Office of Highway Safety

Road Safety Audit Review

Town:	Barre City	**Date Reviewed:**	September 3, 2015
Route:	Prospect St and Berlin St Intersection	**Mile points:**	Prospect: 0.539, Berlin: 0.000

Location Map

RSAR Process

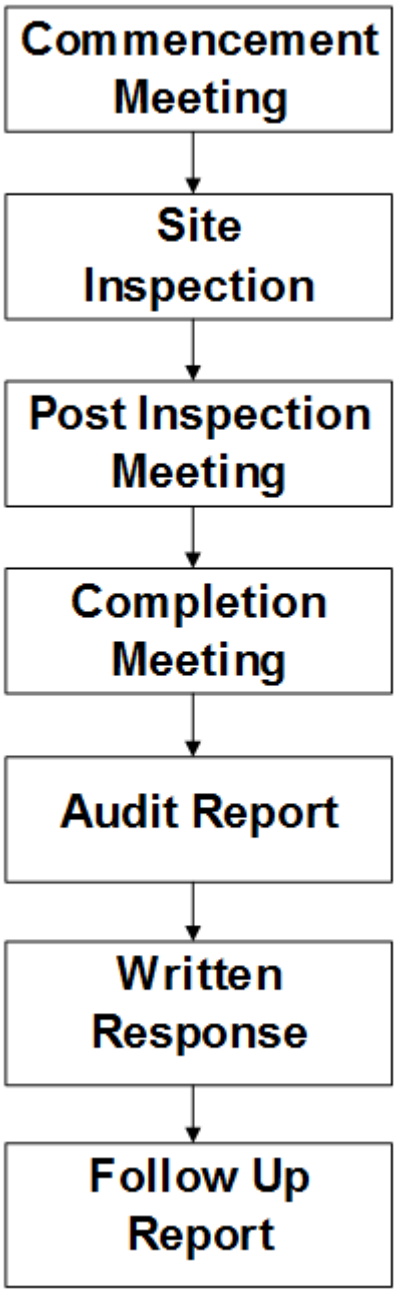
A ***Road Safety Audit Review*** (RSAR) is a formal examination of an existing road in which an independent, multi-discipline team (the Audit Team) reports on potential safety issues.

Office of Highway Safety

Road Safety Audit Review

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 Prospect Street, Berlin Street and Westwood Parkway in Barre City.

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
Pat McManamon,	Department of Motor Vehicle, VTRANS
Andrew Marceau,	Barre City Police
Steve Micheli,	Barre City Public Works

Information Reviewed

Geometry

This is a four-way intersection with Prospect Street running west to east, Westwood Parkway approaching the intersection from the south and ending at Prospect Street, and Berlin Street starting at Prospect Street and running north. The intersection is located in a residential area.

Prospect Street, when traveling eastbound towards the intersection is on a down grade.

The intersection is controlled by stop signs that are located on Berlin Street as well as on Westwood Parkway.

Lighting is provided directly at the intersection in the southeast corner of the intersection. There is also a luminaire on the southwest corner and another luminaire a few hundred feet away on Berlin Street.

Speed Limit

The posted speed limit is 25 mph on all streets.

Traffic Volumes

The 2012 Average Annual Daily Traffic on Prospect Street was 1700 vehicles per day west of the intersection while it was 1600 vehicles per day east of the intersection.

On Berlin Street, the 2012 Average Annual Daily Traffic was 2000 vehicles per day.

Signs and Markings

Stop signs are located on the side roads, on the right hand side of the Berlin Street approach and of the Westwood Parkway approach. A street name sign is installed above each stop sign.

In addition, on the Berlin Street approach, there is a “no commercial vehicles over 160000 lbs gross” sign below the stop sign and a green route marker below this weight limit sign. This assembly is installed on a round post.

The stop bars are faded on both approaches. There is also a crosswalk on the Westwood Parkway approach that is partially faded. Faded crosswalks are also visible on the Prospect Street approach as well as on the east approach on Prospect Street.

There are double yellow centerline markings on Prospect Street and Berlin Street but not on Westwood Parkway.

Pavement Conditions

Pavement condition was visually observed to be good on Prospect Street. Cracking was observed on Westwood Parkway.

Past Projects

Recent past projects are unknown.

Future Projects

Future projects are unknown.

Traffic Studies

The City of Barre installed a speed cart with speed measuring capabilities on Prospect Street back in September 2014. The cart was in placed between September 5 and September 11 2014. The results indicated that the 85th percentile speed was 34 mph and that the average speed was 29 mph.

Crash History

Crash history was reviewed at the intersection for the five-year period covering the years 2010 to 2014. This intersection is defined as a high crash intersection in the 2010-2014 listing.

A collision diagram and the crash narratives for each of the crashes are provided at the end of this report.

There were thirteen crashes reported at this intersection during the 2010-2014 period.

Overall, eighty-five percent of these crashes were right angle crashes (11 out of 13 total crashes). Of these right angle crashes, eighty-two percent happened on the Berlin Street approach.

The principal crash pattern is therefore a right angle crash between a vehicle entering Prospect Street from Berlin Street and a vehicle traveling on Prospect Street. This overall crash pattern represents sixty-nine percent of all the crashes at this intersection. Specifically, two sub-crash patterns can be identified. The first involved a vehicle that is traveling on Prospect Street from the east (thirty-eight percent, 5 out 13 total crashes) and the other, involving a vehicle that is traveling from the west on Prospect Street (thirty-one percent, 4 out of 13 total crashes).

From a review of the crash narratives, it was determined that the motorists on Berlin Street intended to continue across the intersection onto Westwood Parkway. It was further determined that these motorists stopped at the stop sign and continued across Prospect Street as they did not see any oncoming traffic. In only once case did a motorist fail to stop as a result of not seeing the stop sign.

Current Local Concerns

The City reported that most of the motorists that were traveling through this intersection were familiar with it and that they were leaving nearby.

The City indicated that there were some issues with people cutting the corner (Berlin Street to Prospect Street westbound). This was observed also by the audit team while conducting the field visit.

The City indicated that they had received complaints about the bush that is located in the northwest corner of the intersection.

The City also reported that the issue at this intersection could be similar to what was happening at VT 63 and Miller Road and that motorists had difficulties judging the speed of oncoming traffic as well as how far oncoming traffic was.

There was a discussion in the field as to whether the painted crosswalks should be present given that they do not lead to a sidewalk, with the exception of the piece of sidewalk on the northeast corner.

Identified Safety Concerns

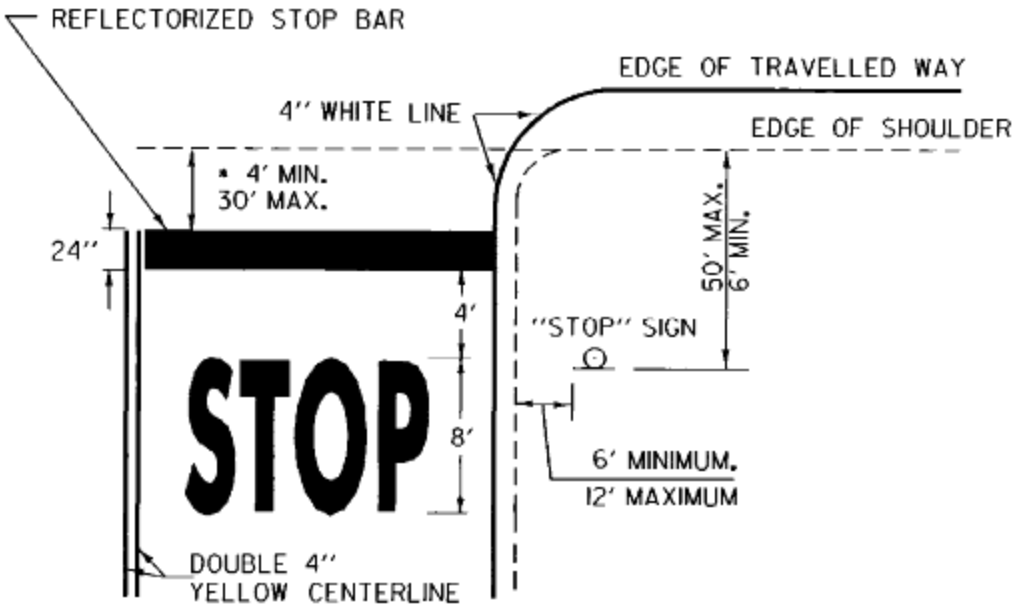
This section lists the areas of safety concern identified by the audit team during the site inspection and from the analysis of available data. This section also reports the potential safety enhancements suggested by the audit team. The concerns are not listed in order of importance.

Concern: Corner Sight Distance Issue, Northwest Quadrant

The corner sight distance when stopped on Berlin Street and looking to the right (west) is impeded by the presence of a fence covered with leaves and of a bush.

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.

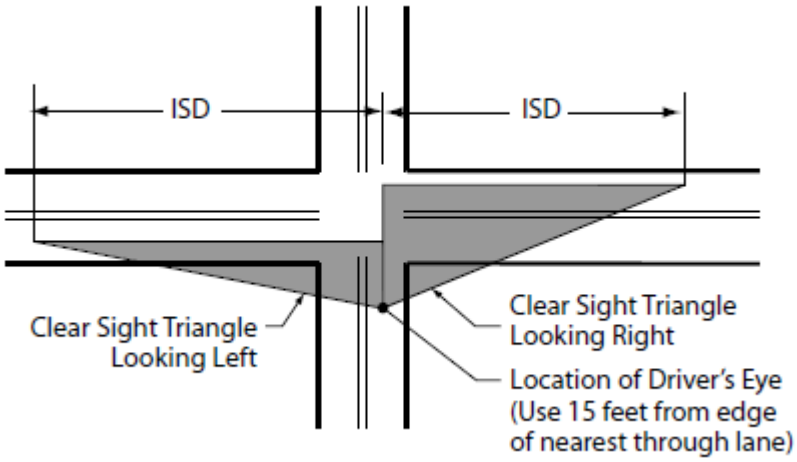


* THE ''DESIRED STOPPING POINT'' IS THE LOCATION BASED ON SITE CONDITIONS THAT BEST ALLOWS THE STOPPED VEHICLE TO VIEW THE APPROACHING TRAFFIC.

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 25 mph is 280 ft, for 30 mph, 335 feet and 390 ft for 35 mph as per AAHSTO.



Concern: Corner Sight Distance Issue, Northeast Quadrant

The corner sight distance when stopped on Berlin Street and looking to the left (east) is impeded by the presence of trees and brush.

Safety Enhancements:

Provide a clear sight triangle (as explained previously) by removing any obstructions that are located inside the boundaries of the triangle.

Concern: Corner Sight Distance Issue, Southwest Quadrant

The corner sight distance when stopped on Westwood Parkway and looking to the left (west) is possibly impeded by the presence of brush.

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).

Provide a clear sight triangle (as explained previously) by removing any obstructions that are located inside the boundaries of the triangle.

Concern: Issue with Crosswalks that Corner Sight Distance Issue, Southwest Quadrant

With the exception of one terminal, the painted crosswalks at this intersection do not connect to a safe landing.

As per VTrans guidance, it is an unsafe practice to install crosswalks in the absence of sidewalks unless adequate shoulders exist for use by pedestrians[1].

Safety Enhancements:

Remove the crosswalks.

Concern: Westwood Parkway Approach Lacks Conspicuity

The Westwood Parkway approach is extremely wide and lacks definition.

Safety Enhancements:

Install thirty feet of yellow center line on the Westwood Parkway approach from the stop bar.

Consider removing pavement on the southwest corner or use crosshatch markings to reduce the width of the approach.

Concern: Possibly Non-Breakaway Post Used for Stop Sign

The stop sign on Berlin Street is installed on a round post that is most likely not breakaway.

Safety Enhancements:

Install the stop sign on a new two-inch square post.

[1] http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/highway/TrafficOpsCrosswalk_Guidelines_2004.pdf, page 14

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 City 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 Berlin Street and looking to the right (west) is impeded by the presence of a fence covered with leaves and of a bush	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	Barre City	Med (19%[2])	Short	Low
	Provide a clear sight triangle by removing any obstructions that are located inside the boundaries of the triangle	Barre City	High (48% red Inj, 11% PDO CMFID 307, 308)	Short	Low- Med
The corner sight distance when stopped on Berlin Street and looking to the left (east) is impeded by the presence of trees and brush	Provide a clear sight triangle by removing any obstructions that are located inside the boundaries of the triangle	Barre City	High (48% red Inj, 11% PDO CMFID 307, 308)	Short	Low-Med
The corner sight distance when stopped on Westwood Parkway and looking to the left (west) is possibly impeded by the presence of brush	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	Barre City	Med (19%[3])	Short	Low
	Provide a clear sight triangle by removing any obstructions that are located inside the boundaries of the triangle	Barre City	High (48% red Inj, 11% PDO CMFID 307, 308)	Short	Low-Med
The painted crosswalks at this intersection do not connect to a safe landing	Remove the crosswalks	Barre City	Med	Short	Low

[2] http://safety.fhwa.dot.gov/tools/crf/resources/fhwasa08011/page2.cfm#linktarget_6 (install stop bar)
[3] 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
The Westwood Parkway approach is extremely wide and lacks definition	Install thirty feet of yellow center line on the Westwood Parkway approach from the stop bar	Barre City	Low (1% red serious/min or injury CMFID 87)	Short	Low
	Consider removing pavement on the southwest corner or use crosshatch markings to reduce the width of the approach	Barre City		Short-Mid	Low-Med
The stop sign on Berlin Street is installed on a round post that is most likely not breakaway	Install the stop sign on a new two-inch square post	Barre City	High (if sign is hit)	Short	Low