

TECHNICAL MEMORANDUM

DATE: December 30, 2021
TO: Kendra Dedinsky, PE, PTOE, City of Shoreline
FROM: Alex Atchison, PE, PTOE
Emily Welter, PE
SUBJECT: Multi-Way Stop Control Evaluation at 25th Avenue NE/NE 153rd Street
PROJECT NUMBER: 554-3485-005

The City of Shoreline received a request to review the intersection of 25th Avenue NE and NE 153rd Street for a change in stop control. This memo evaluates the change from a two-way stop control to a multi-way stop control at this intersection.

ROADWAY NETWORK

25th Avenue NE is a two-lane collector arterial running north-south with a posted speed limit of 30 mph. The east leg of the intersection is NE 153rd Street, a two-lane local secondary street with a posted speed limit of 25 mph. The west leg of the intersection is one of four driveways along 25th Avenue NE that are used to access Shorecrest High School.

DATA COLLECTION

Traffic volume and crash data was collected to be used in the multi-way stop control evaluation. Tube counts were collected along 25th Avenue NE south of NE 153rd Street for 7 days in September 2021 and included traffic volume and speed data. Intersection turning movement counts were collected on Tuesday, December 14, 2021 during the AM and PM peak hours. Since the study intersection provides access to Shorecrest High School, the turning movement counts were collected when traffic is coming to and from the high school. On full school days, the morning bell is at 7:50am and the afternoon bell is at 2:35pm, so volumes were collected during 7-9am and 2-4pm. All school days are full days except for Wednesday, which is an early release day. Crash data was collected from WSDOT for the 10-year period from January 1, 2010 to December 31, 2020.

EVALUATION

A multi-way stop at the intersection of 25th Avenue NE and NE 153rd Street was evaluated according to Section 2B.07 of the 2009 Edition of the *Manual on Uniform Traffic Control Devices* (MUTCD). The MUTCD states that the decision to install a multi-way stop control should be based on an engineering study. The engineering study should consider four criteria when deciding to install multi-way stop control, and if one of the four criteria is satisfied, then it is appropriate to install a multi-way stop control.

Criteria A

Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

This location does not meet MUTCD signal warrants due to low traffic volumes. Both the PM peak hour and school crossing signal warrants were evaluated and neither condition was met. Additionally, the City of Shoreline has no plans to install a traffic signal at 25th Avenue NE and NE 153rd Street, so **Criteria A is not satisfied**.

Criteria B

Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

Between 2010 and 2020, three crashes were recorded at the intersection of 25th Avenue NE and NE 153rd Street, two in 2013 and one in 2018. There have not been five or more reported crashes in a 12-month period at the intersection, so **Criteria B is not satisfied**.

Criteria C

Minimum volumes:

1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*

Criteria C.1 and C.2

The December 2021 turning movement counts were first evaluated to determine if the combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches would meet the threshold of 200 units to satisfy Criteria C.2. During the AM peak hour, the combined volume was 89 units and during the PM peak hour, the combined volume was 190. Since neither peak hour volume meets the threshold of 200 units, it is unlikely that this threshold will be met during 8 other hours in an average day. Since Criteria C.1 and Criteria C.2 must both be met to satisfy Criteria C, **Criteria C is not satisfied**.

Criteria C.3

Speed data was collected along 25th Avenue NE south of NE 153rd Street for 7 days and the 85th percentile speed for both directions during the 7-day period was 34 mph. **Criteria C.3 is not satisfied**, so Criteria C.1 and C.2 must both be satisfied to the full extent.

Criteria C is not satisfied.

Criteria D

Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

In order for Criteria B to be satisfied to 80 percent of the minimum values, there must have been four or more reported crashes in a 12-month period at the intersection. Between 2010 and 2020, the largest number of crashes in a single year was two. **Criteria D is not satisfied**.

Other Criteria

The MUTCD cites additional criteria that may be considered as part of the multi-way stop control evaluation. This criteria includes:

- A. *The need to control left-turn conflicts;*
- B. *The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;*
- C. *Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and*
- D. *An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.*

None of these other criteria are applicable to the intersection of 25th Avenue NE and NE 153rd Street.

RECOMMENDATION

Based on the collected volume and crash data, none of the criteria listed in the MUTCD for installing a multi-way stop control are satisfied. The intersection of 25th Avenue NE and NE 153rd Street should remain a two-way stop-controlled intersection. The City of Shoreline could consider other options to improve pedestrian safety at the intersection, such as crossing guards or flashing beacons.