



**Multi-Way Stop Warrant Analysis**  
Gosnold Street at Andover Street Intersection  
September 6, 2023

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Petition:	Councilor Candy Mero-Carlson on behalf of Amelia O'Brian request installation of four-way stop signage at the intersection of Gosnold St. and Andover St.  # 8s CC April 26, 2022
Scheduled Committee Hearing:	September 20, 2023 Traffic & Parking Committee, Item 7c
Prepared by:	Scott W. Galbraith, PE, Senior Traffic Engineer

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In response to a Council petition requesting multi-way stop control (aka all-way stop), the Department of Transportation & Mobility (DTM) has conducted an evaluation of conditions at the intersection of Gosnold Street and Andover Street. Presently, the intersection operates with stop sign control on the minor street approaches of Andover Street only.

Multi-way stop control can be an effective way to address intersection safety under certain conditions. These include conflicts between road users - including pedestrians, bicyclists, and motorists - who experience difficulty navigating an intersection safely due to opposing traffic volumes or limited sight distance. Stop signs are not appropriate for traffic calming purposes and can reduce safety when applied in inappropriate conditions.

Installation of multi-way stop control is governed by criteria established by the Manual of Uniform Traffic Control Devices (MUTCD) and Massachusetts amendments to the manual promulgated by the Massachusetts Department of Transportation (MassDOT). The MUTCD is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and is the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel. Chapter 85 Section 2 of the Massachusetts General Laws further establishes that signs, traffic control signals, traffic devices, school zones, parking meters or markings on any way must be in conformance with the MUTCD, as amended.

### Summary

Analysis of the intersection of Gosnold Street and Andover Street found that multi-way stop-control warrants are not met, primarily due to very low traffic volumes on Gosnold Street.

Given that more targeted proven safety countermeasures are available and multi-way stop control warrants are not satisfied, **DTM does not recommend installation of multi-way stop control** at this location.

Instead, DTM recommends that the following actions be taken:

- Trim lower branches of tree on the eastern curb line just north of the intersection.
- Extend 20-foot statutory no parking zone on the eastern curb line north of the intersection to 40 feet to improve sight distance for approaching Andover Street westbound traffic.
- Repair damaged Stop sign on the northeast corner of the intersection (Andover Street westbound approach).
- Install stop line pavement markings on eastbound and westbound Andover Street approaches.

## **Background**

The intersection of Gosnold Street and Andover Street is a combination of roadway functional classes. Gosnold Street to the North and Andover Street to the East are Local roadways. Andover Street to the West and Gosnold Street to the South are Urban Collectors. Gosnold Street is the major street of this intersection, with stop control only provided for both Andover-Street approaches.

All approaches to the intersection accommodate two-way traffic with one travel lane in each direction. There are no apparent parking restrictions near the intersection, other than the statutory no-parking zones 20-feet from the intersection along all approaches and departures.

There are no crosswalks at this intersection but sidewalks are present on all corners, extending into other parts of the neighborhood. There are some other pedestrian accommodations, such as ramps and a single detectable warning panel but most are in a state of disrepair and not ADA compliant.

Land uses in the vicinity include multi-family housing, the 25 Andover Street condo building (formerly Andover Street School), and a variety of retail and service-based businesses along nearby West Boylston Street.



**Figure 1: Aerial view of Gosnold St-Andover St intersection.**



**Figure 2: View southbound on Gosnold St approaching Andover St (source: Google Street View)**



**Figure 3: View westbound on Andover Street looking north to Gosnold St (source: 9/5/2023 site visit)**

### ***Traffic Characteristics and Data Sources***

#### **Traffic Volumes and Speeds**

Traffic volumes were acquired in September 2023 from Streetlight InSight, a transportation data and analytics platform, for the time period March-May 2021 and September-November 2021 (excluding the Thanksgiving holiday weekend).

Annual Average Daily Traffic volumes entering the intersection are 394 vehicles per day (VPD) along the northbound Gosnold Street approach, 300 VPD along the southbound Gosnold Street approach, 183 VPD along the westbound Andover Street approach, and 83 VPD along the Andover Street eastbound approach.

The reported 85<sup>th</sup> percentile speed on Gosnold Street was 23 miles per hour.

#### **Crash Data**

Five crashes were reported at this intersection during the five-year period from January 2018 to December 2022. Of these five, four were angle collisions with two vehicles involved. The fifth crash was a single-vehicle collision with an unknown fixed object. The four two-vehicle accidents are potentially correctable with implementation of multi-way stop control.

#### **Sight distance and intersection configuration**

Confirmed in the field and using City GIS imagery.

### **Warrant Evaluation**

The MUTCD provides *guidance* that the decision to install multi-way stop control should be based on an engineering study that considers the criteria evaluated below. Massachusetts amendments add the *standard* (requirement) that YIELD or STOP signs shall not be used for

speed control. Multi-way stop control may be considered for installation when one or more of the following warrants are met and installation of stop control has been determined through engineering judgement to be a preferred solution for addressing the identified issues.

**Warrant 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.

**Not met – The location is not a candidate for a traffic signal.**

**Warrant 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.

**Not met – There were fewer than five potentially correctable crashes during the 12-month period analyzed.**

*The four potentially-correctable crashes shown in Appendix B occurred a relatively small period within the analysis period (5/2019-4/2021—just under three years). However, they are not within a 12 month period, but spread over almost 24 months. No crashes were reported in 2022 at this intersection.*

**Warrant C.** This warrant is satisfied when both criteria 1 and 2 are met below, or if applicable, criterion 3 is met.

**Not met**

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

*The major-street entering volume on Gosnold St (total of both approaches) averages 26 vehicles per hour for the peak eight hours. Therefore, this criterion is not met.*

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

*Based on the known traffic volumes, this criterion would likely not be met.*

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.

*The 85<sup>th</sup> percentile speed on the major street is 23 mph. The 70% reduction is not applicable. Therefore, this criterion is not met.*

**Warrant 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.

***Not met – Criteria B, C.1, and C.2 are not met to the 80% threshold.***

*80% of 5 crashes = 4 crashes. The B-criteria is satisfied to 80% with four potentially-correctable crashes occurring at this intersection. However the criterion requires they occur over a 12 month period and these are over a 24 month period. The B-criteria is not satisfied to 80%.*

*80% of 300 vehicles per hour = 240 vehicles per hour. The major approach average entering volume for the peak eight hours is 26 vehicles per hour. The C.1 criteria is not satisfied to 80%.*

*Based on the known traffic volumes, this criterion would likely not be met.*

Other Optional criteria that may be considered in an engineering study:

- A. The need to control left-turn conflicts;

***N/A – Left turn conflicts are not a factor at this intersection.***

- B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

***N/A - There are not any significant pedestrian-activity generators near the intersection.***

- 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

***Adequate sight lines are provided in all directions with one possible exception. Traffic traveling westbound on Andover Street can experience obscured sight distance looking north on Gosnold Street.***

*The Andover Street westbound approach to Gosnold Street may experience obscured sight distance when looking to the North. This is caused by a tree and larger vehicles parked along the eastern curb of Gosnold Street North of the intersection. We recommend trimming the lower branches of the tree and extending the statutory 20-foot no-parking zone another 20 feet from the intersection along this curb.*

- 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.

***N/A – Streets at this intersection are different functional classes (Local and Urban Collector or Rural Minor Collector) with different operating characteristics.***

**RECOMMENATION**

DTM staff recommends the following actions:

- Vote to FILE the request for installation of a Multi-way Stop Control at the intersection
- Chair's Order requesting that the Commissioner of Transportation & Mobility, through the City Manager, explore a Council item to ordain a 40 foot NO PARKING ANYTIME zone on the eastern side of Gosnold Street to the north of the intersection
- Chair's Order requesting that the Commissioner of Department of Public Works & Parks, through the City Manager, replace the damaged STOP sign on the northeast of the intersection (Andover Street westbound approach), trim lower branches of tree on the eastern curb line just north of the intersection
- Chair's Order requesting that the Commissioner of Transportation & Mobility, through the City Manager, install stop line pavement markings on eastbound and westbound Andover Street approaches.

## Appendix A

### Traffic Volume Estimates

	<b>Major Street</b>	<b>Minor Street</b>	
	<b>Gosnold Street</b>	<b>Andover Street</b>	
	Entering Volume (both approaches) on Major Street (VPH)	Entering Lower-Vol Approach on Minor Street (VPH)	Entering Higher-Vol Approach on Minor Street (VPH)
Midnight	1	0	0
1:00 AM	1	0	0
2:00 AM	1	0	0
3:00 AM	1	0	0
4:00 AM	1	0	1
5:00 AM	2	0	1
6:00 AM	4	1	2
7:00 AM	14	10	38
8:00 AM	<b>21</b>	<b>3</b>	<b>20</b>
9:00 AM	14	2	4
10:00 AM	16	4	6
11:00 AM	17	4	8
Noon	<b>18</b>	<b>5</b>	<b>8</b>
1:00 PM	<b>26</b>	<b>6</b>	<b>9</b>
2:00 PM	<b>31</b>	<b>6</b>	<b>19</b>
3:00 PM	<b>27</b>	<b>6</b>	<b>13</b>
4:00 PM	<b>27</b>	<b>9</b>	<b>12</b>
5:00 PM	<b>38</b>	<b>7</b>	<b>14</b>
6:00 PM	<b>22</b>	<b>7</b>	<b>10</b>
7:00 PM	18	8	7
8:00 PM	17	2	4
9:00 PM	12	2	4
10:00 PM	9	1	1
11:00 PM	1	0	2
Daily Total	338	Avg High-Vol Minor Street 8-Hour Volume	13

	Major street approach exceeds 300 vph
	Major street approach exceeds 240 vph (80% warrant)
	Major street approach exceeds 210 vph (70% warrant), if applicable

**Highest 8-hrs in bold.**

Notes:

1. Obtained from Streetlight InSight database 9/1/2023.



**Appendix A**  
 Gosnold Street at Andover Street  
 Crash Summary

Crash Date	# of veh	Manner of Collision	First Harmful Event	Vehicle Actions
5/3/2019	2	Angle	Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2: Travelling straight ahead
9/24/2019	1	Single Vehicle	Collision with unknown fixed object	V1: Travelling straight ahead
1/30/2020	2	Angle	Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2: Travelling straight ahead
3/9/2020	2	Angle	Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2: Travelling straight ahead
4/29/2021	2	Angle	Collision with motor vehicle in traffic	V1: Travelling straight ahead / V2: Travelling straight ahead

	Potentially correctable by installation of AWSC
	Unclear/unknown
	Unlikely to be correctable by installation of AWSC

Notes:

1. Retrieved from MassDOT IMPACT database on 9/1/2023 for the five-year period 1/1/2018-12/31/2022.