Office of Highway Safety

Road Safety Audit Review

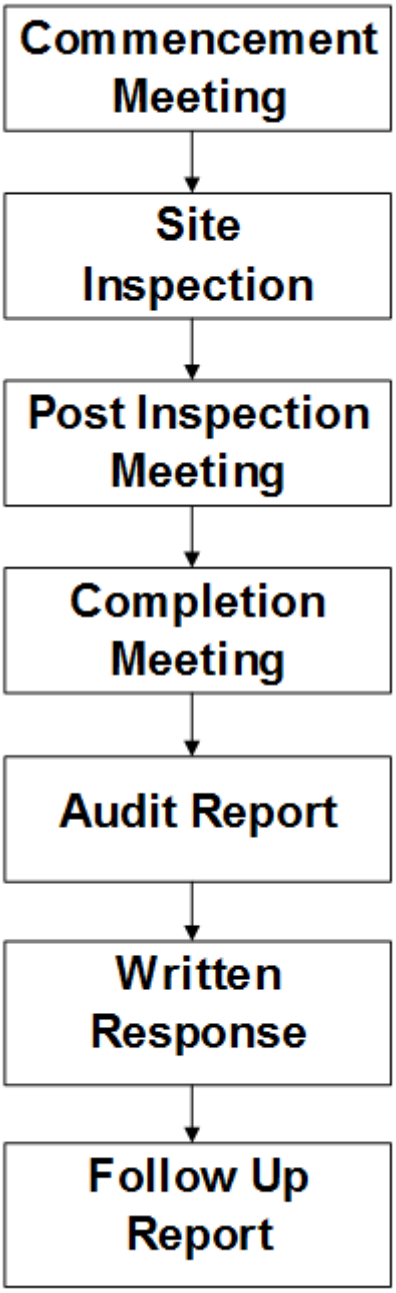
Town:	Swanton	**Date Reviewed:**	September 7 2016
Route:	VT 207	**Mile points:**	VT 207 MM 1.57-1.87

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 section of road on VT 207 between mile points 1.57 and 1.87 in Swanton. This segment is located south of Hazard Road and north of Bushey Road. This is a rural area bounded by farm fields on either side of the road.

Purpose of the RSAR

This RSAR was conducted as part of VTrans Highway Safety Improvement Program (HSIP). The locations selected for this HSIP effort were originally identified as high crash locations and subsequently ranked in terms of fatal and injury crash rate.

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:

Jim Cota,	District 8, VTrans
Tom Fields,	GHSP, VTrans
Tyler Guazzoni,	TSMO, VTrans
Pat McManamon,	DMV, VTrans
Ritch Kelley,	Swanton Public Works
Leonard Stell,	Swanton Police Department
Bethany Remmers,	Northwest RPC

Information Reviewed

Geometry

This section of VT 207 is a two-lane road with an eleven-foot lane and a narrow two-foot shoulder in each direction.

The specific section is bounded between mile points 1.57 and 1.87. Within this section, there is a four-degree horizontal curve from mile point 1.69 to mile point 1.79. This is a curve to the right when traveling north on VT 207.

According to GIS data from the VTrans Mapping Unit, still when traveling north, there is a six percent vertical downgrade from mile point 1.61 to mile point 1.73 as well as a positive upgrade from mile point 1.895 to 1.946.

The pavement surface of this section of VT 207 is rated as fair. The year the road was last paved was in 2004 (VTransparency, December 2016).

Pavement edge drop off and pavement edge crumbling were observed on the outside of the curve.

Speed Limit

The posted speed limit on VT 207 is 50 mph.

The Technical Services Section of the VTrans Maintenance and Operation Bureau performed a speed study in September 2016 on VT 207. Speeds were measured in a range between mile points 1.78 and 1.82.

The results showed that the 85th percentile speed was 54 mph (meaning that 85% of the traffic travels at a speed of 54 mph or less) and that the 90th percentile speed was 55 mph.

The results of this study also showed that the 10-mph pace, which is defined as the range of speeds that encompasses the highest proportion of vehicles, was between 46 and 55 mph with sixty-seven percent of all vehicles.

The 50 mph speed limit was determined to be adequate for traveling around the horizontal curve when traveling southbound (this was determined using a ball bank indicator).

Traffic Volumes

The 2014 Average Annual Daily Traffic on VT 207 was 2100 vehicles per day.

Traffic Signs

There are no traffic signs within or in the vicinity of this section. There are, however, “no passing zones” markings as follows:

Northbound from mile point 1.60 to mile point 1.74;
Northbound and southbound from mile point 1.74 to mile point 1.82;
Southbound from mile point 1.82 and mile point 1.94.

Past Projects

Project STP 2114(1)S was for the resurfacing of VT 207. This project was completed in 2004.

Future Projects

No future projects were identified for this area.

Crash History

The crash history was reviewed along this segment for the six-year period covering the years 2010 to 2015. A total of six crashes were reported during this period. Crash narratives are provided at the end of this report along with a collision diagram.

The principal crash pattern at this location is a single vehicle that went off the road. This crash pattern represents five out of the six crashes within this section (83%). The majority of these run off the road crashes took place between the months of June and September (80%), under clear conditions. With the exception of one crash that took place in the evening, all of these run off the road crashes also happened in the afternoon between the hours or 2:30 pm and 5: 30 pm and most happened when travel was in the southbound direction (60%, with one crash unknown).

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: Substantively[1] Unsafe Curve

There is a clear run off the road crash pattern attributable to the presence of the horizontal curve in this section of VT 207. While this 0.3-mile section of VT 207 is a high crash location, the crashes are concentrated at the curve. Most crashes are in the southbound direction.

Safety Enhancements:

Short to Mid Term

Install a southbound curve warning sign in advance of the curve.

Long Term

Increase the shoulder width on the outside of the curve (potentially with a future paving project).

[1] A roadway could be nominally safe (i.e., all design elements meet design criteria) but at the same time substantively unsafe (i.e., it reflects a high crash problem relative to expectations). Source: http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter1/1_comparnominal.htm

Concern: High Travel Speeds

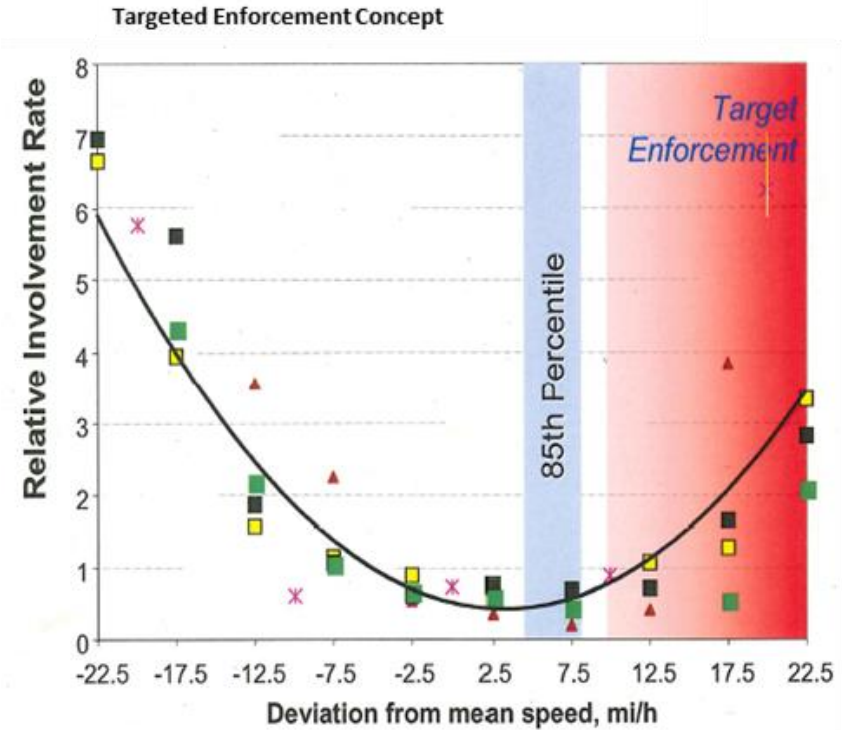
The 85th speed on this road was measured to be 55 mph.

Safety Enhancements:

Conduct recurring speed limit enforcement campaigns for the high-risk drivers.

Consider targeting, for the first month, drivers who are in the top five percent of speeders (in this case, over 59 mph) and later on targeting motorists who are traveling at or above the 90th percentile speed (55 mph in this case) as per the following concept suggested by NHSTA:

The graph below from NHSTA shows that the crash involvement rate increases as traveling speeds deviate from the 85th percentile speed. This means that targeting motorists who are traveling above the 85th percentile speed will apprehend motorists who are more likely to cause a crash. Crash involvement starts to increase more drastically 5 mph above the 85th percentile speed or around the 90th percentile speed.



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 respective parties for further consideration.

Potential Safety Enhancements Summary Table

Safety Concern	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
Substantively Unsafe Curve (*Clear southbound run off the road crash pattern at the horizontal curve*)	Install a southbound curve warning sign in advance of the curve	VTrans (TSMO)	Low	Short	Low
	Increase the shoulder width on the outside of the curve (implement with a future project)	VTrans (AMP)	29%[2] reduction (if go from 2 ft to 4 ft)	Long	Mid
High Travel Speeds	Conduct recurring speed limit enforcement campaigns for the high-risk drivers: 1st month, target top 5% drivers (over 59 mph) and later on, the top 10% (over 55 mph)	Swanton	21% crash reduction?[3]	Mid	Mid

[2] http://safety.fhwa.dot.gov/roadway_dept/horicurves/fhwasa07002/ch6.cfm , see section called Widen Shoulder
[3] Accident Analysis & Prevention, Volume 37, Issue 6, November 2005, Pages 1135–1144

COLLISION DIAGRAM

Key Number =

MUNICIPALITY:	COUNTY:
INTERSECTION: VT 207	
PERIOD: 6 YEARS 0 MONTHS	FROM 1/1/2010 TO 12/31/2015
FILE: swavt207	
CASE # :	
BY:	DATE: 9/2/2016

SYMBOLS		MANNER OF COLLISION	
MOVING VEHICLE	P PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE	FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER	Fatal	OUT OF CONTROL	SIDE SWIPE

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
1	VT 207	1.68	8/6/2011	14:33	Clear	1	0	Single Vehicle Crash	On August 6, 2011, a single vehicle rollover. Vehicle 1 was on the east side of the roadway facing north on the drivers' side. The roadway was slightly curved and level. Operator 1 stated that he was heading into St. Albans and swerved to miss a man walking. He stated that he overcorrected and was in a fishtail. Operator 1 then stated that he hit the telephone pole and as the vehicle was flipping through the air, he was ejected out the driver's side window onto the corn field. Stated that he was not wearing a seatbelt. Officer explained to Operator 1 that he left the roadway and traveled on the gravel towards a pedestrian as there were marks in the gravel and gravel sprayed on the roadway were he drove off. The pedestrian stated that he was walking north on Route 207 facing southbound traffic. The pedestrian stated that he was on the corner and noticed the above vehicle not negotiating the corner and entering onto the gravel towards him. Investigation revealed that Operator 1 was traveling south on Route 207. Operator 1 went off the road way toward a pedestrian. When Operator 1 realized the situation he abruptly turned the wheel causing the vehicle to fish tail. The vehicle then skidded across the roadway before striking a telephone pole and flipping in the air. There were skid marks in the road

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
									showing the vehicle went off the west side of the road into the gravel. The vehicle then entered back onto the road way and lost control traveling sideways towards the telephone pole.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
2	VT 207	1.68	8/4/2013	17:13	Clear	1	0	Single Vehicle Crash	On August 4, 2013, near 2432 Highgate Road. An atv that had fallen out of the truck during the crash remained in a field near the crash scene. St Albans City Police Officers had located and stopped the white truck on RT 207 near Woods Hill Road. I was advised that the location where St Albans City Police had stopped the vehicle was the same location as the crash. The result of the breath test was .180%. Operator 1 advised he had been traveling south on Highgate Road when he observed a vehicle in his lane traveling north towards him. He stated he swerved off the roadway to avoid the crash. That was when the atv fell out of the truck. While speaking with Operator 1 I smelled a moderate odor of alcohol coming from his person. I also observed his eyes appeared watery and bloodshot. Witness #3 and property owner stated, " around 5 pm I was watching TV in my living room, when I heard a cracking noise in front of the house, I look out the living room window and saw a large white pick-up truck with a ATV on the truck bed, then the truck went off the west side of RT 207 at a high rate of speed, with the truck on the bank of the road, Then the ATV flew out the bed of the truck the continued to go south for about 100 yards and proceeded to stop in the woods, the driver then backed onto the bank of the

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
									road, back up some more then got back on the road "207" heading south". Investigation revealed Operator 1 was traveling south on RT 207 when he left the southbound lane of travel. Operator 1 claimed there was a vehicle in his lane of travel. His vehicle left the west side of the roadway traveled down an embankment and continued south along RT 207.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
3	VT 207	1.78	9/30/2013	12:18	Clear	2	0	Other - Explain in Narrative	On September 30, 2013. It should be noted that this involved a two-seater bike. Bicyclists advised that while they were driving their bike down the road, the truck came by and bumped them off the road, causing them to fall. They advised they were far enough over to the right. Operator 1 advised that while he was following the tractor, another vehicle was headed northbound. He advised that while traveling south, the bicycle ended up moving to the left and bumped into his truck. The road at the time of the accident was dry and the weather was clear. There is an uphill slope and slight curve in the area of where the bike was struck. Both Operator 1 and the operators of the bicycle are still giving different accounts of how they were struck.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
4	VT 207	1.86	6/15/2014	17:38	Clear	1	0	Single Vehicle Crash	On 06/15/14 a single vehicle crash on Route 207 near box #2432, in Swanton. This section of roadway, when traveling south, is a slight downhill grade with a right to left hand curve in the road which then climbs up a slight incline after where the crash occurred. In surveying the scene, I observed that as the vehicle entered into the turn, the tire marks indicated that it left the roadway near the start of the turn. Off the edge of the roadway, I observed that the vehicle flipped at least one time before coming to rest on its tires facing the east. It appeared from the road surface evidence that the vehicle had been traveling southbound. The vehicle was observed to be approximately 20 feet off the roadway, in a ditch. Witness 1 advised that she had been traveling north and observed the vehicle traveling south. Witness 1 advised that she did not believe that the car was speeding. Witness 1 advised that she observed in her rearview mirror the vehicle go off the road and roll at least once if not twice. Operator 1 advised that she had her windows down and that a bee flew into the vehicle. Operator 1 advised that she tried to swat the bee and while doing so went off the road.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
5	VT 207	1.78	1/31/2010	23:16	Clear	1	0	Single Vehicle Crash	On January 31, 2010 at approximately 2316 hours, a One Vehicle collision, which occurred on VT Route 207. The road where the crash occurred is a flat road with a slight curve. It was clear and cold, and the roads were wet and patches of road were covered by snow. Op 1 advised that he was traveling north on Route 207 in route home from work and traveling approximately 50 mph because of snow and ice covered roads, he lost control of the vehicle and struck the telephone pole. Also advised that he was traveling 50 mph, but that must have been too fast for conditions, and advised that he was not wearing his seat belt. It was found that Op 1 was traveling North on VT Rt. 207 and when he approached the slight curve in the road, because of snow covered roads went off the road in a west direction and crossed the southbound lane of traffic and struck a telephone pole head on. The impact forced the vehicle to revert in a northwest direction and came to rest north of the pole.
6	VT 207	1.68	6/2/2015	14:32		0	0		No Report