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MEMORANDUM

Date: October 14, 2021
To: City of Baxter City Council
From: Aaron Warford, P.E.
Subject: 2022 Inglewood Drive Railway Crossing and Associated Roadway Improvements
City of Baxter

Background

Bolton & Menk is the design consultant for the City of Baxter on this 2022 Inglewood Drive Railway Crossing and Associated Roadway Improvements (Inglewood Drive) project (www.inglewooddrive.com). The project focuses on the relocation of the Knollwood Drive traffic signal and railroad crossing to Inglewood Drive, pavement rehabilitation on Foley Road, public utility improvements, and an improved configuration for the Forthun Road and Isle Drive intersection.

Discussion at the Public Hearing included questions related to the proposed roadway section of Foley Road. The proposed design reduces the roadway width from 29.5-ft (4-ft shoulder/12-ft lane/12-ft lane/1.5-ft gutter) to 26-ft (2-ft shoulder/11-ft lane/11-ft lane/2-ft gutter). In response to questions at the meeting, the design team noted that the proposed roadway section was in-line with generally accepted design practices for local streets with similar speeds and traffic volumes. We also stated that narrowing lane widths has the positive side effect of reducing vehicle speeds and improving safety for all modes of travel. The following documentation is provided to support the design decisions noted during the public meeting, as the concept of speed reduction and increased safety through right-sizing roadway widths was not accepted by all in attendance.

Documentation of Design Principles

Reconstruction projects are great opportunities to evaluate current and future roadway needs. Narrowing roadway sections, often referred to as a “road diet”, can provide numerous benefits including

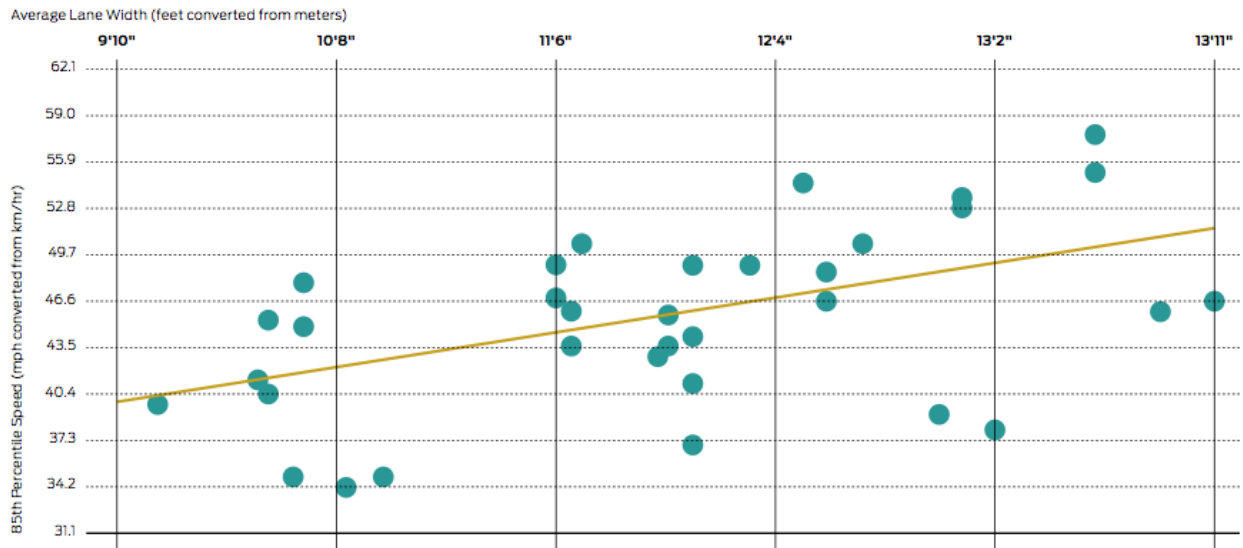
- Economic – decreased cost of construction
- Environmental – reduced impervious area to minimize runoff and improve water quality
- Maintenance – reduced annual and service life maintenance costs
- Safety – decreased speeds, reduced crash frequency and severity, and improved safety for other modes of transportation

Speed reductions are documented through observed behavior, reduced speed limits on narrower roadways, and by research findings. In general, reduced lane widths and constricted corridors affect driver behavior and slow down traffic. Barriers, curbs, walls, and obstructions have also been shown to reduce driver speeds. The following design guidance is generally accepted by highway designers and has become the standard practice for local roadway and highway corridors statewide.

MnDOT's Performance-Based Practical Design (PBD) guidance recommends lane widths of 10 feet for design speeds of 20 to 35 mph and 11 feet for 40 mph design speeds and greater. In general, 12-foot lanes are appropriate only on high-speed facilities; they're generally not suitable for low-speed streets due to their probable speed and safety disadvantages. The proposed section of Foley Road intentionally follows this guidance.

The **National Association of City Transportation Officials (NACTO)** provides similar guidance for urban and suburban street design. As noted in the graph below from the NACTO **Urban Street Design Guide**, research documents that wider travel lanes directly correlate to higher vehicle speeds.

Wider travel lanes are correlated with higher vehicle speeds.



"As the width of the lane increased, the speed on the roadway increased... When lane widths are 1 m (3.3 ft) greater, speeds are predicted to be 15 km/h (9.4 mph) faster."

Chart source: Fitzpatrick, Kay, Paul Carlson, Marcus Brewer, and Mark Woodridge. 2000. "Design Factors That Affect Driver Speed on Suburban Streets." *Transportation Research Record* 1751: 18-25.

— Regression Line
● 85th Percentile Speed of Traffic

NACTO recommends that lane widths "greater than 11 feet should not be used as they may cause unintended speeding and assume valuable right of way at the expense of other modes."

A **National Cooperative Highway Research Program (NCHRP)** report dating back to 1994 provided one of the first in-depth evaluations of reduced lane widths on vehicle speeds. The research utilized design guidance and standards from the Highway Capacity Manual and AASHTO to test lane widths and vehicle speeds. Their research states that 85th-percentile speeds, typically used to set speed limits in most states, on roads with 10-ft lanes were about 6 mph lower than speeds on roads with 12-ft lanes. These findings led to numerous modifications of design standards nationwide for both rural and urban roadways.

Numerous other studies and design standards reference the benefits of reducing roadway sections to decrease speed and increase safety. Including an in-depth FHWA study evaluating "road diet" measures and the effects on safety. A link to the summary report is provided below.

Name: Trevor Walter
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References

MnDOT PBPD Process and Design Guidance – <http://www.dot.state.mn.us/pbpd/design-guidance.html>

NACTO Urban Street Design Guide – <https://nacto.org/publication/urban-street-design-guide/street-design-elements/lane-width/>

NCHRP Report 362, Roadway Widths for Low-Traffic-Volume Roads –
https://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_362.pdf

FHWA Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries –
<https://www.fhwa.dot.gov/publications/research/safety/humanfac/04082/04082.pdf>