

Scarborough, ME

Payne Road and Gorham Road

Road Safety Audit Report

Virtual RSA meeting: 11/17/2020, Field review: 11/18/2020

Prepared by



Issued on: 06/30/2021

TABLE OF CONTENTS

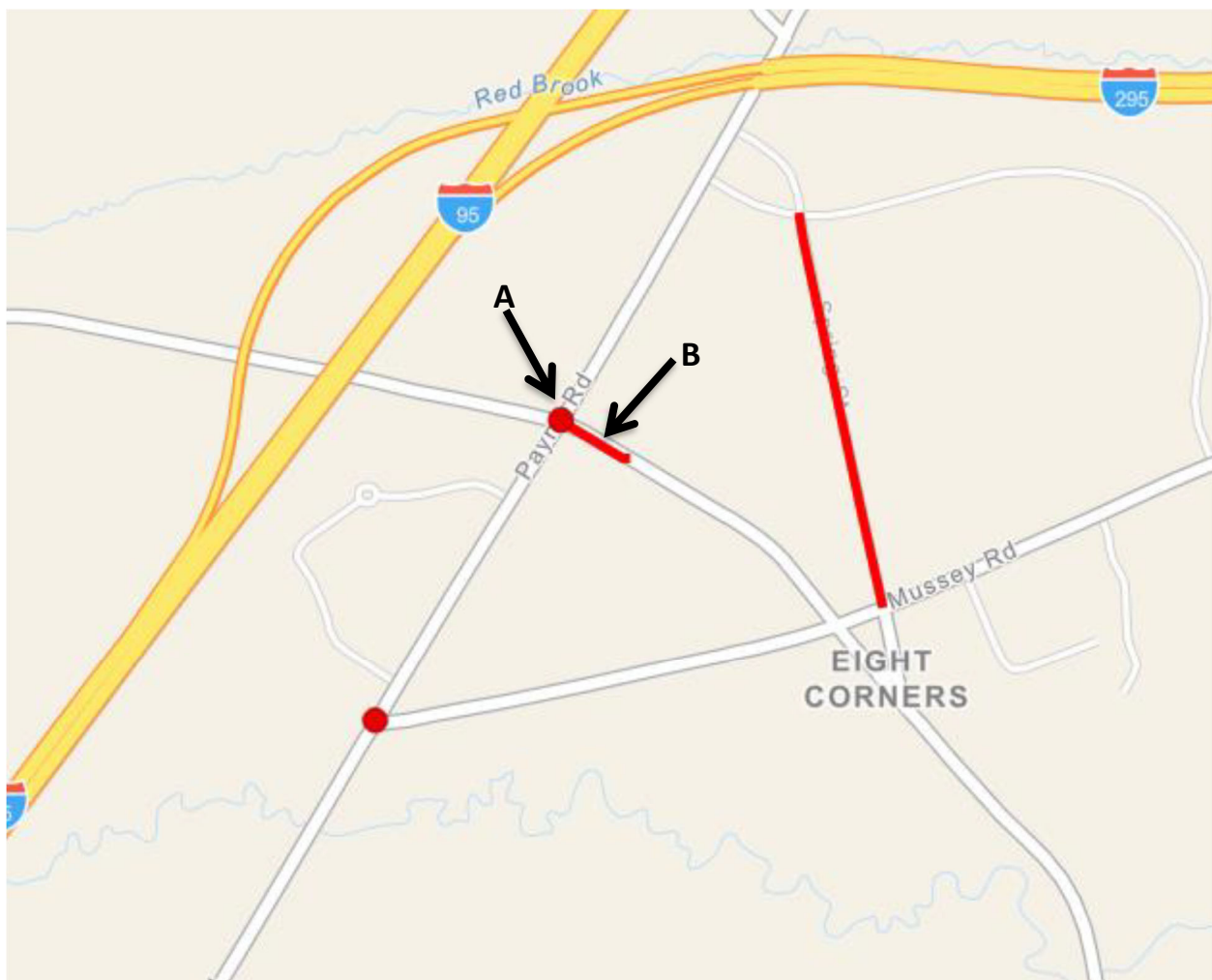
INTRODUCTION	3
Background	3
RSA SITE LOCATIONS	4
RSA TEAM	4
Attendees – Virtual Meeting.....	4
Attendees – Field Review	4
Potential Partners not in Attendance	4
ASSESSMENT FINDINGS.....	4
Positive Features	4
RSA Team Prioritization of Issues.....	5
Summary	5
<i>Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes.....</i>	<i>6</i>
<i>Issue 2: Gorham Road and Payne Road intersection: rear end crashes on Gorham Road, both approaches.....</i>	<i>7</i>
<i>Issue 3: Cumberland Farms exit: left turns into and out of Cumberland Farms.</i>	<i>8</i>
Costs and Challenges.....	9
Crash Modification Factors	10
CONCLUSIONS	12
APPENDIX A: Desktop Assessment.....	APPENDIX A
APPENDIX B: Conceptual Plans.....	APPENDIX B

INTRODUCTION

Background

VHB is under contract with the Portland Area Comprehensive Transportation System (PACTS) to prepare desktop assessments for 24 High Crash Locations (HCLs) within the PACTS region. After the desktop review process, 10 of these 24 sites were selected for field review and further investigation. The Gorham Road and Payne Road intersections were some of the sites selected for field review.

This RSA took place across two meetings, a virtual RSA meeting on 11/17/2020 and a field review on 11/18/2020.



Overview showing the Gorham Road and Payne Road high crash locations.

RSA SITE LOCATIONS

This site includes an intersection and a roadway segment:

- A. Intersection of Payne Road and Gorham Road:** This is a four-leg, signalized intersection. The Gorham Road intersection leg, on the west side, is slightly skewed relative to the other three legs, which are perpendicular to each other.
- B. Intersection of Gorham Road and Cumberland Farms Exit:** This is a drive on the Gorham Road northbound approach. The drive has a low-profile median island that is intended to channel vehicles to the right.

See the HCL Desktop Assessment in Appendix A for more background on these locations including crash diagrams.

RSA TEAM

Attendees – Virtual Meeting

- Tony Grande, VHB
- Ania Chandler, VHB
- Elissa Goughnour, VHB
- Elizabeth Roberts, GPCOG
- Harold Spetla, GPCOG
- John Adams, Milone and Macbroom
- Angela Blanchette, Town of Scarborough

Attendees – Field Review

- Tony Grande, VHB
- Ania Chandler, VHB
- Ethan Flynn, VHB
- John Adams, Milone and MacBroom
- John O'Malley, Scarborough Police

Potential Partners not in Attendance

- Randy Illian, MaineDOT

ASSESSMENT FINDINGS

Positive Features

The westbound receiving lanes on Payne Road do not have any crashes. The merging lanes in the adjacent segment, to the west of the Payne Road and Gorham Road intersection, had only one crash during the study period.

RSA Team Prioritization of Issues

The issues listed below were prioritized based on crash frequency, severity, and local interest in the issue:


1. Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes.
2. Gorham Road and Payne Road intersection: rear end crashes Gorham Road, both approaches.
3. Cumberland farms exit: left turns into and out of Cumberland Farms.

Summary


The following section summarizes specific issues observed and discussed by the RSA team and identifies potential countermeasures to address these issues. Included in this summary is a discussion of crash modification factors (Table 1) related to the countermeasures. Additional discussion on the suggested countermeasures is included in the costs and challenges table of this report.

Some of the recommended countermeasures may require further analysis, such as a capacity analysis or warrant analysis, to confirm applicability.


Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes.

Specific Safety Concern	Suggested Improvements	Example of Issue
<ul style="list-style-type: none"> Vehicles traveling straight through the Gorham Road and Payne Road intersection westbound are running the red light, resulting in crashes with vehicles traveling southbound on Gorham Road. 	<p>Short Range –</p> <ul style="list-style-type: none"> Install retroreflective backplates to improve the visibility of the traffic signals, particularly in situations like the one pictured at right where the sun obscures the traffic signals. Explore improving the coordination of the traffic signal timing at this intersection with upstream traffic signals, including Payne Road and Sam’s Club, Payne Road and Marden’s, and Payne Road and Gallery Boulevard. 	 <p>Payne Road westbound approach.</p>

Issue 2: Gorham Road and Payne Road intersection: rear end crashes on Gorham Road, both approaches.

Specific Safety Concern	Suggested Improvements	Example of Issue
<ul style="list-style-type: none"> • Vehicles traveling on Gorham Road, both directions, are rear ending vehicles ahead of them. • Speed is a contributor for southbound vehicle crashes, as vehicles speed down the hill to try and make it through the intersection before it turns red. 	<p>Short Range –</p> <ul style="list-style-type: none"> • Install advanced vehicle detection on both Gorham Road approaches at the Gorham Road and Payne Road intersection. • Install a speed feedback sign at the posted speed reduction location, on southbound Gorham Road. 	 <p>Gorham Road southbound approach showing lanes and lane assignments.</p>

Issue 3: Cumberland Farms exit: left turns into and out of Cumberland Farms.

Specific Safety Concern	Suggested Improvements	Example of Issue
<ul style="list-style-type: none"> • Vehicles turning left, into and out of the Cumberland Farms exit onto Gorham Road, are not yielding to through traffic on Gorham Road. • The Cumberland Farms exit is situated at the right turn lane taper before the Gorham Road and Payne Road intersection. 	<p>Short Range –</p> <ul style="list-style-type: none"> • Install a No Left Turn sign in the pork chop island located in the Cumberland Farms driveway. <i>Note: this sign likely existed here previously but may have been hit.</i> <p>Intermediate Range –</p> <ul style="list-style-type: none"> • Extend the median island along Gorham Road to prevent left turns into and out of the Cumberland Farms driveway. • Raise the existing porkchop island at the Cumberland Farms entrance. <i>Note: there is an existing porkchop island that is almost flush with the pavement.</i> 	 <p>Cumberland Farms entrance/exit on Gorham Road.</p>

Costs and Challenges

Issue	Countermeasure	Challenges	Cost Range
Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes	Install retroreflective backplates.	No challenges.	Low
	Coordinate this intersection with upstream traffic signals.	Would require further study of existing traffic signal timing.	Low
Issue 2: Gorham Road and Payne Road intersection: Rear end crashes on Gorham Road, both approaches.	Install advance vehicle detection on both Gorham Road approaches.	Would need to determine that the mast arm is not overloaded.	Moderate
	Install a speed feedback sign at the speed drop on Gorham Road southbound.	No challenges.	Moderate
Issue 3: Cumberland Farms Exit: left turns into and out of Cumberland Farms	Install No Left Turn sign in the porkchop island of driveway.	Vehicles can disregard this sign if they choose	Low
		It appears that a no left turn sign existed here previously but it was struck by a vehicle.	
	Extend median island along Gorham Road to prevent left turns into and out of Cumberland Farms at this exit.	Would require vehicles that want to travel south on Gorham Road to turn left out of Cumberland Farms on Payne Road and then left again onto Gorham Road at the intersection.	Moderate
	Raise porkchop island in Cumberland Farms drive.	Would need to ensure that a fire truck can still easily access Cumberland Farms.	Moderate

The above table summarizes the findings from the RSA conducted on 11/17/2020 and 11/18/2020. Countermeasures highlighted in green are recommended by VHB for implementation. The scale for costs is as follows:

Low	< \$10,000
Moderate	\$10,000 - \$100,000
High	> \$100,000

These costs do not include professional engineering, construction engineering, or right of way.

Crash Modification Factors

A crash modification factor (CMF) is a multiplicative factor, based on documented safety research studies, used to compute the expected number of crashes after implementing a given countermeasure at a specific site. CMFs provide some indication of the potential benefit, or lack thereof, associated with specific countermeasures.

FHWA compiles CMF data from published safety studies in the CMF Clearinghouse (<http://www.cmfclearinghouse.org/index.cfm>) to help practitioners select the most effective safety treatments. While CMF data is not available for all potential countermeasures, the CMF Clearinghouse provides a useful and consolidated source of data to help engineers, planners, and project owners make informed decisions. CMFs have been provided to demonstrate the effectiveness of proposed safety treatments, regardless of whether crashes can be applied to the CMF at this time. For example, some proposed treatments may reduce crash risk but do not have recent crashes directly associated with a specific location. It should be noted that as most CMFs represent the effect of a single treatment; it is difficult to accurately estimate the combined safety effects of multiple CMFs at one location. The combined effect of multiple treatments may be over-estimated if the CMFs are multiplied and engineering judgment is necessary to assess the interrelationships and independence of multiple treatments. In particular, CMFs should never be multiplied if the respective CMFs apply to different crash types and/or severities (e.g., the CMF for treatment A applies to total crashes and the CMF for treatment B applies to injury crashes) and the treatments address the same crashes (i.e., the treatments are not independent). For more information, please refer to the CMF Clearinghouse.

Table 1. Crash Modification Factor (CMF) Summary

Countermeasure	CMF (% Change in Crash Incidence)	Other Information
Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling southbound on Payne Road running red light crashes and rear end crashes.		
Install retro reflective backplates.	0.85 (15%)	Applies to all crash types and severities
Explore improving the coordination at this intersection with upstream traffic signals at Payne Road and Sam's club, Payne Road and Marden's, and Payne Road and Gallery Boulevard.	F(X)	This is a CMFunction that requires inputs on the number of traffic signal cycles per hour from X to Y. The formula is $e^{-0.0444(Y-X)}$
Issue 2: Gorham Road and Payne Road intersection: rear end crashes Gorham Road, both approaches.		
Install advanced vehicle detection on both Gorham Road approaches.	N/A	
Install a speed feedback sign at the speed drop on Gorham Road eastbound.	N/A	There is a CMF for dynamic speed feedback signs but is only applicable in a rural two-lane road setting.
On Gorham Road eastbound, provide louvered signal heads to decrease distance that a vehicle sees the green light.	N/A	
Issue 3: Cumberland Farms exit: left turns into and out of Cumberland Farms.		
Install No Left Turn sign.	0.36 (64%)	Applies to left-turn crashes and all severities
	0.32 (68%)	Applies to all crash types and severities
Install median island along Gorham Road to prevent left turns into and out of Cumberland Farms.	N/A	
Raise existing median island in Cumberland Farms drive.	N/A	

For Issue 1, retroreflective backplates are shown to reduce total crashes up to 15 percent. There is a CMFunction for reducing the number of traffic signal cycles per hour, but exact values are needed to compute the CMF. For Issue 2, no CMFs exist for the proposed countermeasures. For Issue 3, installing a "No Left Turn" sign may reduce left-turn crashes and total crashes by 64 percent and 68 percent, respectively. Although there is no CMFs for restricting left-turns with a raised median, it can be assumed that a median physically restricting left-turns would eliminate all left-turn crashes.

CONCLUSIONS

Given the safety and site needs at these intersections, the best opportunities for improving safety include installing retroreflective backplates at the Gorham Road and Payne Road intersection to increase signal head visibility, especially during times of day when the sun limits visibility. Additionally, a speed feedback sign should be installed at the speed decrease on Gorham Road. At the Cumberland Farms driveway and Gorham Road, it is recommended that the median island be extended along Gorham Road to restrict left turns into and out of Cumberland Farms.

APPENDIX A

HCL Desktop Assessment

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)



Overview map of HCLs reviewed in this assessment.

Assessment

This site includes an intersection and a roadway segment.

- A. Intersection of Payne Road and Gorham Road:** This is a four-leg, signalized intersection. The Gorham Road intersection leg, on the west side, is slightly skewed relative to the other three legs, which are perpendicular to each other.
- B. Roadway Segment on Gorham Road:** This roadway segment is the stretch of road to the east of the intersection. In the westbound direction, there is a left-turn lane, a thru lane, and a shared thru/right-turn lane. There is one lane in the eastbound direction. There is a driveway with a concrete median (A.K.A. pork chop island) to Cumberland Farms on the north side of this segment.

Recent or Pending Projects

Mill and fill Beginning at Mussey Road and extending north 0.33 of a mile to Gorham Road (PACTS Sponsored) scheduled for 2020.



Aerial view of (A) Gorham Road and Payne Road

Municipal Input

Noted concerns by the city include the following:

- This intersection is very large in overall width and length, and includes increased turning radii for truck traffic through the intersection.
- There are multiple turning lanes from many of the approaches, which may contribute to motorist's confusion.
- There have been reports of the eastbound Gorham Road (Rt 114) approach significantly backing up during the morning commuting hours even with dual left turning lanes onto Payne Road.
- The lane designations, and travel patterns for those commuting through the intersection should be reexamined.

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)



Street view of intersection at Payne Road and Gorham Road traveling South on Payne Road, from Google Maps



Aerial view of Payne Road and Gorham Road, from Google Maps

Safety Issues

A. Intersection of Payne Road and Gorham Road

There were 48 crashes at the intersection between 2015-2017, most of which were rear end or angle crashes. The majority of the crashes (28 of the 48) involved vehicles traveling eastbound on Gorham Road. Eight of the 28 involved a vehicle running a red light. There were two additional red-light-running crashes involving vehicles on other legs of the intersection. Additionally, quite a few vehicles are running the red light at this intersection. In particular this is a problem with vehicles traveling South on Payne Road.

The most prevalent crash type on both southbound Payne Road and westbound Gorham Road was rear end.

B. Roadway Segment on Gorham Road

This segment has only experienced two crashes between 2015-2017 and is not a HCL. There are a number of driveways so safety may increase through access management.

Recommendations

- Investigate speed of vehicles on eastbound Gorham Road, approaching the Payne Road intersection.
- Observe conditions to note if aggressive driving is prevalent. If so, consider conducting aggressive driving enforcement and providing educational messaging.
- Consider applying high friction surface treatments on intersection approaches, particularly those in the eastbound, westbound, and southbound directions.
- Review signal cycle length and phasing, including red and yellow change intervals. Longer cycle lengths may decrease the risk of red-light-running crashes. Also, there are many signals within a short distance on the north leg of Payne Road. Consider evaluating signal timing and retiming/coordination if necessary.
- Install retroreflective borders on signal backplates and consider increasing the size of the signal heads, if possible.
- Add dotted pavement markings between the dual left-turn lanes for eastbound vehicles on Gorham Road.
- Install advance detection.

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)

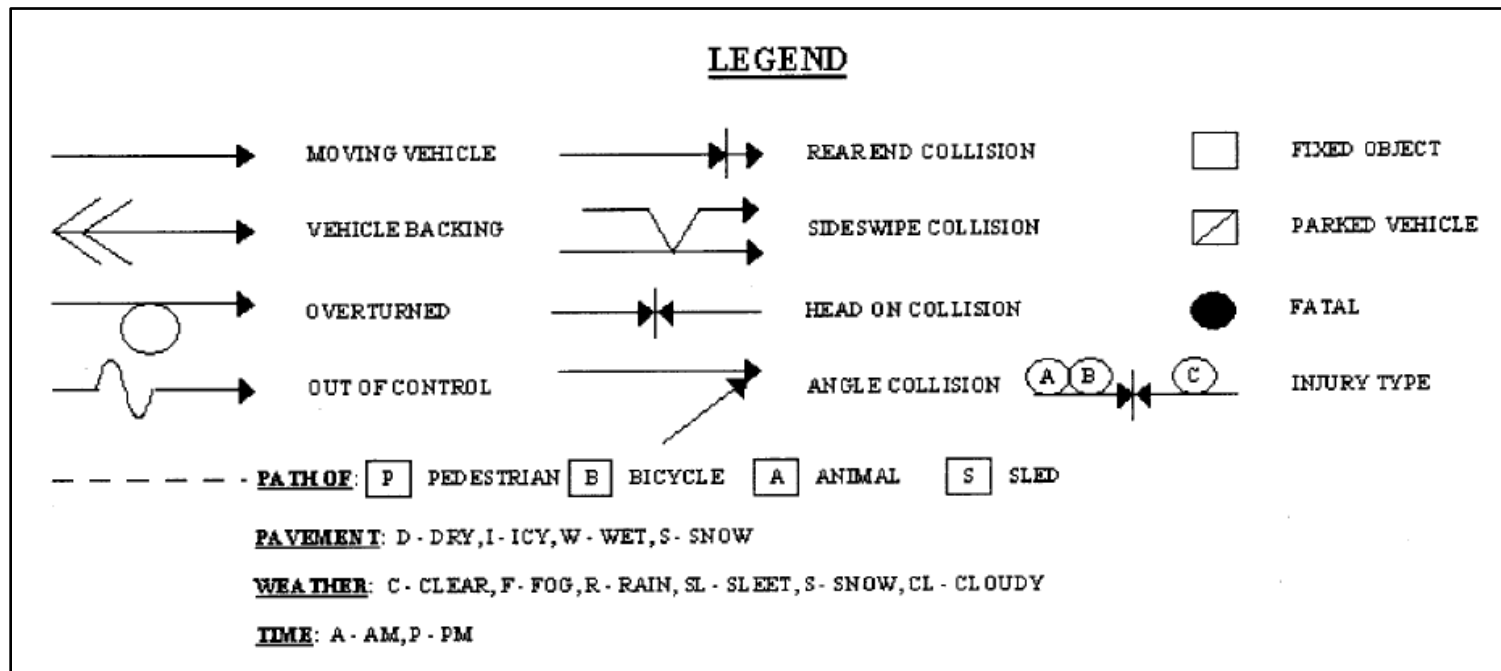
Crash Data

The crash data used for this assessment was based on 2015-2017 crash data. The following table summarizes the crash data for both locations and also shows additional crashes from 2018. The crash diagrams for both locations are shown on the following pages.

Location	HCL Node	Crashes by Year				Total Crashes (2015-18)	Percent Injury (2015-17)	Critical Rate Factor (2015-17)	Highway Corridor Priority (2015-17)	Speed Limit	Estimated AADT
		2015	2016	2017	2018						
Payne Rd and Gorham Rd	15611	14	17	17	14	62	43.8%	1.45	2	35 mph	5,000-8,500
Gorham Rd	15611-66237	1	1	-	-	2	-	-	2	35 mph	11,000

*See the abbreviations and definitions section at the beginning of this report for more information about each data point.

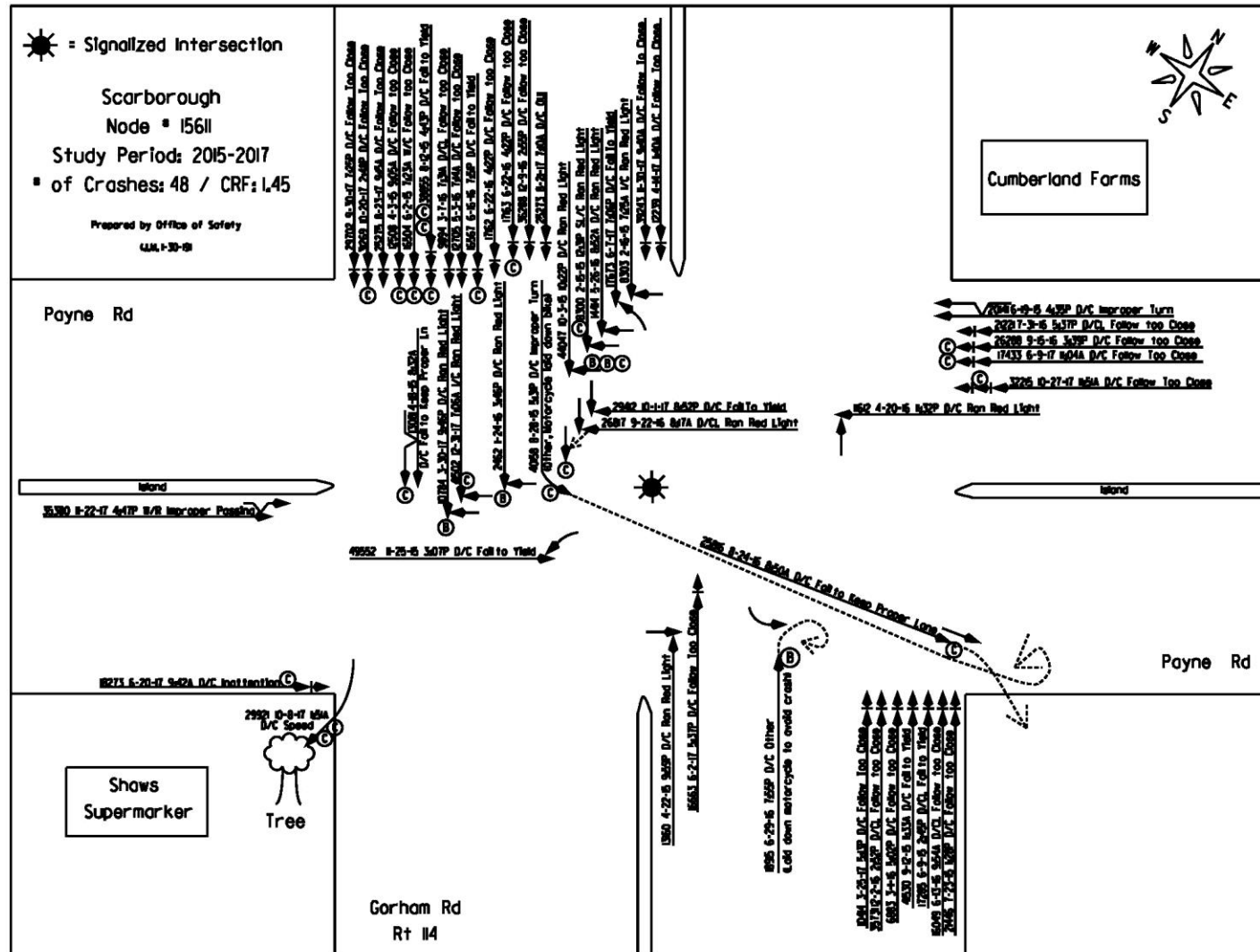
The legend below will aid in understanding the crash diagrams that follow.



SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)

A. Intersection of Payne Road and Gorham Road

Note: the businesses are labeled incorrectly. Cumberland Farms should be in the southeast corner and Sam's Club should be in the northeast corner.



APPENDIX B

Conceptual Plans

The following proposed improvements are conceptual in nature and were based on existing aerial photographs. They are not construction ready, and field measurements and/or surveys to verify the existing conditions were not performed. VHB recommends the appropriate level of field review, survey, and preliminary engineering/analysis be completed prior to progressing the conceptual improvements to construction.

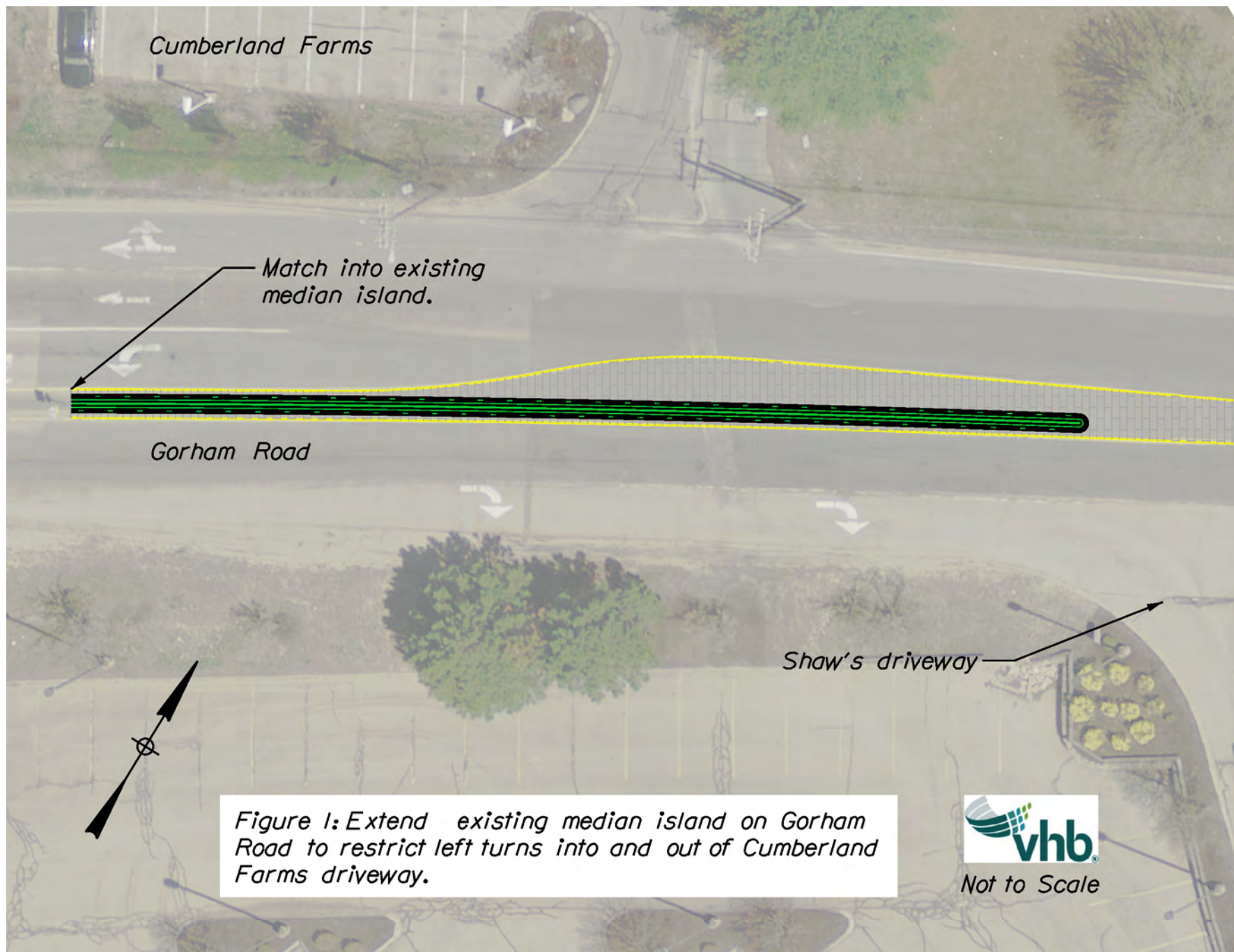


Figure 1: Extend existing median island on Gorham Road to restrict left turns into and out of Cumberland Farms driveway.