Literature Search: Right Turn Lane Safety Improvements for Pedestrians
April 28, 2020

Results
Title: Right and Left Turn Lane Warrants
Source and date: MnDOT Transportation Research Synthesis (2014)
Abstract: The genesis of this project stems from a perception by city and county engineers that there is a lack of guidance relative to the installation of right and left turn lanes along local road systems. An initial review found the MnDOT Road Design Manual (RDM) has guidance for when turn lane installation is warranted along the State’s roadway system, but the focus is reconstruction. Many times separated turning and through volumes are required in order to determine whether or not a turn lane is needed, as well as to determine the length of the turn lane. This lack of guidance for local systems may cause some agencies to miss out on opportunities to build turn lanes when needed, to work with the zoning (permitting) authority and/or to have a developer pay for the cost of a turn lane as part of their development project. CH2M HILL was asked to conduct a literature review to determine what existing turn lane guidance is available and being used by different agencies. The review focused on six key areas that local agencies are concerned with and encounter when deploying turn lanes on their road systems and include both long-term and short-term scenarios. Consistent with MnDOT Transportation Research Syntheses, the objective of this project is to search existing literature and how it relates to the topic of providing guidance for installing right and left turn lanes along local systems, but not about developing new guidance. The summary of those findings are in this report, along with suggested next steps, followed by the individual literature results.

Title: Safety Effect of Smart Right-turn Design at Intersections
Abstract: This article describes the development, implementation, and safety benefits of smart right-turns. The design consists of a narrow angle of channelization at approximately 70 degrees. A smart right-turn widens the cone of vision of the driver towards the pedestrians as well as the cross-traffic. Thus, smart right-turns allow for safer pedestrian crossing and also improve vehicle–vehicle interactions since the new approach angle affords drivers a better view of the traffic stream they are to merge with. As part of the Safety Improvement Program in the Austin Transportation Department, several smart right-turns were constructed at high crash intersections where high speed right-turns were found to be a contributing factor. This paper presents the state of the art techniques applied in planning, engineering, designing and construction of this smart right-turn, key factors driving the success, and lessons learned in the process. This paper focuses on the safety effect of smart right-turns at intersections and features significant crash reductions achieved from the application of smart right-turns using Empirical Bayes method. The result showed that smart right-turns can reduce overall right-turn crashes by 47 percent and severe right-turn crashes by 40 percent. Full text available upon request

Title: Safety of Channelized Right-Turn Lanes for Motor Vehicles and Pedestrians
Source and date: Transportation Research Record, issue no. 2398 (2013)
Abstract: The paper presents the results of research undertaken to evaluate how the safety performance of intersection approaches with channelized right-turn lanes compares with that of intersection approaches with conventional right-turn lanes or shared through and right-turn lanes. Crash data for nearly 400 intersection approaches in Toronto, Ontario, Canada, including intersection approaches with channelized right-turn lanes, conventional right-turn lanes, and shared through and right-turn lanes, were analyzed to compare the safety performance of the three right-turn treatment types. The research results indicate that intersection approaches with channelized right-turn lanes appear to have similar motor vehicle safety performance as approaches with conventional right-turn lanes or shared through and right-turn lanes. This result was found both at the downstream end of the channelized right-turn lane (where the right-turning vehicle merges with the cross street traffic) and at the upstream end of the channelized right-turn lane (where the right-turning vehicle begins the right-turn maneuver). Intersection approaches with channelized right-turn lanes also appear to have similar pedestrian safety performance as approaches with shared through and right-turn lanes. Intersection approaches with conventional right-turn lanes have substantially more pedestrian crashes (approximately 70% to 80% more) than approaches with channelized right-turn lanes or shared through and right-turn lanes.

This older paper doesn’t mention pedestrians:
Title: Safety Effectiveness of Intersection Left- and Right-Turn Lanes
Source and date: Transportation Research Record, issue no. 1840 (2003)
Abstract: This paper presents the results of research on the safety effectiveness of installing left- and right-turn lanes for at-grade intersections. Geometric design, traffic control, traffic volume, and traffic accident data were gathered for a total of 280 improved intersections as well as 300 similar intersections that were not improved during the study period. The types of improvement projects evaluated included installation of added left-turn lanes, added right-turn lanes, and extension of the length of existing left- or right-turn lanes. An observational before-and-after evaluation of these projects was performed by using several alternative evaluation approaches. http://dx.doi.org/10.3141/1840-15

Full text available upon request