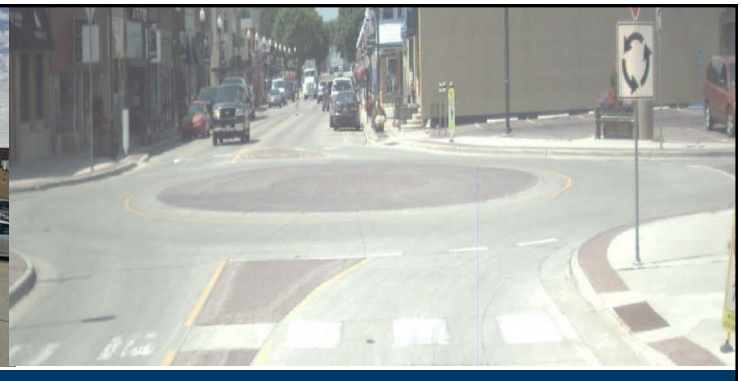
- Complete Streets Process establishes a hierarchy of users:



Mora: Site Observation and Virtual Discussion

- The highway is a barrier
- Speeding is a concern
- Difficulty crossing the highway
- There are people walking and biking in shoulder
  - Footprints observed in gravel shoulder
- Marked crossing is not very visible and does not feel safe

5/23/2024



Design for the Results We Want

** Disclaimer: The project and recommendations we discuss may not be part of the final project and are for discussion purposes only **

DEPARTMENT OF TRANSPORTATION

5/23/2024

User Priorities

- Based on the hierarchy, apply SSA concepts
- What can we do to…

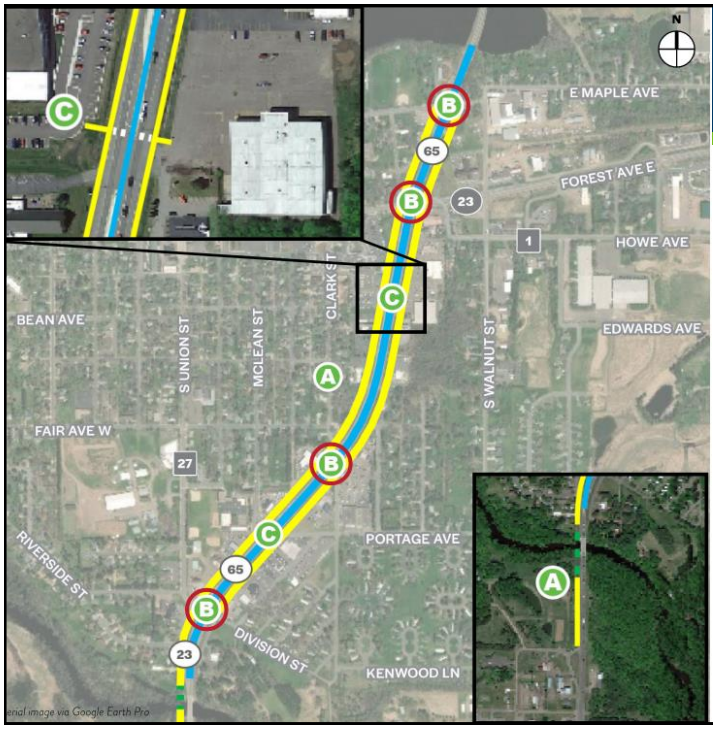
Prevent death and serious injuries?

Design for human mistakes/limitations?

Reduce system kinetic energy?

Share responsibility?

Proactively identify and address risks?



Mora Recommendations

LEGEND – Segments

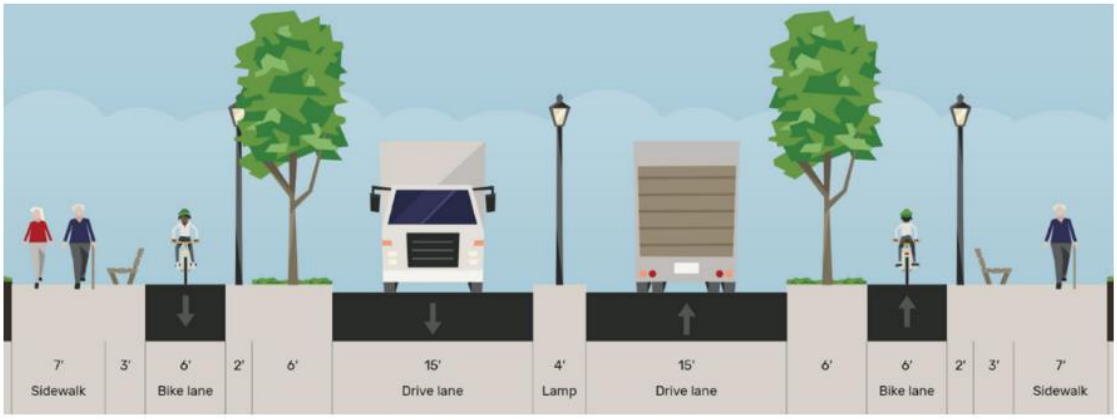
- Roadway reconfiguration along a segement
- Separated active transportation facilities
- Existing shared-use path

LEGEND – Intersections and Crossings

- Mini or urban compact roundabout
- Enhanced crossing

Mora Recommendations

Concept A-1: S Union Street/Divions Street to E Maple Avenue



Going beyond the roadway

Trees provide shade for VRUs, among other benefits.

Bioswales provide storm water management.

A chicane provides traffic calming on this bicycle boulevard in addition to the traffic calming affects of the landscaping.

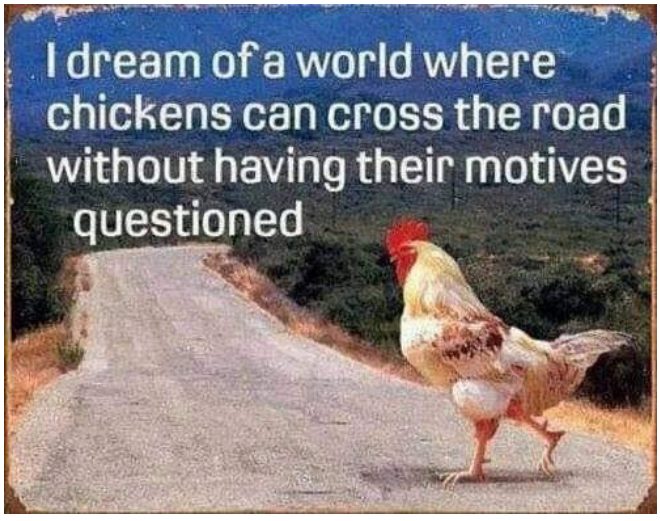
Conclusion

DEPARTMENT OF TRANSPORTATION

"…it has always been our job to make streets "complete"…Each time we use the excuse "we don't have enough budget or staff" (rather than strategically making decisions about our community needs), we are contributing to incomplete streets. **We will never have enough funding.** Obtaining public support for the investment and the accountability needed a name, which is why we have Complete Streets. Achieving these types of roads in our communities can't fall victim to scarcity-based decision making."

Ransford S. McCourt, ITE International President, November 2020 issue of ITE Journal

Thank you!



Sonja Piper, PE
sonja.piper@state.mn.us
651-234-7376