Transportation Association of Canada's Requirements for a Left Turn Phase

The City of Saskatoon implements left turn phases in accordance with the guidance provided by the Transportation Association of Canada. The Manual of Uniform Traffic Control Devices for Canada (June 2021) provides a detailed assessment of the requirement for a left turn phase, outlined below.

Criteria A1 and A2 indicate special conditions for which a protected left turn phase is recommended. Criteria B1 to B3 describe negative impacts which may indicate that a protected left turn phase is undesirable. Criteria C1 to C3 describe conditions under which a protected left turn phase is warranted.

PART A: Mandatory Conditions Criteria

Under the following special conditions, a protected left turn phase is recommended regardless of whether or not the warrant and negative impact criteria are satisfied:

A1. Railway or public transit vehicles operate in an exclusive right of way in the median which is parallel to the left turn lane, or

A2. Double left turns are permitted where there is an opposing through movement.

PART B: Negative Impact Criteria

Unless criterion A1 or A2 is satisfied, a protected left turn phase would be undesirable if any one of the following negative impact criteria is met:

B1. There is insufficient green time within the current cycle length to accommodate the proposed protected left turn phase. This is based on an operational analysis that quantifies the effect of the new phase on volume-to-capacity ratios and vehicle delay. Furthermore, a longer cycle length may not be practical due to system considerations,

B2. The protected left turn phase encourages neighbourhood traffic infiltration, or

B3. An assessment of the proposed protected left turn phase demonstrates that when implemented, significant undesirable effects in terms of stops, delay, or increased fuel consumption will result such that the anticipated positive safety effects would not be justified.

PART C: Warrant Criteria

If PART A is not satisfied and there are no negative effects as per PART B, a protected left turn phase is warranted if any one of the following warrant criteria is satisfied:

C1. (a) and (b) are satisfied,
C2. (a) and (c) are satisfied, or
C3. (a) and any two of (d), (e) or (f) are satisfied.

The warrant criteria are as follows:

a) The average left turn demand is at least three passenger car units (pcu) per cycle throughout the peak hour. Vehicles may be converted to pcu by using a factor of one truck or bus equals two pcu. If detailed truck classification information is available, then a more accurate conversion may be undertaken for single unit trucks (= 1.5 pcu), multi-unit trucks (= 2.5 pcu), and heavily loaded multi-unit trucks (= 3.5 pcu).

b) More than 25 percent of the left turn volume is delayed by more than one signal cycle during the peak hour.

c) The total number of left turn collisions that have occurred satisfies one of the following:

    (i) During the hours of the left turn study period (see below) within the past five years, the number of left turn collisions is greater than six,

    (ii) During the hours of the left turn study period within the past 12 months, the number of left turn collisions is greater than two,

    (iii) During all 24 hours of the day within the past five years, the number of left turn collisions is greater than 20, or

    (iv) During all 24 hours of the day within the past 12 months, the number of left turn collisions is greater than five.

    The study period outlined above refers to the actual hours of the day for which the protected left turn phase is being considered, such as the a.m. peak period or the p.m. peak period, for example. If two or more study periods are being analyzed, then the above-noted thresholds should be adjusted accordingly. For instance, if both a.m. and p.m. peak periods are under consideration, then the thresholds should be doubled to 12 collisions within five years, and four collisions within 12 months.

d) The average number of left turns which clear during the intergreen exceeds two pcu per cycle.

e) On an approach with:

    (i) A single through lane: Over the course of an hour, the queue from an exclusive left turn lane spills back and blocks the adjacent through lane during more than 10 percent of the cycles, or

    (ii) Two or more through lanes: Over the course of an hour, the queue from an exclusive left turn lane spills back and blocks the adjacent through lane during more than 30 percent of the cycles.

f) The left turn transit demand exceeds three in-service vehicles per hour.

If the requirement for a protected left turn phase cannot be demonstrated using any warrant criterion other than queue spillback, consideration should be given to extending the left turn lane rather than implementing the protected left turn phase. If the requirement for a left turn phase cannot be demonstrated using any warrant criterion other than collision history, other measures such as horizontal realignment for better sight distance, increase of the clearance times, etc. should be fully explored prior to installing the protected left turn phase, recognizing that a protected left turn phase has significant safety benefits in terms of pedestrian and angle/turning collisions.