Three-Lane Road Design and Operation

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Presentation overview

• Background
• Countywide study
• Case study
Background
Existing 4-lane undivided roadways with AADT
Completed and in progress 4-to-3 lane conversions
FHWA guidance

• The Federal Highway Administration says 4-to-3 lane conversions typically see a “crash reduction of 19 to 47 percent.”

• Peak-hour volume guidance
  • Probably feasible at or below 750 vehicles per hour per direction (vphpd) during the peak hour.
  • Consider cautiously between 750 – 875 vphpd during the peak hour.
  • Feasibility less likely above 875 vphpd during the peak hour and expect reduced arterial LOS during the peak period.
Four to Three-Lane Roadway Conversion Study
Why study 4-lane undivided

• Better understand operational impacts and tradeoffs
• Varied professional opinions
• Establish a consistent county practice
• Roadway safety is a county priority
Study tasks

• Literature review and peer assessment
• Before and after assessment
• Capacity guidelines
• High-level screening analysis
• Detailed analysis
Peer agency survey

• How many miles of 4-lane undivided roadways are in your jurisdiction?
Peer agency survey

• Does your jurisdiction construct new or rebuild existing 4-lane undivided roadways?
  • Most jurisdictions surveyed do not prioritize and/or avoid construction of new 4-lane undivided roadways
Peer agency survey

• Are there recently completed and/or pending 4-lane to 3-lane roadway conversions in your jurisdiction? For any recently completed, can you offer any best practices or lessons learned?

  • “Consistently found that such conversions significantly reduce crashes and operate well.”

  • “Project required a lot of communication and education, but led to a community accepted project.”

  • “3-lanes likely have more capacity than what many think, and can outperform operations of a 4-Lane undivided segment in the right circumstances.”
Capacity guidelines

• Utilize sources from the Literature Review, Peer Assessment and Before/After Assessment to prepare motor vehicle traffic capacity threshold guidelines (AADT, peak hour directional volume, and other considerations).
  
  • Broadway St NE, Portland Ave, Maryland Ave (Ramsey Co), Larpenteur Ave (Ramsey Co)

• The guidelines will distinguish between various arterial roadway characteristics including traffic control, curbside uses/transit, and access density.
High-level screening analysis

- High-level screening analysis along 22 identified corridors to determine the feasibility of converting each segment from four lanes to three lanes.

- Motor vehicle traffic capacity thresholds from will be applied in addition to other factors such as curbside uses/transit, lane utilization, speeds, access density, and land use.
Detailed analysis

• Detailed traffic operations/capacity analysis and safety analysis will be conducted for 10 selected corridors.

1. Traffic operations analysis
   • Synchro/ SimTraffic

2. Safety analysis
   • Identify number and type of crashes
   • Crash severity and critical crash rates
Case study
66th Street Reconstruction

• 4- to 3-lane conversion from Nicollet Ave to Richfield Parkway completed in 2019

• 2016 AADT 14,800

• Crash data 3 years prior and 3 years after
66th Street reconstruction—County Road 53 in Richfield

Construction phases
Features of the reconstruction

- Full street reconstruction to address deteriorating pavement, utility and drainage concerns and storm water quality conditions.

- Raised medians and two-way left turns to separate traffic and provide a safer pedestrian crossing at locations throughout.
  - Some sections 3-lane others 5-lane

- Bicycle facilities and enhanced pedestrian accommodations.

- Accessible curb ramps at intersections.

- Accessible traffic signal replacement at intersections.

- Roundabouts at Lyndale and Nicollet avenues.

- Streetscaping.

- Improvements to bus stop waiting areas
Before

- Curb ramps are not ADA compliant
- 4-lane undivided roadway
- Narrow sidewalk with limited separation from moving vehicles
After
After

- ADA compliant curb ramps
- One travel lane in each direction with median or center turn lane
- Wider sidewalk and dedicated separated bikeway
Crash data

• Crash rate – 5.07
• Severity rate – 6.54
• Total crashes - 111

After 2019, 2020, 2021
• Crash rate – 3.61
• Severity rate – 4.02
• Total crashes - 79

Source: MnCMAT
Pedestrian and bicyclist crashes

Hennepin County
Total crashes

Hennepin County
Streetlight analysis
Average annual daily traffic

Average Annual Daily Traffic (AADT)

- H025 West
- H337 Middle
- H027 East

2014, 2018, 2021
Average speed distribution

Average Speed Distribution (35 MPH Speed Limit)

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<th>Year</th>
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<th>Westbound</th>
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<tr>
<td>2019-2021</td>
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Legend:
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40

Hennepin County
Average speed

Average Speed (35 MPH Speed Limit)

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<th>Westbound</th>
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<td>2019-2021</td>
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Hennepin County
### Average Corridor Travel Time

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**Hennepin County**
Average congestion

Hennepin County