



**Chittenden County Regional Planning Commission**  
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**To:** Andrew Legg, Gary Estus  
Town of Westford

**From:** Daryl Benoit, Transportation Planner, CCRPC

**Date:** 26 Oct 2011

**Subject:** Multi-way Stop Analysis for Woods Hollow Rd.  
Intersections

Attached to this memorandum are the multi-way stop warrant analyses requested by the Town of Westford for the **Phelps Road** and **Maple Tree Lane** intersections at **Woods Hollow Road**.

CCRPC staff have reviewed the relevant data and the Manual on Uniform Traffic Control Devices<sup>1</sup> (MUTCD) procedure, and have determined that multi-way stop installations are not warranted at either of the two intersections for the following reasons:

- The minimum traffic volumes are well below minimum requirements to warrant multi-way stop control, even when factoring in the 85<sup>th</sup> percentile speed (observed to be just under 50 MPH) near both of the intersection locations.
- The review of state crash data did not highlight any patterns which would be improved through all-way stop applications as suggested by the MUTCD (5 or more crashes in the last 12 months).

Although stop warrants have not been met at this time, CCRPC staff would be happy to meet with all parties in the Town of Westford to discuss opportunities for further study to improve safety for all users on their town highways. In the meantime, additional law enforcement of existing speed limits may be in order.

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<sup>1</sup> <http://mutcd.fhwa.dot.gov/pdfs/2009/part2b.pdf>

# Phelps Rd & Woods Hollow Rd Multi-way Stop Analysis

Chittenden County Regional Planning Commission

DRAFT ~ 21 Oct 2011

## 2009 MUTCD : Section 2B.07 : Multi-Way Stop Applications

### 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.

**Table 1. Intersection Traffic Count Data: 7 June 2011**

Woods Hollow Road--SB						Phelps Road--WB					Woods Hollow Road--NB				
Hour	Right	Thru	Left	Bike/Ped	Total	Right	Thru	Left	Bike/Ped	Total	Right	Thru	Left	Bike/Ped	Total
7:00 AM	0	79	1	0	80	1	0	32	0	33	11	17	0	0	28
8:00 AM	0	61	1	0	62	0	0	20	0	20	3	7	0	0	10
9:00 AM	0	17	0	0	17	1	0	9	0	10	2	13	0	0	15
10:00 AM	0	26	1	0	27	0	0	5	0	5	5	8	0	0	13
11:00 AM	0	15	0	1	16	0	0	3	0	3	1	9	0	0	10
12:00 PM	0	14	0	0	14	3	0	4	0	7	6	11	0	0	17
1:00 PM	0	14	0	0	14	0	0	6	0	6	7	10	0	0	17
2:00 PM	0	19	1	0	20	0	0	6	0	6	11	17	0	0	28
3:00 PM	0	17	0	0	17	0	0	14	0	14	13	33	0	0	46
4:00 PM	0	21	0	2	23	0	0	9	1	10	14	58	0	0	72
5:00 PM	0	17	0	1	18	0	0	5	0	5	7	61	0	0	68
6:00 PM	0	15	0	0	15	0	0	2	0	2	13	46	0	0	59
<b>Total</b>	<b>0</b>	<b>315</b>	<b>4</b>	<b>4</b>	<b>323</b>	<b>5</b>	<b>0</b>	<b>115</b>	<b>1</b>	<b>121</b>	<b>93</b>	<b>290</b>	<b>0</b>	<b>0</b>	<b>383</b>

### MUTCD Warrant Analysis

A 12-hour intersection count was conducted on 7 June 2011 to ascertain the minimum traffic volumes required to warrant stop-sign installation at the approaches. Furthermore, an Automatic Traffic Counter (ATR) was installed 0.6 miles south of the intersection on Woods Hollow Road from 1-9 June 2011.

Although the posted speed limit was 35 MPH, the 85<sup>th</sup> Percentile Speed obtained from the eight-day count was between 48-49 MPH in both directions of travel.

Additional criterion for the installation of a multi-way stop at this intersection could warranted if it experiences *“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.”*<sup>1</sup>

A search through the Vermont Agency of Transportation’s 2006-2010 Town Highway Crash Database yielded a single crash occurring in 2007 at this intersection, related to DUI and driving too fast for conditions<sup>2</sup>.

**Table 2. Warrant Analysis Hourly Breakdown**

Hour	Major Street Approach Volumes	Major Street 70% (210 vehicles) Volume Met	Minor Street Approach Volumes	Minor Street 70% (140 vehicles) Volume Met
7:00 AM	108	No	33	No
8:00 AM	72	No	20	No
9:00 AM	32	No	10	No
10:00 AM	40	No	5	No
11:00 AM	25	No	3	No
12:00 PM	31	No	7	No
1:00 PM	31	No	6	No
2:00 PM	48	No	6	No
3:00 PM	63	No	14	No
4:00 PM	93	No	10	No
5:00 PM	85	No	5	No
6:00 PM	74	No	2	No

<sup>1</sup> Manual on Uniform Traffic Control Devices, 2009 - Section 2B.07 B

<sup>2</sup> Vermont Agency of Transportation – Highway Research Data

# Maple Tree Lane & Woods Hollow Rd Multi-way Stop Analysis

Chittenden County Regional Planning Commission  
DRAFT ~ 21 Oct 2011

## 2009 MUTCD : Section 2B.07 : Multi-Way Stop Applications

### 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.

**Table 1. Intersection Traffic Count Data: 7 June 2011**

Woods Hollow Road--SB						Maple Tree Lane--WB					Woods Hollow Road--NB				
Hour	Right	Thru	Left	Bike/Ped	Total	Right	Thru	Left	Bike/Ped	Total	Right	Thru	Left	Bike/Ped	Total
7:00 AM	0	73	8	0	81	3	0	3	0	6	3	15	0	0	18
8:00 AM	0	53	3	0	56	3	0	4	0	7	1	7	0	0	8
9:00 AM	0	16	2	0	18	2	0	0	0	2	2	11	0	0	13
10:00 AM	0	19	2	1	22	2	0	5	1	8	1	7	0	0	8
11:00 AM	0	11	0	0	11	2	0	2	1	5	2	6	0	0	8
12:00 PM	0	13	2	0	15	1	0	1	0	2	0	9	0	0	9
1:00 PM	0	12	2	0	14	1	0	1	0	2	3	8	0	0	11
2:00 PM	0	18	6	1	25	4	0	0	0	4	1	14	0	0	15
3:00 PM	0	11	2	0	13	10	0	2	0	12	2	25	0	0	27
4:00 PM	0	19	3	0	22	1	0	1	2	4	0	53	0	1	54
5:00 PM	0	14	1	0	15	2	0	4	0	6	1	60	0	3	64
6:00 PM	0	14	6	0	20	3	0	2	0	5	1	42	0	0	43
<b>Total</b>	<b>0</b>	<b>273</b>	<b>37</b>	<b>2</b>	<b>312</b>	<b>34</b>	<b>0</b>	<b>25</b>	<b>4</b>	<b>63</b>	<b>17</b>	<b>257</b>	<b>0</b>	<b>4</b>	<b>278</b>

### MUTCD Warrant Analysis

A 12-hour intersection count was conducted on 7 June 2011 to ascertain the minimum traffic volumes required to warrant stop-sign installation at the approaches. Furthermore, an Automatic Traffic Counter (ATR) was installed 1.3 miles south of the intersection on Woods Hollow Road from 1-9 June 2011.

Although the posted speed limit was 35 MPH, the 85<sup>th</sup> Percentile Speed obtained from the eight-day count was between 48-49 MPH in both directions of travel.

Additional criterion for the installation of a multi-way stop at this intersection could warranted if it experiences *“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.”*<sup>1</sup>

A search through the Vermont Agency of Transportation’s 2006-2010 Town Highway Crash Database yielded a single crash occurring in 2007 near the location (on Phelps Rd.), related to DUI and driving too fast for conditions<sup>2</sup>.

**Table 2. Warrant Analysis Hourly Breakdown**

Hour	Major Street Approach Volumes	Major Street 70% (210 vehicles) Volume Met	Minor Street Approach Volumes	Minor Street 70% (140 vehicles) Volume Met
7:00 AM	99	No	6	No
8:00 AM	64	No	7	No
9:00 AM	31	No	2	No
10:00 AM	29	No	8	No
11:00 AM	19	No	5	No
12:00 PM	24	No	2	No
1:00 PM	25	No	2	No
2:00 PM	39	No	4	No
3:00 PM	40	No	12	No
4:00 PM	75	No	4	No
5:00 PM	76	No	6	No
6:00 PM	63	No	5	No

<sup>1</sup> Manual on Uniform Traffic Control Devices, 2009 - Section 2B.07 B

<sup>2</sup> Vermont Agency of Transportation – Highway Research Data