Office of Highway Safety

Road Safety Audit Review

Town:	Berkshire	**Date Reviewed:**	September 11, 2015
Route:	VT 118, Richford Rd and Water Tower Rd	**Mile points:**	S0302: 2.65 S0307: 4.10

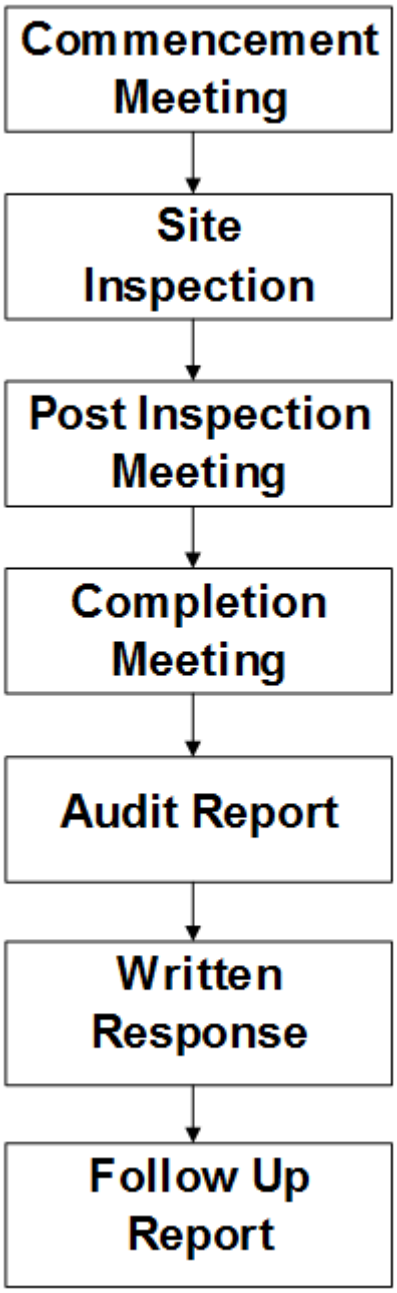
Location Map

RSAR Process

A ***Road Safety Audit Review*** (RSAR) is a formal examination of an existing road in which an independent, multi-discipline team (the Audit Team) reports on potential safety issues.

According to the Federal Highway Administration (FHWA), the purpose of a RSAR is to determine which elements of the road may present a safety concern, to what extent and under what circumstances as well as to identify opportunities to mitigate the identified safety concerns.

Figure 1 - Road Safety Audit Process



The RSAR process is composed of several steps as shown in Figure 1. The process starts with a ***Commencement Meeting*** during which the Audit Team reviews data and gathers community concerns. A ***Site Inspection*** is then performed by the Audit Team. The site visit involves the identification of safety deficiencies as seen in the field. The Audit Team will usually drive through the location of interest to "get a feel" for the area, traveling through each approach in the case of intersections. The team is to then drive at a slower speed to make observations. If needed, the team will also walk the location. Following the site inspection, the Audit Team holds a ***Post Inspection Meeting.*** It is during this meeting that the team members discuss their observations and identify safety issues. The team is to reach a consensus on the importance of each safety issue mentioned. Only those issues for which a consensus is reached are included in the RSAR findings. A RSAR report (Written Report) is prepared.

The ***Written Report*** identifies safety concerns and proposes guidance. These issues and solutions are presented in a tabular format associated to each Responsible Entity for ease of reporting. The ***Responsible Entities*** are any groups who own a roadway feature or who are responsible for making an improvement or for initiating further studies. These could include for example, the VTrans design section, the local town, the local police or the local RPC.

Location

The location of this RSAR is the intersection of Berkshire Center Road, Richford Road and Water Tower Road in Berkshire.

Purpose of the RSAR

This RSAR was conducted as part of a Vermont Highway Safety Alliance effort lead by the Enforcement Focus Group. The locations selected for this effort were originally identified as high crash locations and ranked high in terms of fatal and injury crashes. In addition, the final locations were further selected for their potential of reducing crashes through enforcement.

The RSAR herein has sought to identify potential safety hazards and physical features which may affect road user safety. However, it is possible that not every deficiency has been identified. It should further be recognized that the implementation of the guidance in this report may contribute to improve the level of safety of the facility reviewed but not necessarily remove all the risks.

RSAR Participants

Mario Dupigny-Giroux from the Office of Highway Safety, VTRANS, was the RSAR coordinator.

The other participants were:

Tom Fields,	Office of Highway Safety, VTRANS
John Filipek,	Office of Highway Safety, VTRANS
John Flannigan,	Vermont State Police
Pat McManamon,	Department of Motor Vehicle, VTRANS
Paul Hatch,	Berkshire School Board
Danny Keninnson,	Berkshire Road Foreman
Bethany Remmers,	Northwest Regional Planning Commission

Information Reviewed

Geometry

This intersection is a four-way intersection that is controlled with stop signs on Richford Road and Water Tower Road.

At this intersection, Water Tower Road is to the west and Richford Road is to the East, while Berkshire Center Road runs south to north.

In terms of federal aid roads, the north approach and the east approach of this intersection is referred to as FAS 0302, the south approach is referred to as FAS 0307 and the west approach as minor collector 0810.

On the east approach (Richford Road looking left) the corner sight distance is 440 feet.

On the east approach (Richford Road looking right) the corner sight distance is 590 feet.

On the west approach, (Water Tower looking left) the corner sight distance is 384 feet.

On the west approach (Water Tower looking right) the corner sight distance is 635 feet.

Lighting is not provided at this intersection.

Berkshire Elementary School is located in the southwest corner of the intersection.

Speed Limit

The posted speed limit is 50 mph on Berkshire Center Road as well as on Richford Road. The speed limit is not posted on Water Tower Rd.

Traffic Volumes

The 2012 Average Annual Daily Traffic on Berkshire Center Road was 850 vehicles per day north of the intersection and 640 vehicles per day south of the intersection.

On Richford Road, the 2012 Average Annual Daily Traffic was 830 vehicles per day.

There is no available count on Water Tower Road.

Signs and Markings

An oversized stop sign is located on Water Tower Road and oversized gate posted stop signs are located on Richford Center Road.

There are oversized stop ahead signs on the approaches that are controlled by a stop sign and advanced intersection warning signs supplemented with road name plaques on the other two approaches. There are also school ahead signs on Berkshire Center Road as well as on Water Tower Road.

The street name signs for Richford Road and Berkshire Center Road are located on the same post on the northeast corner of the intersection. Similarly, street name signs for Water Tower Road and Berkshire Center Road are located on the same post on the southwest corner of the intersection.

There are no stop bars on the two approaches that are controlled with a stop sign.

A double yellow center line is present on all approaches.

Pavement Conditions

Cracking was observed on the approaches to the intersection.

Past Projects

The Town received a Class II paving grant to pave FAS 0302 for a distance of 1.4 miles in the area of the intersection (completed in September 2008).

A High Risk Rural Roads Program project that included the relocation of the intersection warning signs closer to the intersection was completed in 2012.

Future Projects

Future projects are unknown.

Traffic Studies

This intersection was reviewed in 2010 as part of the High Risk Rural Roads Program and subsequently in 2014 under the Highway Safety Improvement Program. Signage implementation from the High Risk Rural Roads review was completed in 2012.

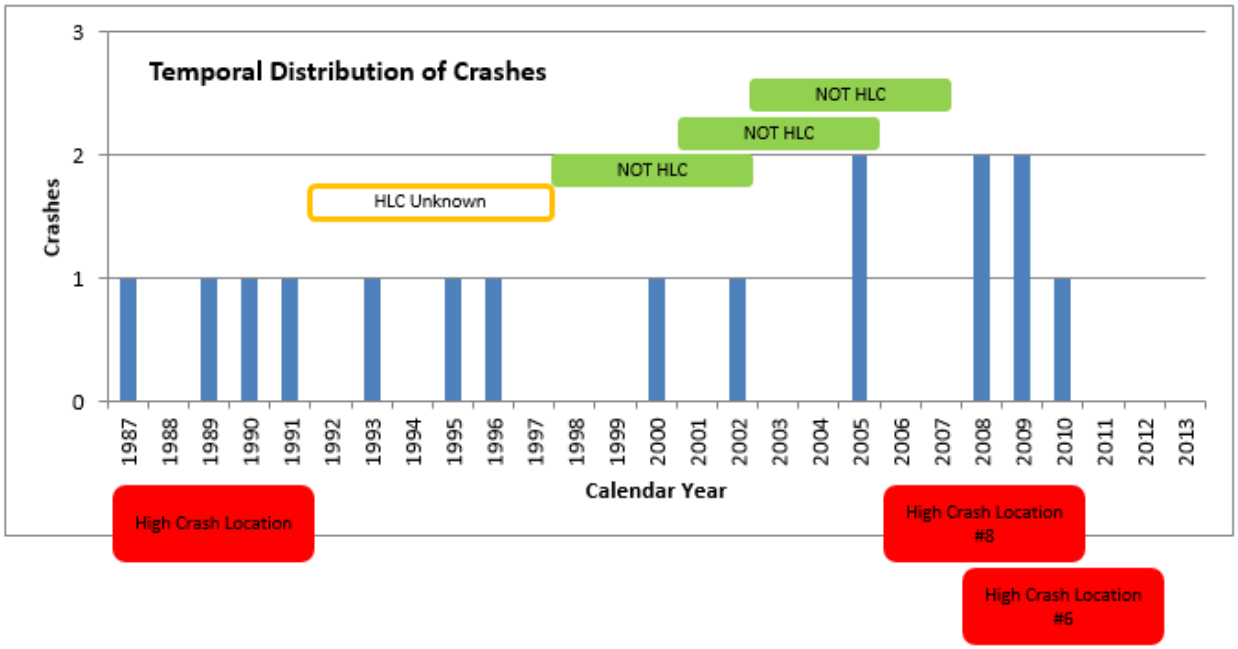
An all-way stop control warrant analysis was performed by VTrans Traffic Research section using a turning movement count done in June 2014. This analysis determined that the traffic volumes were low and not meeting any of the volume related criteria found in the Manual on Uniform Traffic Devices (MUTCD). The analysis determined also that the crash warrant was also not met as there were not at least five crashes in a twelve-month period at this intersection susceptible of correction by all-way stop.

While the MUTCD warrants for all-way stop control are not met, the crashes that are taking place at this intersection are of the right angle type and correctable by multi-way stop control.

Crash History

This intersection was defined as a high crash location in the 2008 to 2012 listing. The intersection is currently not listed as a high crash intersection in the latest 2010-2014 listing.

Historically and as illustrated below, this intersection has been classified as a high crash intersection at different times in the past.



For this Road Safety Audit, crash data was reviewed at the intersection for the five-year period covering the years 2010 to 2014. A collision diagram and the crash narratives for each of the crashes are provided at the end of this report.

There were seven crashes reported at this intersection during the 2010-2014 period with crash narratives available for six of them. In addition, Vermont State Police provided information for one non-reportable crash for the same period.

Overall, right angle crashes represent one hundred percent of all the crashes for which a report was available at this intersection. This crash pattern is consistent with past trends. One crash out of these seven crashes involved a left turn crash while the other six crashes were broadside crashes.

With the exception of the non-reportable crash that involved a northbound vehicle, each of the broadside crashes involved a vehicle that was traveling southbound on Berkshire Center Road.

For the broadside crashes that involved a southbound vehicle, sixty percent of the crashes involved a vehicle that was traveling from Richford Road, and forty percent, a vehicle that was traveling from Water Tower Road.

A review of the crash narratives indicates that motorists on the east approach came to a stop before proceeding through the intersection while the ones on the west approach would have run the stop sign. There is no specific information available for the non-reportable crash between an eastbound vehicle and a northbound one.

Current Local Concerns

Bethany Remmers commented via email that the signs that were added, as part of the High Risk Rural Road program a few years ago, did improve the situation.

Bethany further mentioned that excessive speed and impaired driving were definitely a concern.

Bethany also added that Berkshire Center Road had a lot of bicycle traffic because of the border crossing just north of the intersection.

Identified Safety Concerns

This section lists the areas of safety concern identified by the audit team during the site inspection and from the analysis of available data. This section also reports the potential safety enhancements suggested by the audit team. The concerns are not listed in order of importance.

Concern: Corner Sight Distance Issue, Northwest Quadrant

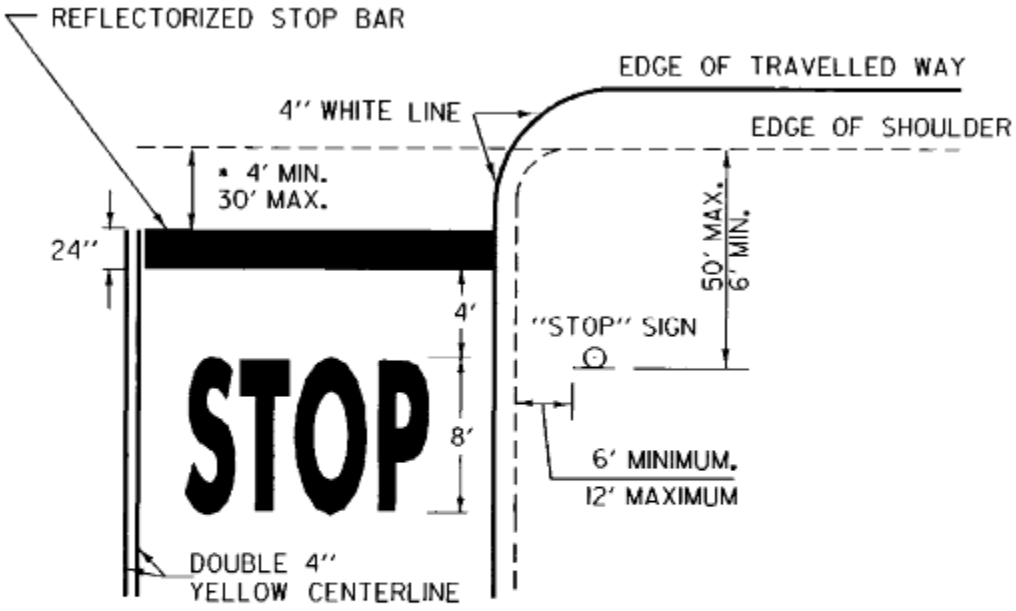
The corner sight distance when stopped on Water Tower Road and looking to the left (north) is poor *(measured at 384 feet, which is below the required 555 feet value for the 50 mph posted speed limit)*. The presence of brush/trees contributes to this issue.

Safety Enhancements:

Ensure that the stop bar is located four feet from the edge of the road to maximize corner sight distance and that it is visible and refreshed on a yearly basis as needed (see the detail below).

Office of Highway Safety

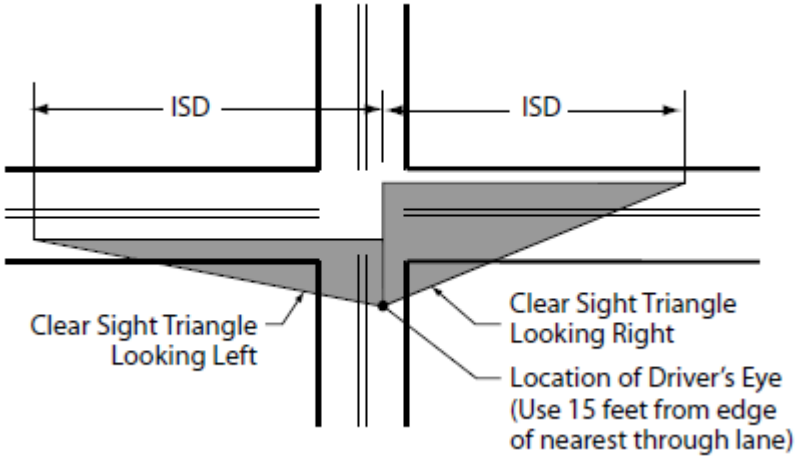
Road Safety Audit Review



• THE "DESIRED STOPPING POINT" IS THE LOCATION BASED ON SITE CONDITIONS THAT BEST ALLOWS THE STOPPED VEHICLE TO VIEW THE APPROACHING TRAFFIC.

STOP BAR LAYOUT

Provide a clear sight triangle by removing any obstructions that are located inside the boundaries of the triangle.



Note, Intersection Sight Distance (ISD) for 35 mph is 390 ft, for 40 mph, 445 feet and 555 ft for 50 mph as per AAHSTO.

Add an advisory plaque to the northbound advance warning intersection assembly that would match the speed for the corresponding available corner sight distance (35 mph plaque).

Concern: Corner Sight Distance Issue, southeast Quadrant

The corner sight distance when stopped on Richford Road and looking to the left (south) is poor *(measured at 440 feet, which is below the required 555 feet value for the 50 mph posted speed limit)*. The crest of the road on VT 118 contributes to this issue.

Safety Enhancements:

Ensure that the stop bar is located four feet from the edge of the road to maximize corner sight distance and that it is visible and refreshed on a yearly basis as needed (see previous layout diagram).

Add an advisory plaque to the northbound advance warning intersection assembly that would match the speed for the corresponding available corner sight distance (40 mph plaque).

Evaluate what gain in corner sight distance could be achieved by lowering the road.

Evaluate if a roundabout or a mini roundabout could be constructed at this intersection.

Concern: Issue with Motorists Not Stopping on Water Tower Road

A review of the crash narratives indicated that, for the right angle crashes that involved motorists on Water Tower Road, these motorists did not stop at the stop sign.

Safety Enhancements:

Conduct a stop sign compliance observation survey to document the issue.

Based on the results, contract with the Sheriff or VSP to enforce stop sign compliance.

Based on the results, install a solar beacon above the stop sign.

Install a Cross Traffic Does Not Stop plaque below the stop sign (W4-4). Install a plaque also below the right hand stop sign on Richford Road.

Concern: Perceived High Traveling Speed

It is perceived that traveling speeds on Berkshire Center Road are High.

Safety Enhancements:

Conduct a speed study to document the issue. Potential survey point could be near pole BT/7c to capture traffic in the southbound direction and by pole 39C/3 to measure the speed of traffic traveling in the northbound direction.

Based on the results, contract with the Sheriff or VSP to enforce the speed, targeting the drivers who are traveling at or above the 90th percentile speed as per the guidance by the National Highway Traffic Safety Administration.

Based on the results, consider a reduction in the posted speed limit or the creation of a school zone speed limit.

Summary of Safety Enhancements

The safety concerns and potential actions that were identified in the previous sections are further summarized in the next table. These potential enhancements will be presented to the Town for further consideration.

Potential Safety Enhancements Summary Table

Safety Concern	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
The corner sight distance when stopped on Water Tower Road and looking to the left (north) is poor (measured at 384 feet, which is below the required 555 feet value for the 50 mph posted speed limit). The presence of brush contributes to this issue	Ensure that the stop bar is located four feet from the edge of the road to maximize corner sight distance and that it is visible and refreshed on a yearly basis as needed	Town of Berkshire	Med (19%[1])	Short	Low
	Provide a clear sight triangle by removing any obstructions that are located inside the boundaries of the triangle	Town of Berkshire	High (48% red Inj, 11% PDO CMFID 307, 308)	Short	Low- Med
	Add an advisory plaque to the northbound advance warning intersection assembly that would match the speed for the corresponding available corner sight distance (35 mph plaque)	Town of Berkshire	Low	Short	Low
The corner sight distance when stopped on Richford Road and looking to the left (south) is poor (measured at 440 feet, which is below the required 555 feet value for the 50 mph posted speed limit). The crest of the road on VT 118 contributes to this issue.	Ensure that the stop bar is located four feet from the edge of the road to maximize corner sight distance and that it is visible and refreshed on a yearly basis as needed	Town of Berkshire	Med (19%[2])	Short	Low
	Add an advisory plaque to the northbound advance warning intersection assembly that would match the speed for the corresponding available corner sight distance (40 mph plaque)	Town of Berkshire	Low	Short	Low
	Evaluate what gain in corner sight distance could be achieved by lowering the road	NRPC	High (48% red Inj, 11% PDO CMFID 307, 308)	Mid	Med
	Evaluate if a roundabout could be constructed at this intersection.	NRPC	High (58% Reduction CMFID 207)	Mid	Med

[1] http://safety.fhwa.dot.gov/tools/crf/resources/fhwasa08011/page2.cfm#linktarget_6 (install stop bar)
[2] http://safety.fhwa.dot.gov/tools/crf/resources/fhwasa08011/page2.cfm#linktarget_6 (install stop bar)

Safety Concern	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
A review of the crash narratives indicated that, for the right angle crashes that involved motorists on Water Tower Road, these motorists did not stop at the stop sign	Conduct a stop sign compliance observation survey to document the issue	NRPC		Short	Low
	Based on the results, contract with the Sheriff or VSP to enforce stop sign compliance	Town of Berkshire	Med	Mid	Med
	Based on the results, install a solar beacon above the stop sign	Town of Berkshire	High (41% reduction right angle)	Short	Low ($1,700 each)
	Install a Cross Traffic Does Not Stop plaque below the stop sign (W4-4). Install a plaque also below the right hand stop sign on Richford Road	Town of Berkshire	Low-Med	Short	Low
It is perceived that traveling speeds on Berkshire Center Road are High	Conduct a speed study to document the issue. Capture the motorists that are approaching the intersection only	NRPC		Short	Low
	Based on the results, contract with the Sheriff or VSP to enforce the speed, targeting the drivers who are traveling at or above the 90th percentile speed as per the guidance by the National Highway Traffic Safety Administration	Town of Berkshire	Med	Mid	Med
	Based on the results, consider a reduction in the posted speed limit or the creation of a school zone speed limit	Town of Berkshire	Med	Mid	Low