

MEMORANDUM

TO: City Council

FROM: Alfred D. Lott, City Manager

SUBJECT: All-Way Stop Warrants

DATE: August 1, 2019

All Way Stop Warrants: In 1992, City Council, by resolution, adopted a policy concerning the installation of multiway stop signs. Staff has been asked whether the policy remains appropriate, and whether multi-way stops could be added as a traffic calming measure.

Staff consulted with a traffic consultant, Sabra & Associates, Inc. for recommendations. Sabra compared the City's 1992 multi-way stop policy with several other jurisdictions, and against criteria provided by Federal Highways Administration and the Maryland Department of Transportation. In summary, the recommendations, which staff agrees with:

- The current City policy is for multi-way stops is appropriate and reasonable.
- Some minor changes to the existing policy's supplemental conditions for multi-way stops are recommended.
- Stop signs do not lower roadway speeds and are not traffic calming devices.

The consultant's recommended changes to the City's supplemental warrants for multiway stops have not yet been fully evaluated, so no change in the current policy is recommended at this time.

Attached are the memo report from the consulting firm Sabra & Associates, Inc. and the City's existing multi-way stop policy.

ADL/GS

Bowie Supplemental All-Way Stop-Control Warrants Memorandum

EXECUTIVE SUMMARY

The Maryland Supplement to the Manual on Uniform Traffic Control Devices (MdMUTCD 2011) provides initial guidance for installation of a multiway, or all-way stop control (AWSC). The City of Bowie has developed supplemental criteria for evaluation of potential AWSC locations. A review of the supplemental all-way stop control warrants was performed for the City of Bowie, and other jurisdictions to assess what type of supplemental criteria other agencies may use and how it is applied to evaluate the need for multi-way stop signs. This research concludes that **the current Bowie policy is appropriate, meets reasonableness within the framework of the MUTCD and Maryland Motor Vehicle Code, and should be updated and applied to future traffic studies seeking to install an all-way stop.** The following paragraphs summarize the preliminary findings and specific recommendations.

Background

The City of Bowie has a supplemental all-way stop control policy that went into effect in 2000 through a Resolution of the Council of the City of Bowie, Maryland (R-49-92). It serves to provide additional guidance to account for local traffic, roadway and land use context in the evaluation of the need for an all-way stop controlled intersection. Stop signs can be a helpful tool when used properly. An extensive body of research as well as day-to-day traffic engineering practice has concluded that some of the advantages of AWSC control include:

- Helps drivers and pedestrians at an intersection decide who has the right-of-way
- Assists pedestrians and bicyclist crossings by stopping one or more approaches of traffic
- Mitigates left-turn and right-angle crashes
- Cost less to install than roundabouts or traffic signals
- Provides interim control of an intersection in need of a traffic signal

However, some of the disadvantages of installing a stop sign or potential negative consequences of AWSC that have been found include:

- Stop signs do not lower roadway speeds and are not traffic calming devices.
- Unwarranted stop signs make drivers stop more frequently, often resulting in driving faster between intersections.
- Stop-controlled locations tend to have higher crash rates for left turning vehicles than traffic signals or roundabouts on larger multi-lane approaches/intersections.
- Unwarranted stop signs discourage obedience and encourage the use of alternate routes, increasing neighborhood cut-through volumes and disrupting through traffic flow.
- Intersections lose effectiveness by adding unnecessary delay to motorists at unwarranted stop-controlled intersections.
- Frequent stops increase vehicle operating costs through increased fuel consumption and general wear and tear on a vehicle.
- Frequent stops increase exhaust fumes, associated hydrocarbons, and noise pollution.

Authority

The City of Bowie has authority to use a supplemental multiway stop evaluation policy as long as that policy is consistent with the MdmUTCD.

Per Section 25-102 of the Maryland Code, the provisions of the Maryland Vehicle Law do not prevent local authorities from regulating traffic by means of traffic control devices or designating any intersection as a stop intersection. Section 25-106 further states that each traffic control device shall conform to the manual and specifications of the Maryland DOT State Highway Administration.

Peer Jurisdictions: Supplemental Criteria

Many other jurisdictions apply supplemental criteria to the MUTCD for warrants. For example, the District of Columbia DOT uses a scoring matrix created to aid in the decision-making process for the installation of a HAWK signal (or pedestrian hybrid beacon). In addition to the criteria listed in the MUTCD (mainly pedestrian and vehicle volumes), DC DOT has added proximity to key land uses, crash history, bus stop presence and use, and distance to nearest signalized crosswalk, among other conditions. The additional information helps prioritize locations that may meet the MUTCD warrants based on more site-specific characteristics.

Peer Jurisdictions: AWSC Criteria

A review of peer jurisdictions with similar AWSC supplemental criteria was conducted. The following locations were included:

- State DOTs – Pennsylvania and Wisconsin
- County DOTs - Montgomery County, MD
- Municipalities - Greensboro, NC Naperville, IL, Dallas, TX, Portland, OR and the California cities of Anaheim, Concord, Escondido, Sacramento, and San Diego

Generally, three criteria stood out as used by most of these jurisdictions: crash rates, quantified thresholds for sight distance deficiencies, and traffic volume distribution by approach. Bowie includes these three criteria in the existing supplemental analysis.

Additional supplemental criteria used by jurisdictions other than Bowie are:

- Pedestrian and bicycle volumes - Anaheim and San Diego consider the number of pedestrians crossing the major street during multiple hours.
- Traffic operations - Wisconsin DOT examines the impact on mobility, i.e. will the high-volume major street experience significant delays for the benefit of reducing delays for a low-volume side street?
- Average Daily Traffic Volumes
- Functional classification and network design – Wisconsin DOT requires the two streets under study to be of equal or within one level of functionality. Concord and Escondido California discount the MUTCD volume requirements if the adjacent land uses are residential, if the streets are local and if there is long distances between adjacent multiway stops.

A matrix summarizing the peer review is appended.

Review of All-Way Stop Control Warrants

A review of the Bowie supplemental all-way stop criteria was conducted for appropriateness and consistency with the MdMUTCD.

Section 2B.07 of the MdMUTCD specifies guidelines that may be used in applying engineering judgment to the application of all-way stop control at an intersection. There are three main criteria that, if met, may warrant an all-way stop: as an interim measure for a signal, high crash history, or minimum volumes. Additionally, four optional criteria are included for consideration during an engineering study: need to control left-turn conflicts, need to control vehicle/pedestrian conflicts, poor sight distance, and to improve traffic operations.

The City of Bowie has expanded these MdMUTCD warrants to add 1) unusual road design, 2) the presence of youth facilities children, 3) proximity to high-volume generators, 4) an identifiable history of high police enforcement or accident investigation efforts, and 5) weighted volume criteria.

The MdMUTCD already has criteria that covers poor sight distance, such as is addressed in **Supplemental Warrant 1** (Unusual Road Design Conditions Resulting in Reduced Sight Distance) as curves and hills. MdMUTCD Option C states, "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". This definition is broader than "curves" and "hills" as specified by the City, which makes this supplemental warrant redundant.

Supplemental Warrant 2 (Presence of Youth-Oriented Facilities) may improve options for pedestrians, particularly young ones, to access schools and playgrounds. Pedestrian volumes may not be high enough at a two-way stop to meet a warrant but more vulnerable pedestrian populations may benefit from the dedicated right-of-way provided by an AWSC to safely cross the intersection.

Supplemental Warrant 3 (Proximity of High Traffic Volume Generator) may also be redundant to the MUTCD volume warrant. If a high traffic volume generator such as a shopping center is nearby, then the volume warrants should be sufficient to record traffic volumes at the intersection without the need to define "proximity" or the type of generator.

Supplemental Warrant 4 (Identifiable History of High Police Enforcement for Speeding Violations and Accident History) is partially included in the existing MdMUTCD warrants. An accident history of five or more reported crashes susceptible to correction by a multi-way stop is included as Guidance 4B. However, often times there are near collisions or unreported crashes that may be correctible through an all-way stop. This supplemental warrant does not specify what constitutes a "high" level of enforcement. Frequent police enforcement of speeding may increase support for installation of a stop sign; although, a stop sign should not be used alone to control speeds (per Section 2B.04.05 of the MdMUTCD).

Additional volume criteria are listed for **Supplemental Warrant 5** (Volume Criteria) and points are given depending on the average AM and PM peak hour total volume and the percent difference between streets. In areas without pedestrian and bicycle traffic, an intersection must

have 500 vehicles per hour for eight hours in an average day (300 major street, 200 minor street). In the supplemental criteria, an intersection that averages 501 vehicles per hour for only two hours is eligible for the highest ten points. This criterion increases the ease with which the warrant may be met. Part B is logical, giving a higher value to an intersection with a nearly equal split in major and minor street traffic while less weight is given to cases with a higher difference in percent of traffic.

Case Study Review

A review of the supplemental City criteria for AWSC was performed for several recent analyses of AWSC requests. The supplemental criteria are intended to reduce the implementation of AWSC as a traffic calming measure. The weighted scoring system requires a minimum of 50 points to meet eligibility for AWSC implementation. Specific guidance is not provided on how to assign points for some categories, e.g. for category 4, history of high police enforcement, would only a few citations earn all 10 points or would there need to be a certain threshold? In some previous scoring sheets, an 85th-percentile speed was used to determine if there is a speeding issue and assign points.

The intersection of Belair Drive and Stonybrook Drive met the MdMUTCD warrants for AWSC based on the entering volume on the major and minor streets and the total combined entering volume, but did not meet the City's point threshold for supplemental criteria. In completing the supplemental evaluation, 10 points were assigned for the presence of a bike lane and 10 points were awarded for average AM and PM total entering volume greater than 500 vehicles for a total of 20 points.

The intersection of Belair Drive and Kenhill Drive also met the MdMUTCD warrants for AWSC based on the entering volume on the major and minor streets and the total combined entering volume, but did not meet the City's point threshold for supplemental criteria. In completing the supplemental evaluation, 10 points were assigned for the horizontal curve to the west, 10 points were assigned for the presence of a bike lane and 10 points were awarded for average AM and PM total entering volume greater than 500 vehicles and 5 points were assigned for the difference in major and minor street volumes for a total of 35 points.

In comparison, the intersection of Jenkins Ridge Road and Jennings Mill Drive did not meet the MdMUTCD warrants but scored a total of 18 points based on roadway curvature (5 points), youth oriented facilities (2 points), and high speeds/ enforcement (2 points) and traffic volume totals/ approach distribution (1 point and 8 points, respectively).







Although open to interpretation, the locations that did meet MdMUTCD warrants would be expected to score higher using the City's supplemental criteria and points system than those that did not.

Recommendations

The following recommendations should be considered.

- Supplemental Warrant 1 – Remove or quantify the minimum sight distance deficiency threshold for implementing AWSC.
- Supplemental Warrant 3 - Remove or alternatively adopt a 20% discount of the volume criteria if any adjacent land uses are commercial, or require an origin-destination study to document a significant presence of non-local traffic is related to the unique commercial generator.
- Supplemental Warrant 4 - Consider requiring a speed study to support police evidence for speeding; include a table or point system for number of miles per hour in excess of posted speed. Confirm adequacy of posted speed and consider alternate traffic calming techniques first. Additionally, the warrant should specify that AWSC should not be used for speed control on a major street or at a T-intersection. Remove accident history or specify additional types/number of crashes or enforcement required.
- Supplemental Warrant 5 - Update point system or intersection volume levels
- **Consider adding** a supplemental warrant for traffic operations.
 - Amount of delay added to the major road compared to the benefit in reduced delay given to the minor street.
 - Consider whether an alternate lane geometry would improve conditions, such as removing right turn volumes from the analysis by providing a separate right-turn lane.
 - Proximity to other locations with traffic control (neighboring intersections with signal or stop control) should be considered to help meet driver expectations, specifically spacing of multiway stops, and consistency between traffic control types (AWSC, signals, and roundabouts).

	City of Bowie	WisDOT	PennDOT	Anaheim, CA	Concord, CA	Escondido, CA	San Diego, CA
Supplemental Criteria							
Crash Rates	✓			✓			✓
Traffic Volume Distribution by Approach	✓			✓	✓	✓	✓
ADT	✓	✓					✓
Pedestrian and Bike Volumes				✓			
Land Use/ Street Design	✓	✓			✓	✓	
Approach Speeds	✓						
Sight Distance	✓		✓		✓	✓	
Traffic Operations		✓					
Other Specifications							

Supplemental Criteria	Naperville, IL	Greensboro, NC	Dallas, TX	Sacramento, CA	Montgomery County, MD	Portland, OR
						
Crash Rates	✓		✓	✓	✓	✓
Traffic Volume Distribution by Approach	✓	✓	✓	✓		
ADT						
Pedestrian and Bike Volumes	✓					
Land Use/ Street Design	✓		✓			
Approach Speeds	✓		✓	✓		
Sight Distance	✓		✓	✓	✓	
Traffic Operations	✓		✓			
Other Specifications	✓			✓		

RESOLUTION
OF THE COUNCIL OF THE CITY OF BOWIE, MARYLAND
ADOPTING A POLICY CONCERNING THE
INSTALLATION OF MULTIWAY STOP SIGNS

WHEREAS, the Council of the City of Bowie desires to provide guidance for the evaluation of circumstances relating to the installation of multiway stop signs within the City; and

WHEREAS, the City of Bowie frequently receives requests from citizens for the installation of multiway stop signs on residential streets; and

WHEREAS, citizens petition the City for the installation of these signs believing that such signs will reduce speed and traffic volume, and improve safety; and

WHEREAS, transportation data and research indicate that multiway stop signs installed at unnecessary locations actually serve to increase speeds after the stop, and increase the potential for accidents; and

WHEREAS, the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) published by the U.S. Department of Transportation, and adopted by the Maryland Department of Transportation, provides generally accepted warrants for the installation of multiway stop signs; and

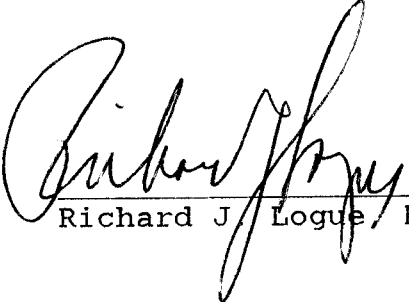
WHEREAS, the MUTCD provides a reliable tool for determining where multiway stop signs should or should not be installed; and

WHEREAS, the City Council deems it appropriate to add local warrants to the standards included within the MUTCD and to consider those local additions in its evaluation of multiway stop sign placement situations; and

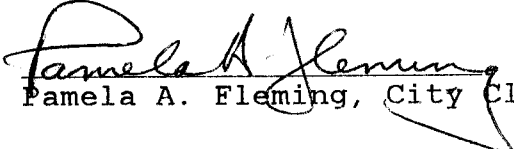
WHEREAS, those local additional warrants will include, but may not be limited to, the presence of unusual road design conditions such as curves or hills which result in reduced sight distance, the presence of youth oriented facilities such as playgrounds, bike trails or schools, the proximity of high traffic volume generators such as shopping centers, or an identifiable history of high police enforcement or accident investigation efforts.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Bowie, Maryland that, in its evaluation of requests for the installation of multiway stop signs, it shall use the warrants as established in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as published by the U.S. Department of Transportation and adopted by the Maryland Department of Transportation, as well as local warrants developed in a substantially similar form to those as attached hereto as Exhibit "A" and incorporated herein by reference, and as may be revised from time to time, as aids in determining whether a multiway stop shall be installed at a certain location.

INTRODUCED AND PASSED at a meeting of the Bowie City Council on November 2, 1992.


Richard J. Logue, Mayor

Attest:


Pamela A. Fleming, City Clerk

ALL WAY STOP EVALUATION WORKSHEET

Intersection _____
(Major) (Minor)

Qualified for All-way Stop based on 50 or more points:

Yes _____ No _____ Points _____

Qualified for All-way Stop based on MUTCD warrants:

Yes _____ No _____

Attach sketch of Intersection with Visibility Data.

Local Warrant

	Points	Possible
1. Unusual Road Design Conditions Resulting in Reduced Sight Distance		
a. Curves	_____	10
b. Hills	_____	10
2. Presence of Youth Oriented Facilities.		
a. Playground/Bike Trail	_____	10
b. Schools	_____	10
3. Proximity of High Traffic Volume Generator		
a. Shopping Center	_____	10
b. Other	_____	10
4. Identifiable History of High Police Enforcement For:		
a. Speeding Violations	_____	10
b. Accident History	_____	10

5. Volume Criteria

a. Average AM and PM Peak Hour Total Intersection Volume

Vehicles	Points	Possible
501 or More		10
451 - 500		9
401 - 450		8
351 - 400		7
301 - 350		6
251 - 300		5
201 - 250		4
151 - 200		3
101 - 150		2
51 - 100		1
50 or Less		0
Subtotal	_____	

b. Traffic Volume Difference (Percent of Traffic on Major Street)

Percent of Traffic	Possible
50 - 54	10
55 - 58	9
59 - 62	8
63 - 66	7
67 - 70	6
71 - 74	5
75 - 78	4
79 - 82	3
83 - 86	2
87 - 90	1
91 or More	0
Subtotal	_____
Total	100