

Office of Highway Safety

Road Safety Audit Review

Town:	Weathersfield	Date Reviewed:	October 5, 2016
Route:	VT 131, US 5 and VT 12	Mile points:	VT 131: 8.28-8.60 US 5: 5.12, VT 12: 0.39

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.

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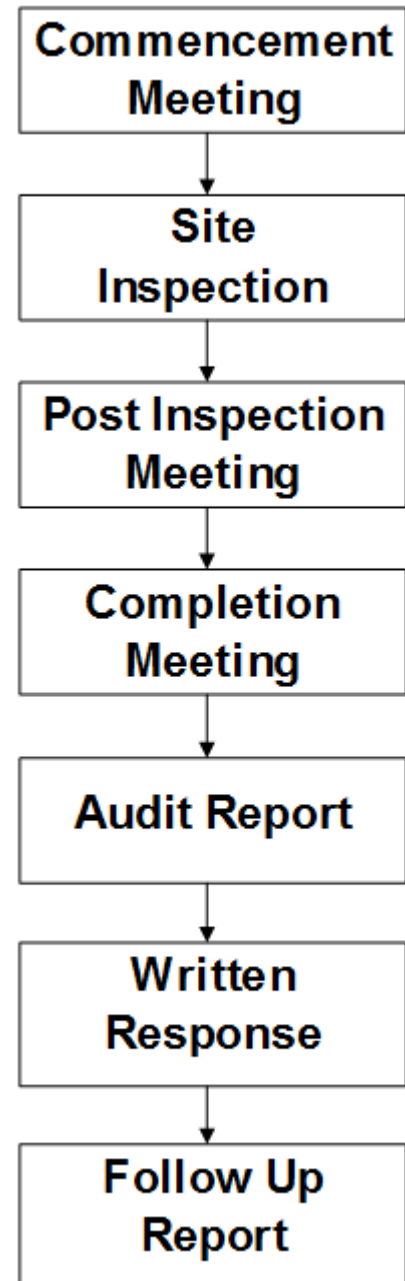
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According to the Federal Highway Administration (FHWA), the purpose of a RSAR is to determine which elements of the road may present a safety concern, to what extent and under what circumstances as well as to identify opportunities to mitigate the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

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.

Figure 1 - Road Safety Audit Process



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Location

The primary location of this RSAR is the intersection of VT 131, US 5 and VT 12 in Weathersfield. A secondary area of concern is the section of road on VT131 from the interstate to the US 5 intersection.

Purpose of the RSAR

The RSAR for the intersection of VT 131, US 5 and VT 12 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 for VT 131 between the interstate and the US 5 intersection was performed at the request of the Town of Weathersfield.

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, VAOT, was the RSAR coordinator.

The other participants were:

Meghan Brunk,	District 2, VAOT
Erin Lewis,	Traffic Design, VAOT
Pat McManamon,	DMV, VAOT
Marcos Miller,	TSMO, VAOT
Spencer Palmer	TSMO, VAOT
Kelsi Record	Traffic Design, VAOT

William Daniels	Weathersfield Police Department
Wes Hazeltine,	Highway Dpt, Town of Weathersfield
Darrin Spaulding,	Ascutney Volunteer Fire Department

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Katharine Otto,

Southern Windsor Regional Planning Commission

Information Reviewed

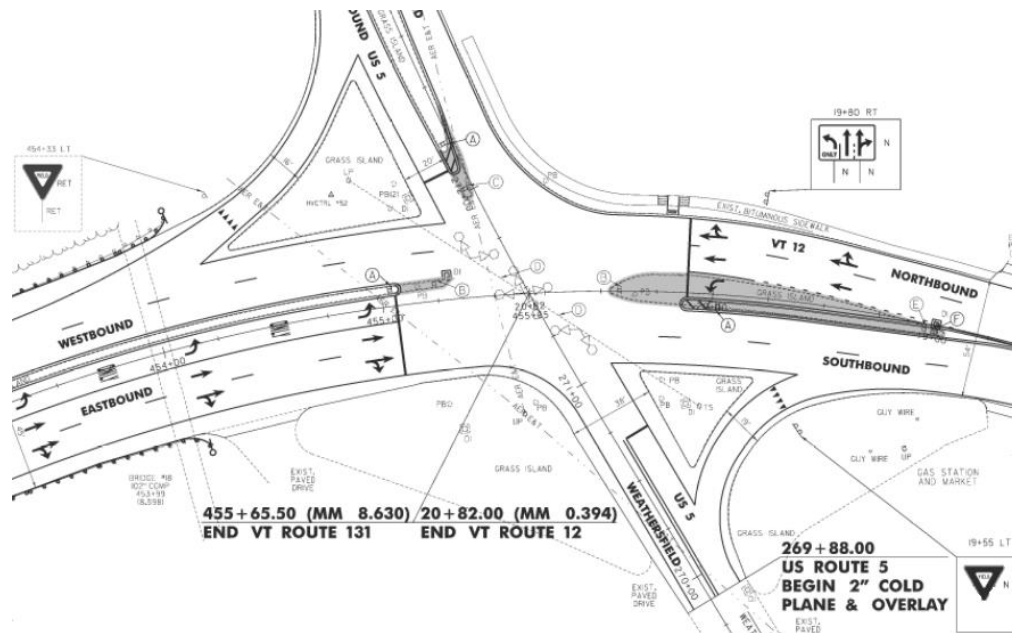
Geometry

VT 131 between the interstate and the US 5 intersection has two travel lanes in each direction. The lanes are twelve feet wide while the westbound shoulder is eleven feet wide and the eastbound shoulder is twelve feet wide.

There is a raised concrete island on VT 131 approaching the US 5 intersection when traveling eastbound. The VT 131 eastbound approach to the intersection has separate left turn, thru and thru/right turn lanes.

Prior to project Weathersfield NH 2948(1) in 2013, the VT 12 approach had two lanes of travel approaching the intersection. Since the project, there is now a dedicated left turn lane on this approach. The three lanes are now assigned as follows: A left turn lane, a thru lane and a shared thru/right turn lane. On both US 5 approaches, there is a slip lane for right turning traffic and a shared left/thru lane.

There is also a dedicated right turn lane on VT 131 at the I-91 northbound ramp.



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Speed Limit

The posted speed limit on VT 131 from I-91 to the US 5 intersection is 40 mph. The posted speed limit is also 40 mph on VT 12 approaching the intersection. On US 5, the posted speed limit is 40 mph south of the intersection and it is 30 mph north of the intersection.

A traffic count was taken by VTrans in May 2016 on VT 131 just east of I-91 (Location Y185). From this count, it can be determined that the 85th percentile speed would be around 48 mph (meaning that 85% of the traffic travels at a speed of 48 mph or less).

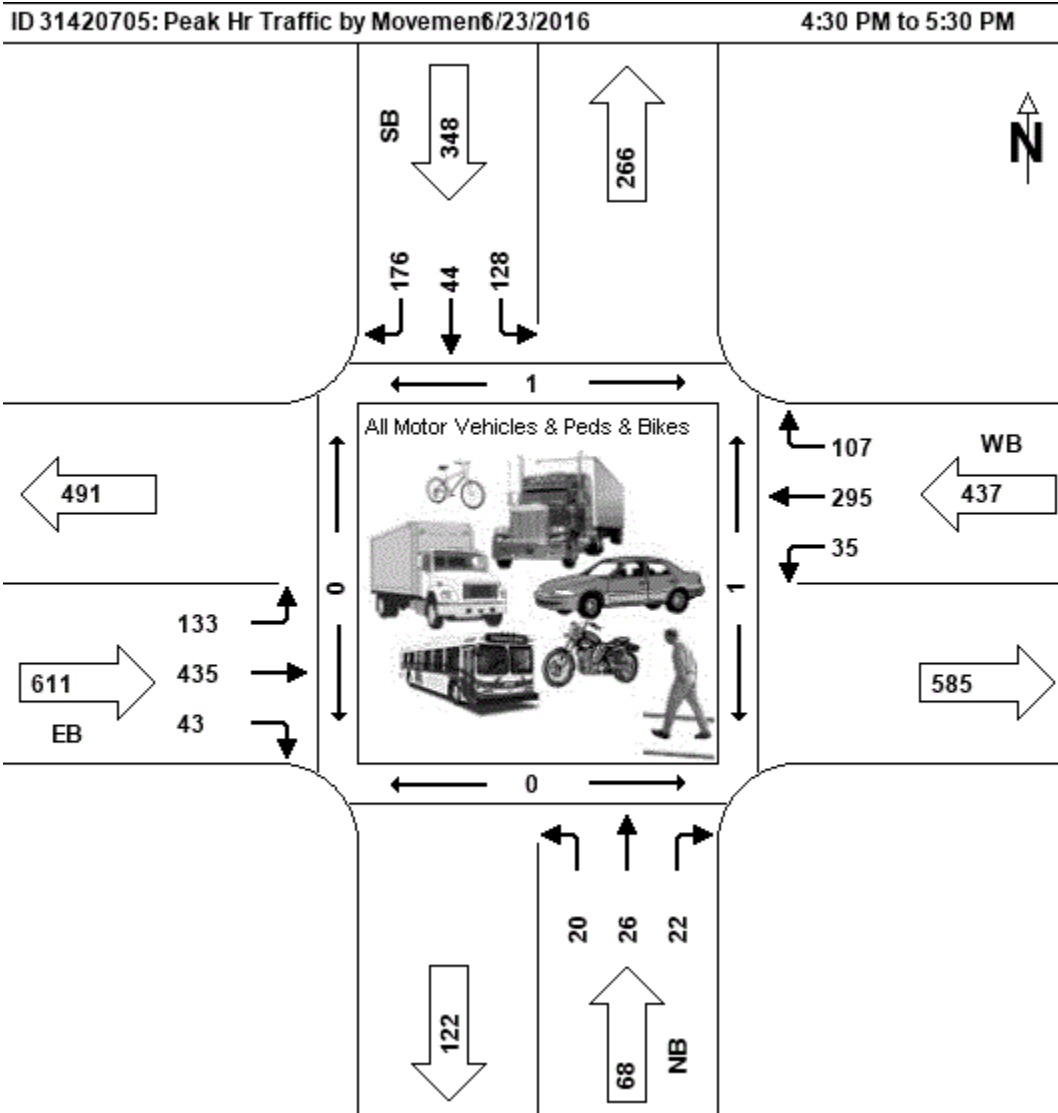
Traffic Volumes

As determined by the traffic count taken by VTrans on May 2016, the average daily traffic on VT 131 between the interstate and the US 5 intersection is around 10291 vehicles per day. Traffic is evenly distributed between the eastbound and the westbound direction (5085 vehicles per day: EB, 3206 vehicles per day WB).

A traffic count was performed at the intersection of US 5, VT 131 and VT 12 in June 2016 by VTrans. The heaviest peak hour was found to be the 4:30 to 5:30 pm time period. The diagram for this period is shown below. During this time period, traffic is heaviest traveling eastbound on VT 131 with 611 vehicles. Of these, 133 are making a left turn and 435 vehicles are driving through the intersection. The second heaviest movement is from VT 12 with 437 vehicles (235 continuing through and 105 making a right onto US 5 northbound). Traffic traveling southbound on US 5 towards the intersection is mostly make a right turn onto VT131 westbound or a left turn onto VT 12 eastbound.

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Traffic Signal

The intersection is controlled by a fully actuated traffic signal. Protected-permitted left turn phasing is provided on the eastbound and westbound approaches. Soft recall is set for the east-west thru directions. The vehicle extension is 3 seconds on all approaches. The maximum green time is 30 seconds for the east-west directions and 20 seconds for the north-south movements. The protected left turn phase has a max green time of 10 seconds. The yellow

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clearance interval is 4 seconds for all approaches and the all red is 2 seconds except for the north-south phases.

Past Projects

Project Weathersfield NH 2948(1) was for the paving on VT 131. As part of this project, the lane configuration on VT 131 was modified as previously described. In addition, a protected-permitted left turn phase with the flashing yellow indication was implemented.

Project STPG SIGN(33) was completed in October 2012 and was for the replacement of traffic signs on US 5.

Future Projects

There are no future projects planned as per VTrans information.

Crash History

The crash history was reviewed at the intersection as well as along VT 131 from the intersection up to the interstate for the five-year period covering the years 2011 to 2015. In reviewing the crashes reported for this period, it is important to note that modifications to the intersection and signal operations were made in 2013.

Overall, the main crash pattern at this intersection involved left turning vehicles and opposing thru vehicles. This crash pattern encompassed ten crashes of the fourteen crashes at this intersection (with most of them being from the VT 12 approach). However, of these ten crashes, six took place prior to the improvements at the intersection. In contrast, there were three left turn crashes of this type during the 2007-2010 period (out of a total of eight crashes).

There were seven crashes along VT 131 from Tenney Hill Rd and the approach to the US 5 intersection. Five of these seven crashes took place after the VT 131 paving project. Four involved a turning vehicle

There were fourteen crashes at the southbound I-91 off ramp I-91 during the reporting period.

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The main pattern was a right angle crash between a left turning vehicle and a vehicle traveling east (four occurrences).

The second crash pattern at this intersection was a right angle crash between a left turning vehicle and a vehicle traveling west (three occurrences).

There were also two instances during which a tractor-trailer collided with a passenger vehicle as both vehicles were making a right turn.

There were two rear-end crashes on VT 131 caused as a result of somebody waiting to make a turn onto the southbound on ramp (one crash in each direction on VT 131).

Two other crashes on the southbound off ramp resulted in single vehicle run off the road crashes.

Current Local Concerns

The RPC reached out to the local Police and Fire Departments to determine if there were still notable highway safety issues since the repaving project in 2013 when the intersection was reconfigured. As a result of this outreach, it was determined that there might have been more issues with motor vehicle crashes then before with a rollover crash being cited as an example.

There are non-reportable crashes at the US 5 intersection (that are not in Web Crash) that are taking place on the US 5 to VT slip lane. These are mostly property damage only rear-end crashes.

The Town reported to District 2 (via a letter dated August 17, 2016) that they had heard concerns about a dangerous situation for motorists who were trying to turn left across VT 131 in the area between I-91 and the US 5 intersection. The Town further brought up for VTrans consideration as a potential remedial action, the idea of installing a two-way left turning center lane from the interstate to about where the existing left turn lane starts for the US 5 intersection in addition to proposing a speed reduction.

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The RPC reported that a pedestrian signal was added to the traffic signal set up during the 2013 repaving project, with the condition that it would only be turned on if the sidewalk on the other side of the road was installed. There is currently no plan for a new sidewalk. The major reason for the signal being added was because the island in the middle of the road was removed when they added another lane of traffic going westbound. Pedestrians have to cross a wide intersection with several lanes and the island served as a refuge for pedestrians. A major generator of pedestrian traffic was the nearby restaurant which closed about one and a half year ago.

It was reported during the commencement meeting that the intersection of the I-91 southbound off ramp had limited visibility for traffic entering from the ramp (mostly due to the ledge, but also sometimes because of a vehicle stopped off the shoulder on the northeast quadrant). It was also mentioned that long trucks had to go to the left in order to make a right turn and that this had resulted in crashes with a passenger car also making a right turn at the same time.

It was also discussed that the right turn lane for traffic entering the northbound on ramp was concealed due to the westbound crest on VT 131 and that eastbound motorists were going around vehicles that were waiting to make a left turn onto the northbound on ramp.

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: General, US 5 Intersection

Improvements were made at this intersection in 2013. A left turn lane on VT 12 was added and a protected-permitted left turn phase was implemented. The crash data do not show an increase of crashes after these changes were made, indicating that motorists are adapting to the flashing yellow arrow permitted phase.

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Safety Enhancements:

An overall safety enhancement is to update the clearance and all red intervals to the latest NCHRP 731 guidance to prevent right angle crashes due to running the red light.

Concern: Left Turning Safety Issue on VT 131

It has been reported by the Town that making a left turning maneuver on VT 131 (between Tenney Hill Road and Cemetery Road) could be hazardous due to the fact that there are two lanes of traffic to cross and due to the traveling speeds being above the 40 mph speed limit.

Safety Enhancements:

Apply the Road Diet Concept and reduce the number of lanes from four to three lanes with the center lane being a two-way left turn lane (The current Annual Average Daily Traffic of about 5000 vehicles on VT 131 is well below the typical maximum volume thresholds for this type of conversion and its implementation would not affect capacity).

The crash reduction factor for all crashes for a two-way left turn lane is high (47%). It was determined that, to obtain a benefits to costs ratio of above 1 at this location, the limiting project costs would have to be no more than \$227,000.

Concern: Right Turn Lane at NB I-91 On Ramp

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The vertical crest on VT 131 limits the visibility to the on-ramp right turn lane.

Safety Enhancements:

Install an advance lane assignment sign east of the crest.

Extend the right turn lane east of the crest (by about 80 feet). Do this in conjunction with the new upcoming Jiffy Mart on the site of the Irving Station.

Reduce the number of accesses to the Irving Station site from two to one (with the upcoming Jiffy Mart).



Concern: Visibility of I-91 NB on Ramp

There have been issues reported concerning the visibility of the I-91 northbound on ramp and not being able to determine where to make the turn when it was foggy or during nighttime. This is an issue that has been mostly affecting eastbound motorists on VT 30.

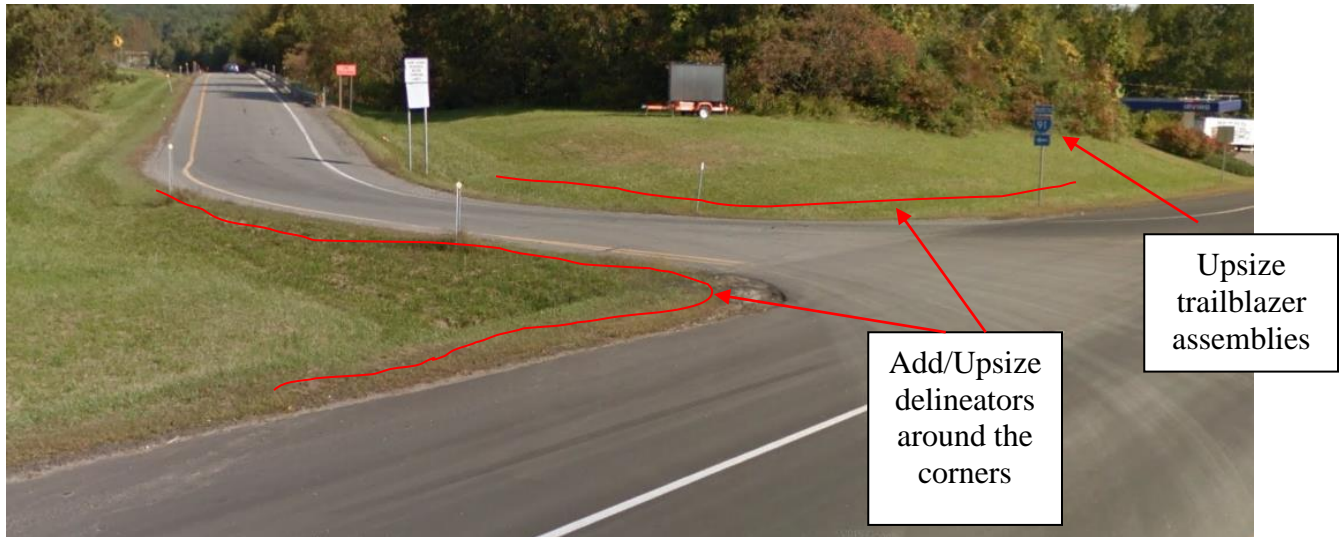
Safety Enhancements:

Install 6" x 8" delineators around the two corners of the intersection.

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Upsize the I-91 trailblazer assemblies that are located at the ramp to improve detection by turning motorists. Upsize both assemblies for both directions.



Concern: SB I-91 Off Ramp

Approaching VT 131 from the southbound off ramp, motorists partially lose sight of the intersection because of the quick hook on the ramp and the presence of some trees (that also conceal signs).

At the intersection with VT 131, corner sight distance to the right is limited by the ledge, and to the left, it has been anecdotally reported as being occasionally limited by a vehicle that stopped off the shoulder in the northeast quadrant.

Reporting of long trucks having to go to the left in order to make a right turn and crashing with a passenger car also making a right turn at the same time.

Safety Enhancements:

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Remove the trees that are growing out of the ledge on the left side of the ramp (these are interfering with signage and the view of the end of the ramp).

Consider making a left and a right turn lane at the end of the ramp.

Add some pavement on the right corner (to give more room for trucks to make a right turn).



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Install delineators on the northeast quadrant of the intersection to deter motorists from stopping



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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
General Signal Improvement	Update the clearance and all red intervals to the latest NCHRP 731 guidance to prevent right angle crashes due to running the red light	VTrans (TSMO)	Low	Short	Low
Left Turning Safety Issue on VT 131	Apply the Road Diet Concept and reduce the number of lanes from four to three lanes with the center lane being a two-way left turn lane	VTrans (via RPC?)	47% crash reduction ¹	Mid-Long	Med- High (up to \$227,000 permissible for B/C ratio of 1 or greater)
The vertical crest on VT 131 limits the visibility to the on-ramp right turn lane	Install an advance lane assignment sign east of the crest	VTrans (TSMO)	Low-Med	Short	Low
	Extend the right turn lane east of the crest. Do this in conjunction with the new upcoming Jiffy Mart on the site of the Irving Station	VTrans (TSMO)		Mid-Long	Low
	Reduce the number of accesses to the Irving Station site from two to one (with the upcoming Jiffy Mart).	VTrans (Utilities)	3.0% crash reduction ²	Mid-Long	Low-Med
Visibility of I-91 NB on Ramp at Night or during Foggy Conditions	Install 6" x 8" delineators around the corners	VTrans (TSMO)	Low-Med	Short	Low
	Upsize the I-91 trailblazers for both directions	VTrans (TSMO)	Low-Med	Short	Low

¹ CMF Clearing House, CMF #2841, crash type: All

² CMF Clearing House, CMF #2459, crash type: Angle, Fixed object, Head on, Rear end, Run off road, Sideswipe, Single vehicle

Potential Safety Enhancements Summary Table

Safety Concern	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
At I-91 SB off Ramp, anecdotal reporting of long trucks having to go to the left in order to make a right turn and crashing with a passenger car also making a right turn at the same time	Consider making a left and a right turn lane at the end of the ramp	VTrans (?)		Mid-Long	Med- High
	Add some pavement on the right corner (to give more room for trucks to make a right turn)	VTrans (?)	Med	Mid-Lon	Med
At I-91 SB off Ramp, approaching VT 131 from the southbound off ramp, motorists partially lose sight of the intersection because of the quick hook on the ramp and the presence of some trees (that also conceal signs)	Remove the trees that are growing out of the ledge on the left side of the ramp	VTrans (District)	Low	Short	Low-Med
I-91 SB off Ramp/intersection with VT 131, corner sight distance to the left has been anecdotally reported as being occasionally limited by a vehicle that stopped off the shoulder in the northeast quadrant	Install delineators on the northeast quadrant of the intersection to deter motorists from stopping	VTrans (TSMO)	Low	Short	Low

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