
Old Stage Road, Woods Hollow Road, Brookside Road and Cambridge Road Speed Study

Introduction

The Town of Westford requested the Chittenden County Regional Planning Commission (CCRPC) staff to investigate and evaluate the posted speed limit on Old Stage Road, Woods Hollow Road, Brookside Road and Cambridge Road. In order for a Legislative Body to determine a safe and reasonable speed on town highways, a traffic engineering investigation (speed study) is required by the Vermont Statutes Annotated Title 23, § 1007. This document provides supporting findings that were used to develop recommendations for establishing speed limits on Old Stage Road, Woods Hollow Road, Brookside Road and Cambridge Road.

Existing Conditions

Old Stage Road

Old Stage Road is classified by the state as a Class III Town Highway and functionally classified as a Local Road. The CCRPC staff installed an Automatic Traffic Recorder (ATR) along Old Stage Road at the location shown in Figure 1 to collect traffic volume and speed data. Data were collected between November 18, 2020 and November 20, 2020. Figure 1 shows the study area and ATR location.

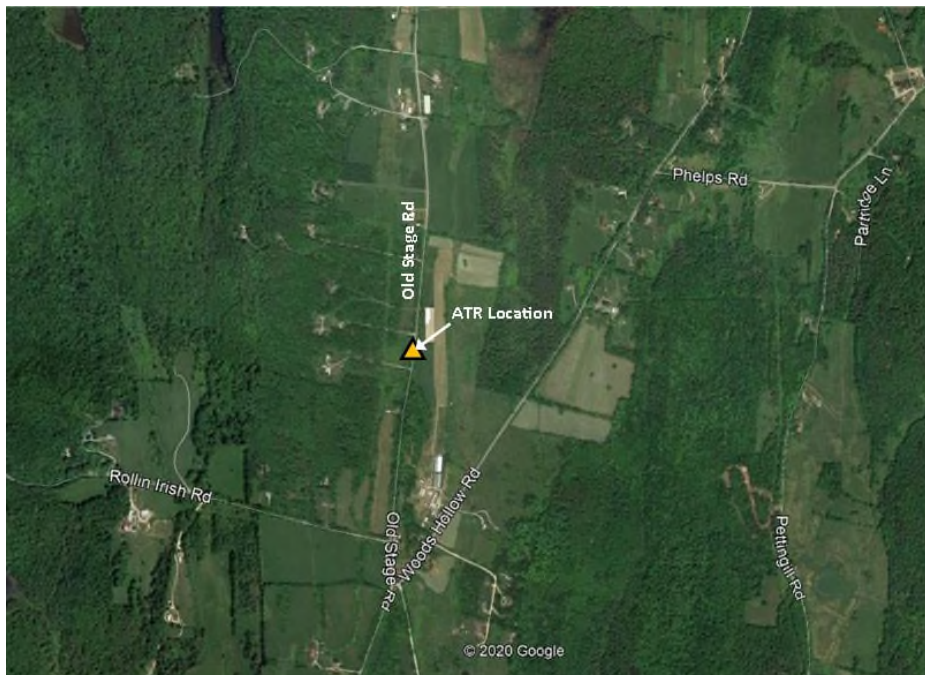


Figure 1: Old Stage Road and ATR Location

Crash History

There were 17 crashes reported in the last five years along Old Stage Road. A crash report summary is attached in the Appendix. Most of the crashes were reported as single vehicle crashes due to driving too fast for conditions in snow and wet weather conditions.

Speed Data

Traffic volume and speed data (attached in the Appendix) were collected using an ATR on Old Stage Road from 11/18/2020 to 11/20/2020. Table 1 below shows a summary of speed data for Old Stage Road.

Table 1: Speed Data on Old Stage Road

Speed Data	Northbound	Southbound	Combined
Average Speed	33 mph	36 mph	36 mph
10 mph Pace Speed	30-39 mph	30-39 mph	30-39 mph
85 th Percentile Speed	37 mph	41 mph	41 mph

The 85th percentile speed for southbound is higher than the northbound direction. The higher speed for the southbound direction can be attributed to the roadway slope going downhill where motorists tend to drive faster. The combined 85th percentile speed associated with the traffic counts was observed as 41 mph, whereas the posted speed limit is 35 mph. This indicates that a majority (85 percent) of drivers are obeying the posted speed limit and operating comfortably at 41 mph or less along Old Stage Road.

Woods Hollow Road

Woods Hollow Road in the study area is an unpaved road classified by the state as a Class II Town Highway and functionally classified as a Local Road. The CCRPC staff installed an Automatic Traffic Recorder (ATR) along Woods Hollow Road at the location shown in Figure 2 to collect traffic volume and speed data. Data were collected between October 09, 2020 and October 19, 2020. Figure 2 shows the study area and ATR location.

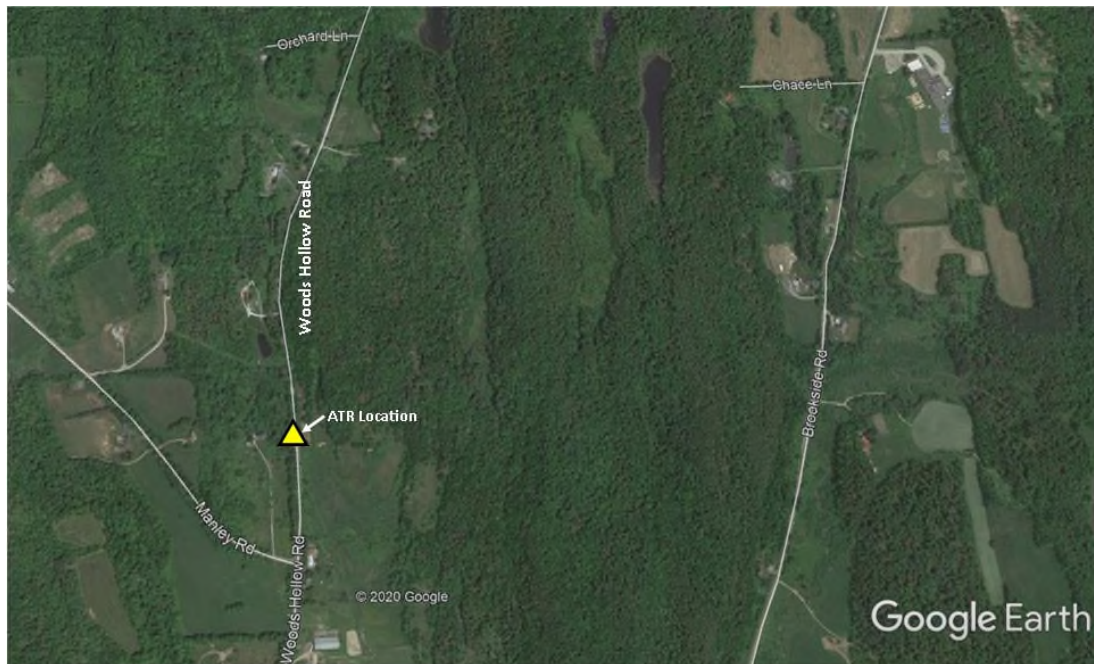


Figure 2: Woods Hollow Road and ATR Location

Crash History

There were three crashes reported in the last five years along Woods Hollow Road. A crash report summary is attached in Appendix. The crashes were reported as single vehicle crashes and contributing circumstances were observed as driving too fast for conditions.

Speed Data

Traffic volume and speed data (attached in the Appendix) were collected using an ATR on Woods Hollow Road from 10/09/2020 to 10/20/2020. Table 2 shows a summary of speed data for Woods Hollow Road.

Table 2: Speed Data on Woods Hollow Road

Speed Data	Northbound	Southbound	Combined
Average Speed	32 mph	32 mph	32 mph
10 mph Pace Speed	25 - 34 mph	25 - 34 mph	25 - 34 mph
85 th Percentile Speed	39 mph	37 mph	38 mph

The 85th percentile speed for the northbound and southbound directions was observed as 39 mph and 37 mph, respectively, and the combined 85th percentile speed was observed as 38 mph. This indicates that 85 percent of drivers are comfortable driving at speeds at or below 38 mph on Woods Hollow Road.

Brookside Road

Brookside Road is an unpaved road classified by the state as a Class II Town Highway and functionally classified as a Minor Collector. The CCRPC staff installed an Automatic Traffic Recorder (ATR) on Brookside Road at the location shown in Figure 3 to collect traffic volume and speed data. Data were collected between November 10, 2020 and November 15, 2020. Figure 3 shows the study area and ATR location.

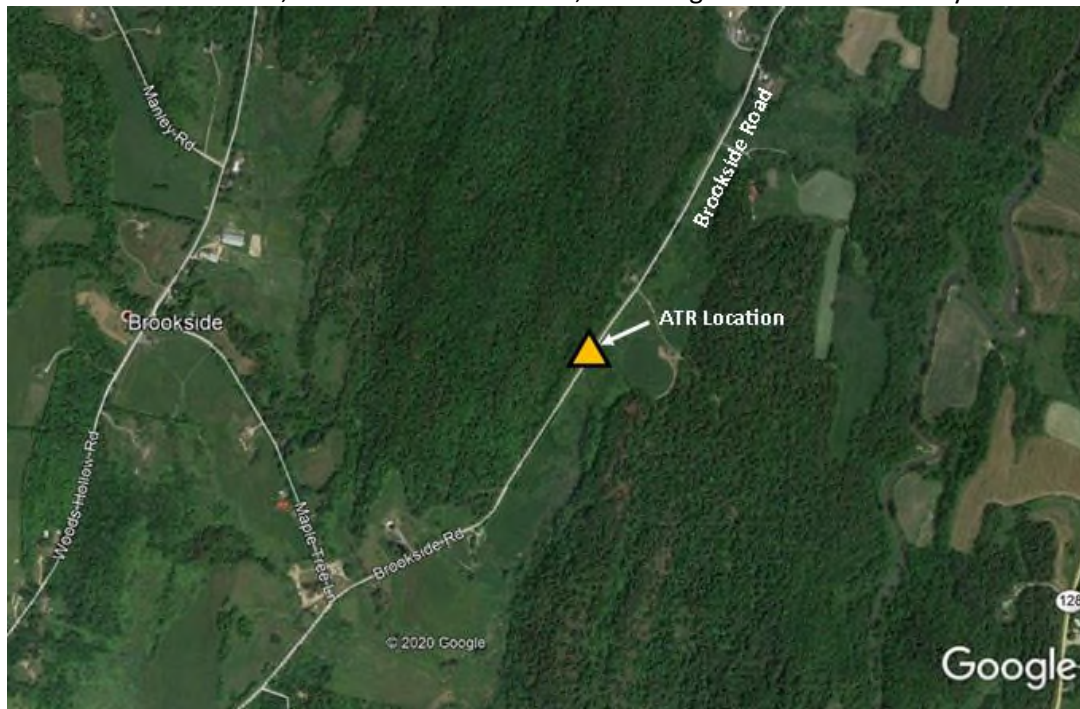


Figure 3: Brookside Road and ATR Location

Crash History

There were three crashes reported in the last five years along Brookside Road. A crash report summary is attached in Appendix. One of the crashes was reported as a single vehicle crash due to failure to keep in proper lane. Crash details on other two crashes are not available.

Speed Data

Traffic volume and speed data (attached in the Appendix) were collected using an ATR on Brookside Road from 11/10/2020 to 11/15/2020. Table 2 shows a summary of speed data for Brookside Road.

Table 3: Speed Data on Brookside Road

Speed Data	Northbound	Southbound	Combined
Average Speed	35 mph	31 mph	33 mph
10 mph Pace Speed	30 - 39 mph	25 - 34 mph	30 - 39 mph
85 th Percentile Speed	40 mph	36 mph	39 mph

The 85th percentile speed for the northbound and southbound directions was observed as 40 mph and 36 mph, respectively, and the combined 85th percentile speed was observed as 39 mph. This indicates that 85 percent of drivers are comfortable driving at speeds of 39 mph or less on Brookside Road.

Cambridge Road

Cambridge Road is an unpaved road classified by the state as a Class II Town Highway and functionally classified as a Minor Collector. The CCRPC staff installed an Automatic Traffic Recorder (ATR) on Cambridge Road at the location shown in Figure 4 to collect traffic volume and speed data. Data were collected between November 15, 2020 and November 18, 2020. Figure 4 shows the study area and ATR location.

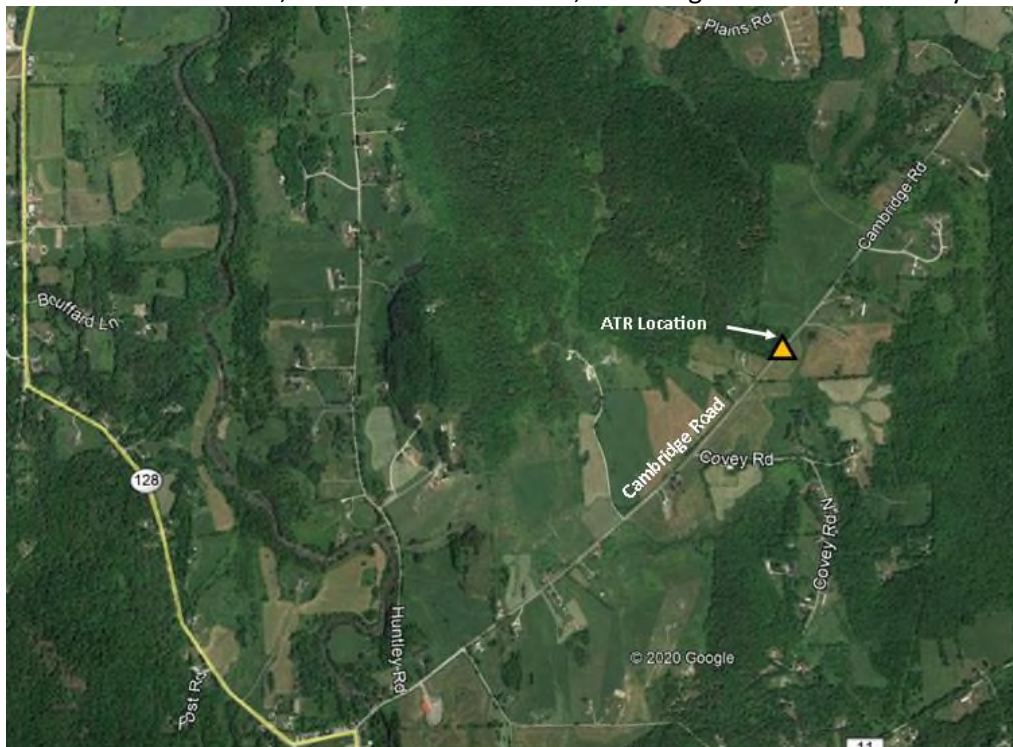


Figure 4: Cambridge Road and ATR Location

Crash History

There were five crashes reported in the last five years along Cambridge Road. A crash report summary is attached in Appendix. Two of the crashes were reported as single vehicle crashes due to failure to keep in proper lane and inattentive driving.

Speed Data

Traffic volume and speed data (attached in the Appendix) were collected using an ATR on Cambridge Road from 11/15/2020 to 11/18/2020. Table 4 shows a summary of speed data on Cambridge Road.

Table 4: Speed Data on Cambridge Road

Speed Data	Northbound	Southbound	Combined
Average Speed	35 mph	37 mph	37 mph
10 mph Pace Speed	30 - 39 mph	30 - 39 mph	30 - 39 mph
85 th Percentile Speed	41 mph	43 mph	42 mph

The 85th percentile speed for the northbound and southbound directions was observed as 41 mph and 43 mph, respectively, and the combined 85th percentile speed was observed as 42 mph. This indicates that 85 percent of drivers are comfortable driving at speeds of 42 mph or less on Cambridge Road.

Findings of Windshield Survey

A windshield reconnaissance survey was conducted in both travel directions on all four study area roads by the team to identify safety related issues, roadway characteristics and roadside safety hazards. The following is a list of findings from the survey on the study area roads:

1. The study area roads are unpaved and roadway width varies between 18 and 20 ft.
2. Very narrow native gravel/grass shoulders exist on both sides of travel lanes.
3. The posted speed limit is 35 mph.
4. Some driveways are obscured due to vegetation at some locations on the study area roads.

Speed Data Analysis

A widely used metric in setting speed limits is the 85th percentile speed. This is defined as the speed in which 85% of motorists are traveling at or below. Based on the best available evidence and previous research, speed limits set using the 85th percentile speed data are not only acceptable by the majority of motorists, but also fall within the speed range where crash risk is lowest¹. The Manual on Uniform Traffic Control Devices (MUTCD), which is adopted as the standard for all traffic control devices in Vermont (Title 23 V.S.A. Section 1025), recommends setting speed limits within 5 mph of the 85th percentile speed while taking into consideration other factors such as roadway characteristics, shoulder condition, grade, the 10 mph pace speed, land uses, development setbacks, parking, crash history, and bicycle/pedestrian activity. There is no evidence of published methodology or practice that recommends setting speed limits below the observed 50th percentile speed.

A research study in Kansas found that a majority of motorists driving on gravel roads tend to judge their speed based on a variety of conditions, including road surface and width, weather, sight distance etc.,

¹ Synthesis of Speed Zoning Practice, FHWA-RD-85-096, Technical Summary.

instead of strictly complying with posted speed limits². As per the Federal Highway Administration (FHWA) safety office, “*speeding issues on gravel roads will be best addressed through the use of a combination of engineering, enforcement and education countermeasures*”.

Pedestrian Activity and Other Factors

As mentioned above, other factors should be considered in determining a safe and reasonable speed limit. Based on research work in other states, the prevailing speeds may be reduced by 5 percent when the total pedestrian traffic exceeds 10 people per hour for any three hours within any eight-hour period. Pedestrian volume data are not available for the study area. However, anecdotal information from general observation indicates that pedestrian volume in the study area does not exceed 10 people per hour for any three hours in a day.

Findings and Recommendations

The study area roads are unpaved roads and exhibit narrow shoulders. As per the observed bidirectional 85th percentile speed data, the majority of drivers are traveling between 38 mph and 42 mph within the study area. The speed data indicate that approximately 7% of traffic on Old Stage Road, 4% on Woods Hollow Road, 3% on Brookside Road, and 7% of traffic on Cambridge Road is exceeding 45 mph. The Town should consider implementing a combination of countermeasures such as public outreach and education, safety awareness campaign and increasing enforcement targeted at changing driver behavior to address speeding issues along the four study area gravel roads.

With the observed 85th percentile speeds at different locations on these roads and considering the roadway characteristics, low traffic volumes, rural residential land use, lack of noticeable pedestrian and bicyclists’ activities, and no parking activities on these roads, **it is recommended to maintain the existing 35 mph speed limits for Old Stage Road, Woods Hollow Road, Brookside Road and Cambridge Road.** It should be noted that setting speed limits too far below the 85th percentile speed may encourage drivers to ignore speed limits, discourage obeying posted speed limit, may pose safety issues due to increase in differential speeds between drivers obeying the posted speed limit and those ignoring, and increase challenges for enforcement.

Generally, most motorists tend to drive at speeds lower than the posted speed limit on unpaved/gravel roads. Therefore, the Vermont Agency of Transportation (VTrans) does not recommend setting speed limits for Class III unpaved roads³.

By clearing or trimming vegetation along narrow curves and in the vicinity of driveway approaches will improve sight distance and safety for all users. Warning chevron signs (see sample picture in Figure 5 below) could be installed to assist drivers in navigating curves and to enhance motorists’ safety. The actual locations to install chevron signs should be surveyed and verified in the field.

² https://safety.fhwa.dot.gov/local_rural/training/fhwas010413spmgmt/speedmanagementguide.pdf

³ <https://localroads.vermont.gov/sites/localroads/files/files/resources/materials/SettingSpeedLimitsGuideUpdateAugust2016.pdf>



Figure 5: Sample of Chevron signs at curves *Photo Courtesy: Texas Transportation Institute*

Table 5: Technical Summary

Municipality:	Town of Westford
Road Name:	Old Stage Road, Woods Hollow Road, Brookside Road, Cambridge Road
Recommended Speed Limit:	35 mph
Evaluation By:	Sai Sarepalli, P.E. Senior Transportation Planning Engineer
Final Report Document Date:	02/08/2021

85th Percentile Speed (mph):	Old Stage Road: NB – 37 mph; SB – 41 mph
	Woods Hollow Road: NB – 39 mph; SB – 37 mph
	Brookside Road: NB – 40 mph; SB – 36 mph
	Cambridge Road: NB – 41 mph; SB – 43 mph
10 mph Pace Speed (mph) & Percentage in the range	Old Stage Road: NB (30-39mph); SB (30-39 mph)
	Woods Hollow Road: NB (25-34mph); SB (25-34 mph)
	Brookside Road: NB (30-39mph); SB (25-34 mph)
	Cambridge Road: NB (30-39mph); SB (30-39 mph)
Safety problem related to speed:	<ul style="list-style-type: none"> • Motorists driving at excessive speeds along curves can pose safety hazard. • Driveways obscured due to vegetation can pose safety hazard for drivers.
Average Daily Traffic (Vehicles per Day)	Old Stage Road: 174
	Woods Hollow Road: 498
	Brookside Road: 285
	Cambridge Road: 315
Town Highway and Functional Classification for both roads	Old Stage Road: Class III and Local Road
	Woods Hollow Road: Class II and Local Road
	Brookside Road: Class II and Minor Collector
	Cambridge Road: Class II and Minor Collector
Road Surface	All Study area Roads are Unpaved/gravel
Road Width	Varies between 18 and 20 ft. No Pavement Markings
Shoulder Surface	Grass/Gravel
Shoulder Width	less than 1 ft.
Parking	No Parking
Pedestrian/Bicycles	No marked bike lanes
Adjacent Land use	Rural Residential

Appendix

Crash Data

APPENDIX

CRASH DATA from 2015 - 2020

Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number of Injuries	Number of Fatalities	Number of Untimely Deaths	Location	Injury Type
Old Stage Road									
1/12/2015	4:10 PM	Snow	Driving too fast for conditions- Failure to keep in proper lane	Single Vehicle Crash	1	0	0	Old Stage Rd at Essex Town Line	Suspected Minor
1/30/2015	8:41 AM	[No Weather]		[No Direction of Collision]	0	0	0	Min. C 0740 Old Stage Rd.	[No Data]
2/7/2015	5:33 PM	[No Weather]		[No Direction of Collision]	0	0	0	S0740 OLD STAGE ROAD at 1ST DRIVEWAY ON LEFT OFF OF WESTFORD RD	[No Data]
8/30/2015	2:10 AM	[No Weather]		[No Direction of Collision]	0	0	0	Min. C 740 OLD STAGE RD at ROLLIN IRISH RD	[No Data]
11/3/2015	11:15 AM	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	Old Stage Road at 864 Old Stage Road	None
4/9/2016	5:08 AM	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	916 Old Stage Road at Woods Hollow Road	None
6/20/2016	7:38 PM	Clear	Operating vehicle in erratic- reckless- careless- negligent- or aggressive manner- No improper driving	Left Turn and Thru- Same Direction Sideswipe/Angle Crash w--	1	0	0	832 OLD STAGE RD at WOODS HOLLOW ROAD	Suspected Minor
12/24/2016	5:27 AM	[No Weather]		[No Direction of Collision]	0	0	0	900 Block OLD STAGE RD	[No Data]
2/25/2015	6:52 PM	[No Weather]		[No Direction of Collision]	0	0	0	TH-6 OLD STAGE RD at BIRCH RIDGE RD.	[No Data]
7/19/2015	6:11 AM	[No Weather]		[No Direction of Collision]	0	0	0	TH-6 (1273 OLD STAGE Rd)	[No Data]
9/20/2015	6:51 AM	Cloudy	Failure to keep in proper lane- Under the influence of medication/drugs/alcohol	Single Vehicle Crash	3	0	0	Old Stage Road at Timberdoodle Lane	Possible
7/3/2016	6:49 AM	Clear	Swerving or avoiding due to wind- slippery surface- vehicle object- non-motorist in roadway etc- Failure to keep in proper lane	Single Vehicle Crash	0	0	0	[No Street Address] at Snow Hill Lane	None
11/21/2016	4:16 PM	Snow		Other - Explain in Narrative	0	0	0	1042 Old Stage Road	None
1/3/2017	11:10 PM	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	1362 Old Stage Road	None
11/10/2017	3:05 PM	Cloudy	Fatigued- asleep	Single Vehicle Crash	0	0	0	Old Stage Road at 1028 Old Stage Road	None
12/12/2017	2:39 PM	[No Weather]		[No Direction of Collision]	0	0	0	1200 Block OLD STAGE RD	[No Data]
11/5/2019	11:52 PM	Clear	Driving too fast for conditions- Failure to keep in proper lane	Single Vehicle Crash	1	0	0	1674 Old Stage Road at Westford Milton Road	Suspected Minor
Woods Hollow Road									
1/14/2015	10:39 AM	[No Weather]		[No Direction of Collision]	0	0	0	TH-4 (732 WOODS HOLLOW RD.)	[No Data]
2/25/2015	8:50 PM	Cloudy	Driving too fast for conditions	Single Vehicle Crash	1	0	0	694 Woods Hollow Rd at 694 Woods Hollow Rd	Suspected Minor
3/21/2018	5:52 PM	Clear	Exceeded authorized speed limit- Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	0	802 Woods Hollow Rd	Suspected Minor
Brookside Road									
12/6/2019	4:01 PM	Other - Explain in Narrative	Failure to keep in proper lane	Single Vehicle Crash	1	0	0	Brookside Road at Phelps Road	Suspected Minor
10/26/2015	6:07 PM	[No Weather]		[No Direction of Collision]	0	0	0	TH-30 (417 Pettingill Rd.)	[No Data]
6/12/2016	8:17 AM	[No Weather]		[No Direction of Collision]	0	0	0	BROOKSIDE RD at PHELPS RD	[No Data]
Cambridge Road									
5/28/2015	9:01 PM	[No Weather]		[No Direction of Collision]	0	0	0	Min. C 0742 (127 CAMBRIDGE RD.)	[No Data]
1/24/2016	1:16 AM	Cloudy	Failure to keep in proper lane- Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	0	510 Cambridge Road at Plains Road	Suspected Minor
11/16/2018	1:00 PM	Cloudy	Inattention	Single Vehicle Crash	0	0	0	Cambridge Road at 337 Cambridge Road	None
2/18/2019	1:10 PM	[No Weather]		[No Direction of Collision]	0	0	0	FAS-0742 480 Cambridge Rd.	[No Data]
11/15/2019	8:22 PM	[No Weather]		[No Direction of Collision]	0	0	0	127 Cambridge Rd.	[No Data]

Speed Data