

**MEMORANDUM**

**Date:** August 24, 2021  
**To:** Trevor Walter, City of Baxter  
**From:** Mike Larson, P.E., Derek Arens, P.E.  
**Subject:** 2022 Inglewood Drive Railway Crossing and Associated Roadway Improvements  
RE: Foley Road and Knollwood Drive Turn Lane Recommendations  
City of Baxter, MN  
Municipal Project No.: 4121  
BMI Project No.: T42.120675

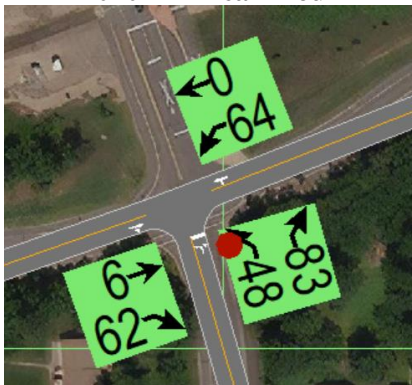
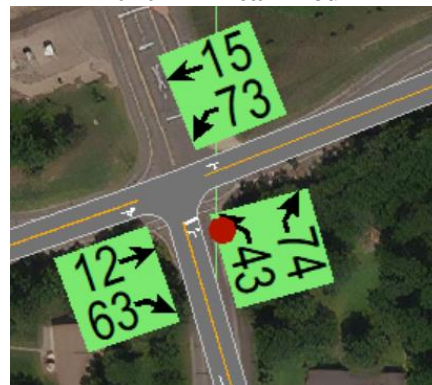
The 2022 Inglewood Drive Railway Crossing and Associated Roadway Improvements project features the closure of the north leg of the Foley Road at Knollwood Drive intersection and conversion to a sidestreet stop-controlled three-legged intersection with Knollwood Drive being stop-controlled. The City of Baxter has received requests for considering turn lanes at the proposed intersection and the following evaluation was conducted.

**Recommendation**

Considering commonly accepted guidance for warranting turn lanes finds that neither a left or right turn lane is warranted at the intersection of Foley Road and Knollwood Drive. The intersection features low posted speeds on all approaches, adequate sight lines, and low volumes on Foley Road. The proposed intersection will also feature lighting which further increases safety. Operations analysis found that no operational benefit would be gained in the construction of turn lanes at the intersection under forecasted traffic volumes. The costs of widening the roadway to accommodate the considered turn lanes are not likely to outweigh benefits given the low volumes on Foley Road.

**Justification**

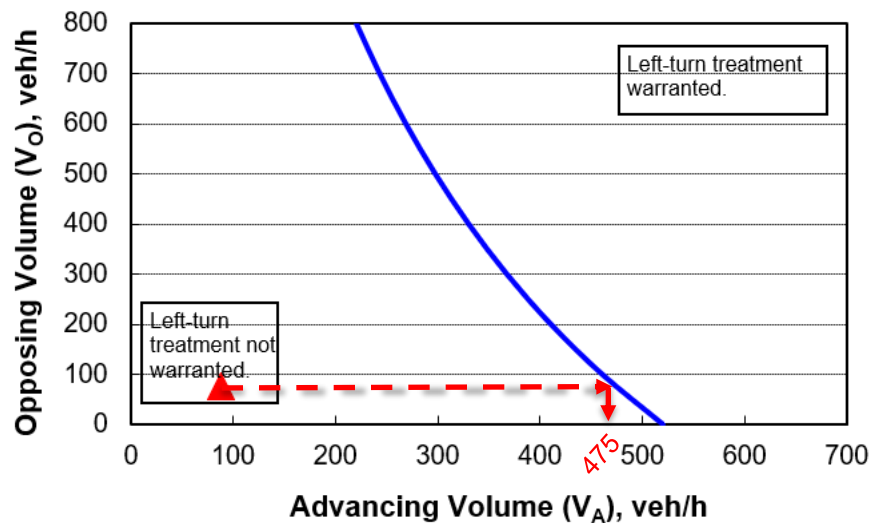
All analysis considered turning movement counts collected within the project area in October 2020 and account for redistributed traffic due to the project improvements. Forecasted peak hour turning movements under the build condition are shown below.

**2040 AM Peak Hour****2040 PM Peak Hour**

Guidance for turn lane warrants is provided from a number of sources and are applicable based on the jurisdiction and environment of the study intersection. MnDOT provides warrants for left turn, bypass and right turn lanes in the *MnDOT Access Management Manual*, however, these guidelines are more applicable to high-speed trunk highways.

Guidelines more applicable to the local, low speed, frontage road intersection is question are listed in National Cooperative Highway Research Program (NCHRP) Report 457: *Evaluating Intersection Improvements: An Engineering Study Guide*. Guidance listing in the report notes the potential operations and safety benefits in adding left turn lanes on major approaches to two-way stop-controlled intersections. Per this guidance, when considering 35 mph facilities with the forecasted traffic volumes, approximately 475 left turns per hour would be needed to warrant the installation of a left turn lane as shown in the graph below. This high number is due to the low speeds and low opposing traffic volumes on Foley Road. left turn volumes of 50 vehicles per hour or greater warrant left turn lane installations when the opposing volumes are greater than 100 vehicles per hour as shown in the table below. Under forecasted, redistributed volumes, this warrant is not met.

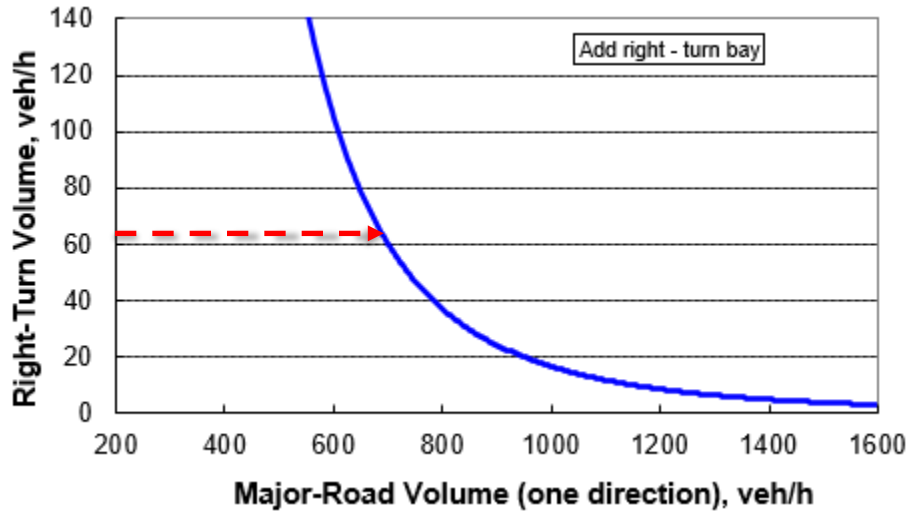
**Guidelines for warranting a major-road left turn lane bay**



Furthermore, an operations analysis of the intersection using *Highway Capacity Manual (HCM) 6<sup>th</sup> Edition* methodology, no discernable operations benefit is expected with the addition of a westbound left turn lane. Sidestreet delays are acceptable during both peak hours without a westbound left turn lane on Foley Road.

Warrants for right turn lanes are also listed in NCHRP 457 and are based on similar criteria. Per guidance listed for two-lane 35 mph roadways, Foley Road volumes are not high enough to meet right turn lane warrants as shown in the figure below. Major road volumes must grow well beyond expected levels to be within warranting per these guidelines.

### Guidelines for warranting a major-road right turn lane bay



Again, HCM operations analysis does not find any operational benefit in adding an eastbound right turn lane. Sidestreet delays are acceptable during both peak hours without an eastbound right turn lane on Foley Road. Furthermore, a private driveway located approximately 170 feet west of Knollwood Drive would be impacted with a properly designed right turn lane. A driveway located within a right turn lane is undesirable.