Office of Highway Safety

Road Safety Audit Review

Town:	Charlotte	**Date Reviewed:**	July 13, 2015
Route:	US 7 at Ferry Road & Church Hill Road	**Mile points:**	US 7: 3.435

Location Map

RSAR Process

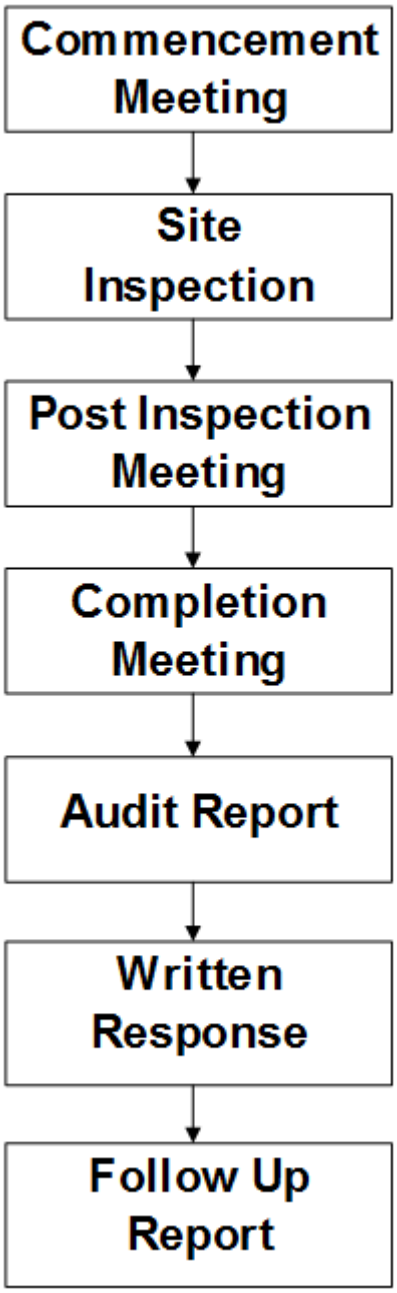
A ***Road Safety Audit Review*** (RSAR) is a formal examination of an existing road in which an independent, multi-discipline team (the Audit Team) reports on potential safety issues.

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 US 7, Ferry Road and Church Hill Road in Charlotte.

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
Johnathan Kaiser,	Office of Highway Safety, VTRANS
Dick Hosking,	District 5, VTRANS
Hugh Lewis Jr	Town of Charlotte
Sai Sarepalli,	CCRPC
James Whitcomb,	Vermont State Police

Information Reviewed

Geometry

This intersection is a 90-degree, signalized, four-way intersection. US 7 runs south to north while Ferry Road is on the west side of the intersection and Church Hill Road is on the east side of the intersection.

There is a dedicated auxiliary northbound left turn lane (500 ft) and a dedicated southbound right turn lane (184 ft).

Lighting is provided at this intersection with luminaires located on the strain poles in the southwest and the northeast corners of the intersection.

Speed Limit

The posted speed limit is 50 mph on US 7 and it is 25 mph on Ferry Road. There is no speed limit sign in the vicinity of the intersection on Church Hill Road.

Traffic Volumes

The 2012 Average Annual Daily Traffic on US 7 was 11000 vehicles per day south of the intersection and it was 12200 vehicles per day north of the intersection.

The most recent twelve-hour turning movement count at this intersection was done in 2012.

The count showed that the majority of the traffic at this intersection is traveling along US 7 through the intersection with ninety percent of the vehicles that are traveling northbound continuing through the intersection and with eighty-five percent of the southbound traffic continuing south.

In addition, on the US 7 southbound approach, fourteen percent of the traffic is turning right onto Ferry Road while five percent of the traffic is turning left onto Ferry Road from the northbound approach on US 7.

On the Ferry Road approach, forty-nine percent of the traffic is making a left turn onto US 7 while thirty-five percent is continuing across US 7 to Church Hill Road and sixteen percent is turning right onto US 7.

From Church Hill Road, sixty-one percent of the vehicles are continuing across to Ferry Road, thirty-two percent are turning left onto US 7, and seven percent are turning right onto US 7.

The 2012 Turning Movement Report is provided at the end of this report.

Signs and Markings

Traveling northbound, there is an intersection sign with a 1100 feet distance plaque near mile marker 3.218. This is followed by a destination board assembly at mile marker 3.253, and a US 7 route marker at mile 3.293. Closer to the intersection, there is a No Parking End sign and a lane assignment sign at the beginning of the northbound left turn lane (3.323). There is also a Left Turn Yield on Green Ball sign on the spanwire.

In the southbound direction, there is an intersection sign with a 1500 feet distance plaque around mile marker 3.738. This is then followed by an OBDS assembly (near mile marker 3.608), a destination board assembly (mile marker 3.563) and a US 7 route marker (mile marker 3.523). Near the intersection, there is a lane assignment sign at the beginning of the right turn lane (mile marker 3.573), and a Left Turn Yield on Green Ball sign on the spanwire above the intersection.

Pavement Conditions

Pavement conditions on US 7 is rated as good by VTrans (VTransparency Portal).

Past Projects

A safety project, HES 019-4(30) was completed in 2005. The project was for the removal of the left most northbound through lane on US 7 through the intersection. To accomplish this, a northbound left turn lane was created and a painted island was installed on the north side of the intersection.

US 7 was resurfaced by project NH 2907(1) in 2013. This project also installed radar dilemma zone protection on US 7.

Future Projects

There are no known planned projects near this intersection at this time.

Traffic Studies

The Technical Services Section of the VTrans Maintenance and Operation Bureau performed a speed study in March 2016. Speeds for traffic traveling on US 7 were measured at a distance of approximately 275 feet south of the intersection and at a distance of about 740 feet from the intersection south of the intersection. Only the speeds of the vehicles that were continuing through the intersection on US 7 were recorded.

The results showed that the 85th percentile speed for traffic approaching the intersection from the south (traveling northbound) was 52 mph. On the other hand, for traffic traveling southbound towards the intersection, the 85th percentile speed was 54 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 45 and 55 mph for southbound traffic with eighty-nine percent of all vehicles. The range of the 10-mph pace in the northbound direction was very similar, being between 46 and 55 mph with eighty-four percent of all vehicles.

During the conduct of the speed study, in the northbound direction, five percent of all vehicles traveled at a speed greater than 55 mph. In contrast, southbound, eleven percent of all vehicles traveled at a speed greater than 55 mph.

Crash History

Crash history was reviewed at the intersection for the five-year period covering the years 2010 to 2014. Crashes that took place during 2015 up to the time of this review were also examined to provide additional insight.

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.

It should be noted that dilemma zone protection was added to this intersection in 2013.

Ten crashes occurred at this intersection between 2010 and 2014. Two other crashes happened during the same period, at the two access points in the southeast quadrant on US 7 south of the intersection. For 2015, only one crash was reported at the intersection. This 2015 crash was a northbound rear-end crash.

Northbound rear-end crashes are the main crash pattern at this intersection (40%). Two of these crashes took place in 2010 and 2011 and two more in 2014. A narrative was available for three of the four crashes. From the review of these narratives, one of these four crashes could be specifically attributed to speeding.

Right angle crashes (broadsides and turning crashes) represented the second most important pattern at this intersection (40%). One of these right angle crashes took place in 2010, two in 2011 and another one in 2012.
Two of these right angle crashes involved a left turning vehicle off Ferry Road and a vehicle from Church Hill Road that was continuing straight onto Ferry Road. None of the crashes involved a through northbound vehicle. Only one involved a through southbound vehicle.

Current Local Concerns

Running the red light has been reported to be an issue by the Town. The audit team actually observed a northbound truck traveling through the red light while visiting the site.

The audit team observed tracks in the grassy area on the east side of US 7, possibly indicating that somebody who was traveling northbound drove off the road to avoid a crash.

The Town noted that, when the ferry was letting off vehicles, queues were forming at the intersection on Ferry Road and that some cars were continuing through the intersection during the yellow or red phase.

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: Northbound Red Light Running & Northbound Rear-End Crashes

The issue of red light running by a northbound vehicle was reported by the Town and observed in the field by the audit team during the site visit.

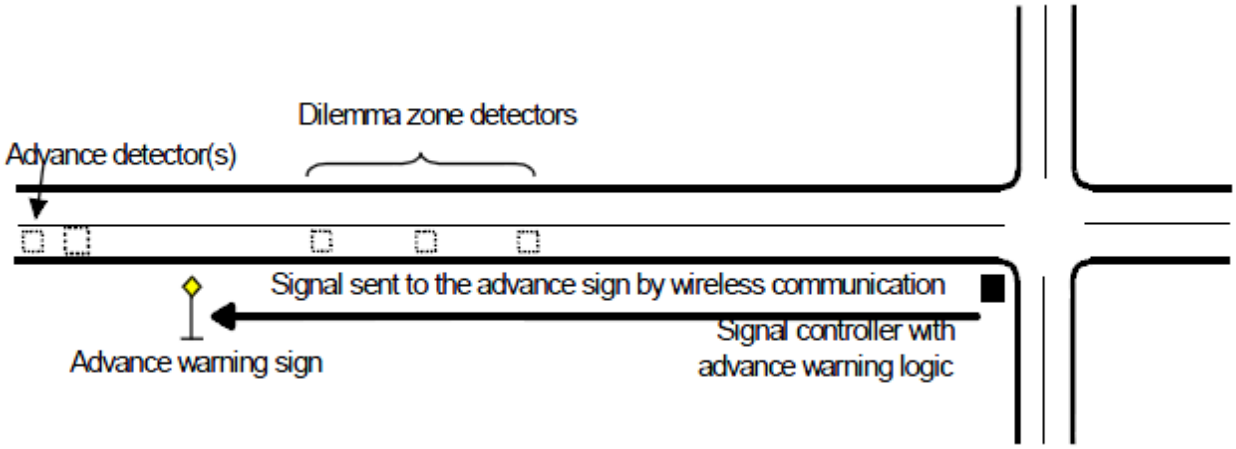
Northbound rear-end crashes are the principal crash pattern at this intersection.

Safety Enhancements:

Make the signal more conspicuous by adding yellow retroreflective tape around each backplate.

Review the dilemma zone protection settings for northbound traffic.

Install a Be Prepared to Stop Sign and beacon (downstream from the Signal Ahead sign) that would warn motorists of the upcoming end of green phase (as illustrated below).



Concern: Potential Safety Issue with Access in Close Proximity to the Intersection

There are two accesses in close proximity to the intersection and that interfere with the US 7 south approach.

Safety Enhancements:

Eliminate the access on US 7 that is closer to the intersection.

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 Director of the Office of Highway Safety for further consideration.

Potential Safety Enhancements Summary Table

Safety Concern	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
Northbound Red Light Running & Northbound Rear-End Crashes	Review the dilemma zone protection settings for northbound traffic	VTrans (TSMO)	Med (10%, CMFID 4857	Short/Mid	Low
	Install a Be Prepared to Stop Sign and beacon (downstream of the signal ahead sign) that would warn motorists of the upcoming end of the green phase	VTrans (TSMO)	High (at least 25% reduction in RLR, Farraher et al. 1999)	Mid	Med
	Make the signal more conspicuous by adding yellow retroreflective tape around each backplate	VTrans (TSMO)	Med (15%, CMFID 1410)	Short	Low
Potential Safety Issue with Access in Close Proximity to the Intersection	Eliminate the access on US 7 that is closer to the intersection	VTrans (District 5 and Utilities)	Low (7.7%, CMFID 1973)	Mid	Low