

## River Road Speed Study

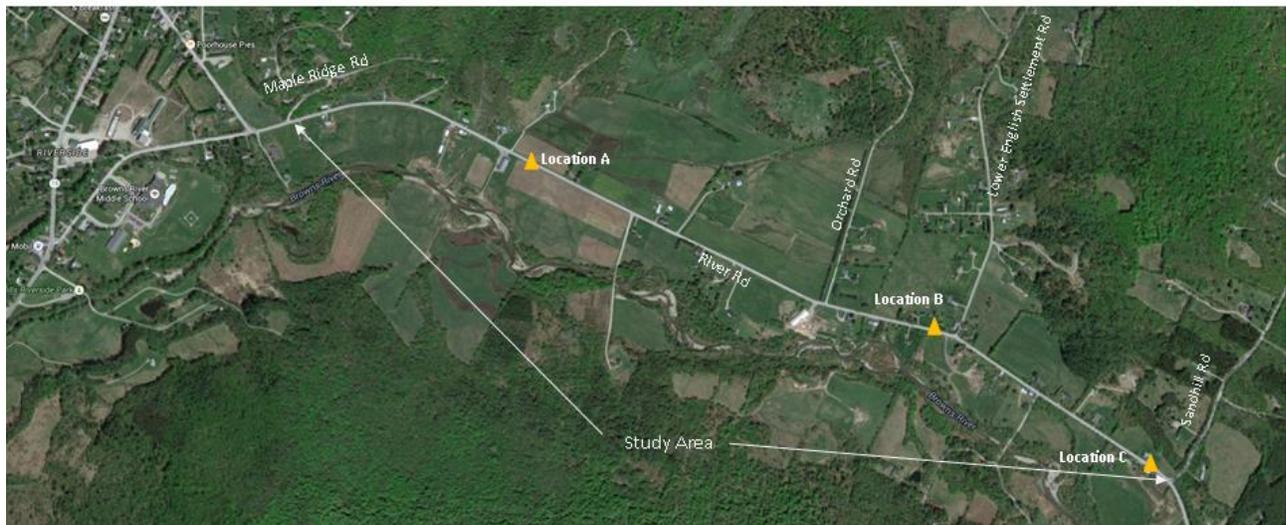
### Introduction

The Town of Underhill requested a traffic speed study for River Road between Maple Ridge Road and Sandhill 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 Vermont Statutes Annotated Title 23, § 1007. This document provides supporting findings that were used to develop recommendations for setting a speed limit for River Road.

### Existing Conditions

River Road is paved and classified by the state as Class II Town Highway and functionally classified as Rural Major Collector. The CCRPC installed 3 Automatic Traffic Recorders (ATR) along River Road at locations shown in Figure 1 to collect traffic volume and speed data. Data were collected from September 9, 2015 to September 16, 2015. The following figure shows the study area and ATR locations.

**Figure 1: Study Area and ATR Locations**



### Findings of Windshield Survey

A windshield reconnaissance survey was conducted in both travel directions on River Road by the team to identify safety related issues, roadway characteristics, limited sight distance locations and roadside safety hazards. The following is a list of findings from the windshield survey:

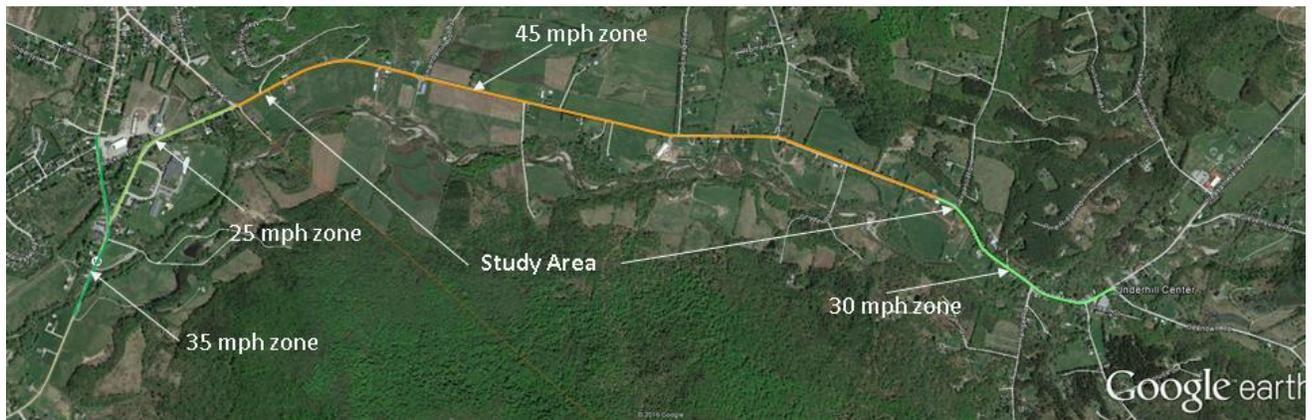
1. The roadway width varies between 20 and 22 ft. The typical travel lane width along River Road is 9.5 ft with a wider width of 10 to 11 ft at curves.
2. Shoulders are marked and vary in width between 0.5 and 1 ft.
3. The posted speed limit is 45 mph in the study area.
4. Some private driveways located along the roadway section are not visible for motorists especially driveways located on curves.
5. Utility poles and mail boxes are located along the road side.

## Speed Data Analysis

The 85<sup>th</sup> percentile speed associated with the traffic counts at Locations A, B and C are observed as 48, 46 and 44 mph, respectively, whereas the posted speed limit is 45 mph. This indicates that 85 percent of drivers are comfortable driving at an operating speed between 44 mph and 48 mph or less along the study corridor. This indicates that majority of motorists traveling along River Road are abiding with the posted speed limit.

The following figure shows currently posted speed limit zones along River Road to understand speed zone variations between VT 15 and Underhill Center.

**Figure 2: Posted Speed Limit Zones along River Road**



A widely used metric in setting speed limits is the 85<sup>th</sup> 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 85<sup>th</sup> percentile speed data are not only acceptable by the majority of motorists, but also fall within the speed range where crash risk is lowest<sup>1</sup>. 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 85<sup>th</sup> percentile speed while taking into consideration other factors such as roadway characteristics, shoulder condition, grade, the speed pace, land uses, development setbacks, parking, crash history, and bicycle/pedestrian activity.

## Crash History and Analysis

There were a total of 10 crashes reported between 2010 and 2014 along River Road between Maple Ridge Road and Sandhill Road. The following figure shows historical crash locations along the study corridor.

<sup>1</sup> Synthesis of Speed Zoning Practice, FHWA-RD-85-096, Technical Summary.

**Figure 3: Historical Crash Locations along River Road**



It is evident from the above figure that most crashes were occurred at intersections along River Road. The following table shows a summary of contributing circumstances for crashes along the study corridor.

**Table 1: Summary of Crash History**

<b>Contributing Circumstances</b>	<b>No. of Crashes</b>
Driving Too Fast for Conditions	4
Failure to keep in proper lane	2
Under the influence of medication/drugs/alcohol	2
Unknown	2
<b>Total</b>	<b>10</b>

The major contributing circumstances for crashes are driving too fast for given road conditions. Driving too fast for given road conditions along horizontal curves and at intersections can pose hazardous situations for drivers.

**Table 2: Technical Summary**

Municipality:	Town of Underhill
Road Name:	River Road
Location:	Between Maple Ridge and Sandhill Road
Recommended Speed Limit:	<b>40 mph</b>
Evaluation By:	Sai Sarepalli, P.E. Transportation Planning Engineer
<b>Final Report Document Date:</b>	<b>03/30/2016</b>

85th Percentile Speed (mph):	<p style="text-align: center;"><b>Location A:</b>  <b>48 MPH</b> : Eastbound  <b>49 MPH</b> : Westbound  <b>Location B:</b>  <b>47 MPH:</b> Eastbound  <b>46 MPH:</b> Westbound  <b>Location C:</b>  <b>44 MPH:</b> Eastbound  <b>45 MPH:</b> Westbound</p>
10 mph Pace Speed (mph)	<p style="text-align: center;"><b>Location A:</b>  <b>41-50 MPH:</b> Eastbound  <b>41-50 MPH:</b> Westbound  <b>Location B:</b>  <b>41-50 MPH:</b> Eastbound  <b>36-45 MPH:</b> Westbound  <b>Location C:</b>  <b>36-45 MPH:</b> Eastbound  <b>36-45 MPH:</b> Westbound</p>
Average Test Car Speed (mph)	<b>40 MPH</b>
Safe Speed at Curves and/or Intersections:	<b>40 MPH</b>
Safety problem related to speed:	Motorists driving at excessive speeds along curves can pose safety hazard
Average Daily Traffic (Vehicles per Day)	<p style="text-align: center;"><b>Location A: 3,337 ADT</b>  <b>Location B: 3,099 ADT</b>  <b>Location C: 2,935 ADT</b>  (09/09/15 – 09/16/15)</p>
Town Highway and Functional Classification	Class II Town Highway - Rural Major Collector
Road Surface	Paved
Road Width	Varies between 20 and 22 ft.
Shoulder Surface	Paved/Gravel

Shoulder Width	Varies between 1.0 and 1.5 ft.
Parking	No Parking
Pedestrian/Bicycles	No marked bike lanes
Adjacent Land use	Residential and Agricultural

**Conclusion and Recommendations**

River Road along the study area is fairly a straight section with wide curves (see pictures in Appendix A). As per the observed bidirectional 85<sup>th</sup> percentile speed data, majority of drivers are respecting the posted speed limit. As shown in Figure 2, the posted speed changes from 25 mph to 45 mph for eastbound drivers at the Jericho and Underhill town line and drops to 30 mph at the Sandhill Road intersection. There is a lack of transition zone between the lower and higher speed limit zones. A speed transition zone warns drivers that the roadway environment is changing and that their speed should change as well.

While considering the above stated reasons and the roadway characteristics, road side development and land use, crash history, **it is recommended to lower the posted speed limit to 40 mph for the study area.** This speed limit not only provides a gradual reduction in speeds from higher speed limit to lower speed limit and vice versa, but is also safer for motorists driving along the curves on River Road.

It is recommended the Town should consider implementing traffic calming measures such as speed feedback radar signs on poles and/or optical speed bars at appropriate locations to warn and slow motorists traveling on River Road. Optical speed bars are a series of white rectangular pavement markings typically 1 foot wide placed just inside both edges of the lane and spaced progressively closer to create an illusion of traveling faster as well as the impression of narrower lane. See picture in Appendix B.

A follow up speed data collection should be conducted to determine the impacts and percentage of drivers complying with the proposed posted speed limit.

**Appendix A - Study Area Pictures**



River Road with narrow shoulders, utility poles, mail boxes looking west



River Road at Lower English Settlement Road looking east

Appendix B – Traffic Calming Measures



Sample of Optical Speed Bars

Photo Courtesy: [usatoday30.usatoday.com](http://usatoday30.usatoday.com)



Sample of Speed Feedback Radar Sign

Photo Courtesy: [www.radarsign.com](http://www.radarsign.com)