



TRANSPORTATION IMPROVEMENT ASSOCIATION

100 E. Big Beaver Rd., Suite 910, Troy, Michigan 48083
Office (248) 334-4971 • Fax (248) 475-3434
www.tiasafety.us

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November 13, 2018

Mr. James Breuckman
City Manager
City of Pleasant Ridge
23925 Woodward Avenue
Pleasant Ridge, Michigan 48069

RE: Woodward Heights and Bermuda Avenue / Bermuda Street

Dear Mr. Breuckman:

At your request, the Transportation Improvement Association (TIA) conducted an evaluation for the Woodward Heights Boulevard and Bermuda Avenue / Street intersections. The objective was to determine if all way stop control is appropriate at the present location or either intersection. Our evaluation included 24 hour vehicular approach counts, an examination of the crash history, and a field visit of the site.

TRAFFIC VOLUMES

In September of 2018, 24-hour traffic volumes counts were collected for Woodward Heights Boulevard and Bermuda Avenue and Bermuda Street (see Figure 1). The daily traffic on Woodward Heights Boulevard is approximately 3,600 vehicles per day. Bermuda Avenue has a daily volume of approximately 250 vehicles.

Bermuda Street has a daily traffic volume of 1,850 vehicles. During the school dismissal period, an hourly directional flow of 109 vehicles (northbound) is experienced. On Woodward Heights the corresponding hourly flow is 95 vehicles eastbound and 164 westbound. Based on counts at University High, 10 pedestrians are expected to cross north-south across Woodward Heights during that hour.

CRASH HISTORY

The three-year crash history (2015-2017) was examined for the intersections. During this time period three (3) crashes are reported in the vicinity of the intersection Bermuda Avenue intersection. One of the crashes appears to be mis-located and belongs at Bermuda Street (a westbound left turn / sideswipe). The remaining crashes included one (1) rear end crash and one collision with an eastbound bicycle in the crosswalk.

Bermuda Street has two (2) crashes reported. One crash appears to be mis-located as it was east of the railroad crossing towards Horton Street. The other crash is a rear end crash where an eastbound left turn vehicle was hit.

The total appears that there are two (2) crashes at each intersection over the three year period. The bicyclist crash was an injury crash and the remaining were property damage only.

SITE OBSERVATION

A field visit of the site was conducted in October of 2018. The general site conditions and surrounding property were noted as follows:

- The Bermuda Avenue Intersection is a tee intersection, with all-way stop control. Bermuda Street intersection is a tee intersection with one way stop control (northbound).
- Both roadways are two way roads with parking allowed on both sides.
- Adequate sight distance exists at the Bermuda Avenue intersection. The northbound approach of Bermuda Street has limited sight distance to the right due to a zero lot line building on the southeast corner.
- ADA compliant crosswalk ramps are present on the north and west legs of the Bermuda Avenue intersection. A marked crosswalk is present on the west leg of Bermuda Street.

CONCLUSION

The total daily entering volume is greater than 2,000 units thus traffic control (stop or yield) is needed for the intersection(s). Neither intersection meets the minimum volume criteria laid out in MMUTCD 2B.07, which requires 300 vehicles per hour and 200 vehicles per hour, needed for 8 hours on the major and minor streets respectively. Additionally, the crash history does not have five (5) crashes in a 12-month period (or is expected to have at Bermuda Avenue).

If the optional criteria were also reviewed for both intersections. The daily traffic imbalance in approach volumes indicate it is not met has the improved operational characteristics. Certainly in the case of Bermuda Avenue, where the volume is greatly less than that on Woodward Heights.

The examination of hourly volumes at Bermuda Street do have some semblance of balance during the school dismissal hour. In that case the eastbound and northbound volumes are similar, with northbound vehicular and non-motorized volume exceeding eastbound volume (119 versus 95).

The sight distance restriction on the northbound approach of Bermuda Street is inadequate when a vehicle is stopped at the stop bar. Vehicles need to roll forward, encroaching on the east-west crosswalk, to gain visibility to the right. While this is expected behavior for the motorist it does create a conflict with pedestrians.

RECOMMENDATIONS

The all way stop control should be removed and one way stop control (southbound) installed at Bermuda Avenue. Pedestrian crossing assemblies (warning sign with down arrow) should be installed for the west leg of Woodward Heights Boulevard.

All way stop control should be installed at the Bermuda Street intersection. Additionally, stop bars and crosswalk pavement markings should be installed at the intersection.

If you have any questions, or if we can be of any further assistance, please don't hesitate to contact us at (248) 334-4971. Thank you for your continued commitment to public safety.

Respectfully,

A handwritten signature in black ink, appearing to read "Patrick Cawley". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

PATRICK M. CAWLEY, P.E., PTOE
Chief Operating Officer
Transportation Engineering

Section 2B.06 STOP Sign Applications*Guidance:*

- 01 *At intersections where a full stop is not necessary at all times, consideration should first be given to using less restrictive measures such as YIELD signs (see Sections 2B.08 and 2B.09).*
- 02 *The use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:*
- A. *The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;*
 - B. *A restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street or highway; and/or*
 - C. *Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.*

Support:

- 03 The use of STOP signs at grade crossings is described in Sections 8B.04 and 8B.05.

Section 2B.07 Multi-Way Stop Applications**Support:**

- 01 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.
- 02 The restrictions on the use of STOP signs described in Section 2B.04 also apply to multi-way stop applications.

Guidance:

- 03 *The decision to install multi-way stop control should be based on an engineering study.*
- 04 *The following criteria should be considered in the engineering study for a multi-way STOP sign installation:*
- 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.*
 - 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.*
 - 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.*
 - 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.*

Option:

- 05 Other criteria that may be considered in an engineering study include:
- 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.