

REPORT TO THE LEGISLATURE PURSUANT TO ACT 165 SECTION 46

Report on the Operation of Bicycles at Controlled Intersections

Date:

December 13, 2024

Submitted to:

**House Committee on Transportation
Senate Committee on Transportation**

**Vermont Agency of Transportation
Highway Division
Operations & Safety Bureau
Safe Systems Section – Active Transportation**



AUTHORIZING LEGISLATION

Act 165, Sec. 46 AGENCY OF TRANSPORTATION; DEPARTMENT OF PUBLIC SAFETY; IDAHO STOP STUDY; REPORT.

The Agency of Transportation, in collaboration with the Department of Public Safety and in consultation with bicycle safety organizations and other relevant stakeholders, shall study the potential effects of implementing a statewide policy that grants an individual operating a bicycle rights and responsibilities at traffic control devices and traffic control signals that differ from those applicable to operators of motor vehicles.

The study shall include consideration of the potential effects of allowing individuals operating bicycles to treat stop signs as yield signs and red lights at traffic signals as stop signs, also known as an “Idaho Stop,” and of allowing individuals operating bicycles to cross intersections during a pedestrian phase at pedestrian-control devices and pedestrian-control signals.

On or before December 15, 2024, the Agency shall report to the House and Senate Committees on Transportation with its findings and recommendations.

REPORT PREPARATION

This report was prepared by the Vermont Agency of Transportation, Highway Division, Operations & Safety Bureau staff:

Active Transportation Unit

Amanda Holland, AICP, AOT Manager II

Traffic Operations & Mobility

Ian Degutis, State Traffic Engineer

Data Management Unit

Geoffery Hash, AOT Manager I

Safe Systems Section

Mario Dupigny-Giroux, Traffic Safety Engineer

Report Point of Contact:

Amanda Holland, AICP, AOT Manager II - Active Transportation
Phone: 802-917-2152 | Email: Amanda.Holland@vermont.gov

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	3
1.1 PURPOSE	3
1.2 BACKGROUND	3
EXPLANATION OF CONTROLLED INTERSECTIONS	3
1.3 REVIEW OF SCENARIOS	5
1.4 WHY IS THIS ISSUE BEING EXPLORED?	6
2.0 EXISTING CONDITIONS.....	8
2.1 VERMONT LAWS DEFINE RULES OF THE ROAD	8
DEFINING THE CLASS OF ROAD USER IN VERMONT	8
2.2 PROVIDING FOR SAFETY AT INTERSECTIONS.....	9
RESPONSIBILITIES OF ROAD USER CLASSES AT CONTROLLED INTERSECTIONS.....	9
APPLICATION OF CONTROLLED INTERSECTIONS IN VERMONT.....	10
EVIDENCE-BASED ANALYSIS OF CRASHES AND CITATIONS	11
2.3 EDUCATION OF ALL ROAD USERS ON RULES FOR A SHARED ROADWAY.....	13
3.0 STATE OF PRACTICE IN OTHER STATES.....	15
3.1 STATE ADOPTION OF BICYCLIST SPECIFIC PROVISIONS.....	15
ILLUSTRATIONS OF PROVISIONS FROM OTHER JURISDICTIONS.....	15
3.2 OUTLOOK SINCE BECOMING LAW	18
4.0 DIRECT AND INDIRECT IMPACTS	20
4.1 VERMONT LAWS	20
4.2 INFORMING THE PROFESSIONALS	20
4.3 INFORMING THE PUBLIC.....	22
4.4 SAFETY OUTCOMES.....	23
5.0 SUMMARY	24
APPENDIX A. STAKEHOLDER ENGAGEMENT	25
APPENDIX B. TOPIC RELEVANT VERMONT LAW.....	26
APPENDIX C. VERMONT HIGHWAY BICYCLE CRASH MEMORANDUM.....	32
C.1. VEHICLE CRASH TRENDS INVOLVING BICYCLISTS: 2014 – 2023.....	32
BEHAVIORAL FACTORS CONTRIBUTING TO EVENTS	33
CHARACTERISTICS OF INFRASTRUCTURE AT CRASH LOCATION.....	35
C.2. CITATION INFORMATION.....	37
C.3. DATA PROCESSING.....	38
REFERENCES	39

LIST OF FIGURES, TABLES AND TEXT BOXES

TEXT BOX 1. INTENT AND KEY CRITERIA OF A TRAFFIC CONTROL DEVICE (FHWA 2023).....	4
TABLE 1: THE MESSAGE CONVEYED TO ROAD USERS BY TRAFFIC SIGNS AND SIGNALS.....	4
TABLE 2. THE MESSAGE CONVEYED TO ROAD USERS BY A COUNTDOWN PEDESTRIAN SIGNAL AT A SIGNALIZED INTERSECTION.	5
TABLE 3. SUMMARY OF THE ROAD USER RESPONSIBILITY AND RIGHTS-OF-WAY AS ASSIGNED IN VERMONT LAW TO MOTOR VEHICLES	9
TABLE 4. SUMMARY OF THE ROAD USER RESPONSIBILITY AND RIGHTS-OF-WAY AS ASSIGNED IN VERMONT LAW DURING A LEADING PEDESTRIAN PHASE	10
TEXT BOX 2. EXAMPLES OF CURRENT EDUCATIONAL PROGRAMMING AND CAMPGAINS IN VERMONT.....	13
TABLE 5. SUMMARY OF THE STATES THAT HAVE CURRENTLY ADOPTED SIMILAR PROVISIONS FOR BICYCLISTS AT TRAFFIC CONTROLLED INTERSECTIONS.....	15
TEXT BOX 3. IDAHO STATE CODE EXCERPT.....	16
TEXT BOX 4. UTAH STATE CODE EXCERPT.....	16
TEXT BOX 5. OREGON STATE CODE EXCERPT.....	17
TEXT BOX 6. LANGAUGE PROPOSED IN MINNESOTA’S 2023 LEGISLATIVE SESSION	17
TEXT BOX 7. EXCERPT OF PROVISIONS PERTAINING TO BICYCLIST’S USE OF PEDESTRIAN SIGNALS.....	18
TABLE 6. PRIMARY STAKEHOLDERS TO RECEIVE AND PROGRAMMATICALLY DISTRIBUTE INFORMATION.....	21
FIGURE C- 1. NUMBER OF MOTOR VEHICLE CRASHES THAT INVOLVED BICYCLISTS BY TYPE OF CRASH FROM 2014 – 2023.	33
FIGURE C- 2. IFIGURE C-3: RELATIVE FREQUENCY OF REPORTED CONTRIBUTING ACTIONS FROM THE BICYCLIST PERSPECTIVE FOR ALL MAJOR CRASHES FROM 2014-2023.....	34
FIGURE C- 3 RELATIVE FREQUENCY OF REPORTED CONTRIBUTING CIRCUMSTANCES FROM THE MOTORIST PERSPECTIVE FOR ALL MAJOR CRASHES FROM 2014-2023.....	34
FIGURE C- 4. ROAD CHARACTERISTICS FOR ALL CYCLIST CRASHS AND MAJOR CRASHES ONLY FROM 2014-2023.....	36
FIGURE C- 5. TYPE OF TRAFFIC CONTROL PRESENT AT ALL CYCLE CRASH LOCATIONS.....	36

EXECUTIVE SUMMARY

In the 2024 legislative session, the Vermont General Assembly directed¹ the Agency of Transportation (AOT) to complete a study concerning the state's regulation of operators of bicycles at controlled intersections to gain a better understanding of the need and outcomes of this law change. AOT was directed to collaborate with the Department of Public Safety (DPS) and consult with the bicycle safety organizations and other relevant stakeholders.

This report considers four specific intersection conditions wherein a bicyclist would be permitted to proceed as follows: treat stop signs as yield signs, treat flashing red lights as yield signs, or treat steady red lights as stop signs, without otherwise changing the assignment of right-of-way as well as utilize the Leading Pedestrian Interval signal to proceed through an intersection. The provisions are intended to update traffic law to represent distinctions between bicycling and driving on a shared road at controlled intersections to improve safety for bicycle operators and reflect current bicycling convention.

This report reviews potential direct and indirect impacts that may result from changes to the rules and responsibilities of operators of bicycles at road intersections. Three primary impacts were identified if Vermont law were to adopt one or more of the applicable provisions based on the perspectives of AOT, Department of Motor Vehicles (DMV) and DPS.

- This action would require a change to state statute and would necessitate careful consideration of proposed language to ensure the provisions provide a clear interpretation of road user responsibilities.
- This action would require dissemination of information to a broad range of professionals statewide. Programmatically, this would necessitate coordination within AOT, DMV, and DPS to ensure changes to laws are conveyed to all relevant representatives in safety education, enforcement and vehicle administration.
- This action would require dissemination of information to state agency partners, such as the VHSA, as well as the need to broadcast it widely to the traveling public through integration into existing and future efforts to educate all road users.

To date eleven states have adopted provisions that define responsibilities for operators of bicyclists at traffic-controlled intersections that are different than motor vehicles. Ten states allow for Stop-As-Yield conditions, five states allow for stop control at steady red lights and one state permits bicycles to utilize pedestrian signals. While the expected action from a bicyclist approaching an intersection would now differ from the expected action from a driver, in all instances the adherence to the assigned right-of-way at an intersection is to be upheld.

The evidence-based analysis presented in this report did not clearly define a safety benefit. Similarly there is minimal available documentation on outcomes of these laws in states that have

¹ Act 165, Sec. 46 Agency of Transportation, Department of Public Safety; Idaho Stop Study; Report.

Report on the Operation of Bicycles at Controlled Intersections

adopted them. However, the National Highway Traffic Safety Administration (NHTSA) has stated in a 2023 fact sheet that based on current information, “these laws showed added safety benefits for bicyclists in states where they were evaluated, and may positively affect the environment, traffic, and transportation.”

Published literature identifies practices such as the Stop-As-Yield to enhance the safety of bicyclists through reduced exposure time, increased visibility to drivers, maintained traffic flow, and reduced travel time. Additionally, these provisions could provide indirect benefits that range from incentivized modal shift, improved public health, and to decriminalize a riding behavior that can be safely performed by the bicyclist. Based on current literature, there is no consensus regarding whether a stop-as-yield law would affect safety positively or negatively based on an analysis of crash records.

Legislation allowing increased bicyclist permission at controlled intersections would result in required actions by multiple stakeholders surrounding information dissemination and a multi-pronged approach to inform and educate the public. A central connection identified in this report is that the National Highway Traffic Safety Administration federal grant program serves as the primary program which supports the development and implementation of highway safety education efforts in Vermont. Consequently, to be at the ready to conduct education and outreach at the onset or prior to a future change in state, timing both for the development of material and alignment of this activity with the NHTSA grant program cycle are important factors for consideration.

1.0 INTRODUCTION

1.1 PURPOSE

In the 2024 legislative session, the Vermont General Assembly passed Act 165 relating to miscellaneous changes to laws related to the Department of Motor Vehicles (DMV), motor vehicles, and vessels. In section 46, the Legislature directed the Agency of Transportation (AOT) to complete a study concerning the state's regulation of operators of bicycles at controlled intersections. AOT was further directed to develop a report in collaboration with the Department of Public Safety (DPS) and in consultation with bicycle safety organizations and other relevant stakeholders.

The intent of this study was to identify potential effects from enabling provisions in state law which would permit individuals operating a bicycle at intersections, under specific traffic control conditions (signs and/or signals), rights and responsibilities that differ from those applicable to individuals operating a motor vehicle.

The study explored the following four scenarios as independent provisions.

Allow an individual operating a bicycle the right to:

- (1) Treat a stop sign as a yield sign, known as 'Stop-As-Yield' or 'Safety Stop';
- (2) Treat a flashing red light at a traffic signal as a yield sign;
- (3) Treat a steady red light at a traffic signal as a stop sign; and
- (4) Proceed through a signalized intersection when a pedestrian signal is in a leading pedestrian interval phase, the walk or countdown phase, while the intersection traffic signal for vehicles remains red for parallel through and/or turning traffic.

This study conducted an evidence-based review on past reports of motor vehicle crashes and citations to operators of bicyclists. Additionally, the study identified impacts and considerations that may be necessary to appropriately implement one or more of these regulations in Vermont should these provisions be further considered.

1.2 BACKGROUND

Explanation of Controlled Intersections

Prior to reviewing the identified scenarios, this section will review the three types of traffic control devices used to direct vehicular traffic (Table 1) and the type of device that controls pedestrian traffic (Table 2). A controlled intersection is one in which the movement and flow of traffic is controlled by devices, such as traffic signals and road signs. The purpose and key criteria to ensure effectiveness of traffic control devices are described in Text Box 1 and adapted from the Manual of Uniform Traffic Control Devices (MUTCD), a document which establishes uniform national criteria for traffic control devices (FHWA 2023). As detailed in Table 1, each device

Report on the Operation of Bicycles at Controlled Intersections

communicates a specific message to the approaching road user with the intention of promoting highway safety and the efficient movement of people and goods.

TEXT BOX 1. INTENT AND KEY CRITERIA OF A TRAFFIC CONTROL DEVICE (FHWA 2023).

The purpose of a traffic control device, as well as the principles for their use, is to promote highway safety, inclusion and mobility of all road users, and efficiency by providing for the orderly movement of road users on streets, highways, bikeways, and site roadways open to public throughout the Nation.

A traffic control device should:

- A. Fulfill a need;
- B. Command attention;
- C. Convey a clear, simple meaning;
- D. Command respect from road users; and
- E. Give adequate time for proper response.

TABLE 1: THE MESSAGE CONVEYED TO ROAD USERS BY TRAFFIC SIGNS AND SIGNALS.



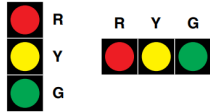

TRAFFIC CONTROL DEVICE	YIELD SIGN 	STOP SIGN 	HIGHWAY TRAFFIC SIGNAL 
MESSAGE TO ROAD USERS	Yield the right-of-way, but a full stop IS NOT necessary at all times.	A full stop IS necessary at all times to control right-of-way for all road users.	Specific action is warned or directed based on type of indicator (RYG) and illumination (steady or flashing).
CONTEXT	<p>A yield sign is not intended to control all approaches to an intersection, except at roundabouts.</p> <p>For an intersection of two roadways with similar context, yield control is typically applied to approach that conflicts the most with established pedestrian crossing activity.</p>	<p>A stop sign may control all approaches (all-way stop control) or specific approaches of an intersection (minor road stop control).</p>	<p>A signal may operate in steady or flashing mode during one or more periods of the day.</p> <p>When operating in steady mode, the signal displays a continuous display of a signal indication (red, yellow, or green) for the duration of the signal phase or interval. Typically used during high-volume traffic periods where assignment of right-of-way is required.</p> <p>When operating in flashing mode, the signal indication (red or yellow) is turned on and off repetitively. May be used during lower-volume traffic periods, or as a fail-safe operation in the event of signal malfunction.</p>

TABLE 2. THE MESSAGE CONVEYED TO ROAD USERS BY A COUNTDOWN PEDESTRIAN SIGNAL AT A SIGNALIZED INTERSECTION.

MESSAGE TO ROAD USERS	 <p>Pedestrian signals provide traffic signal indications exclusively intended for controlling pedestrians. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRaised HAND (symbolizing DONT WALK).</p>
SETTING	<p>The following are modes of pedestrian signal operation on state highways in Vermont.</p> <p>Concurrent mode - allows pedestrians and nonconflicting traffic to move simultaneously.</p> <p>Concurrent with Leading Pedestrian Interval (LPI) mode - provides a timed interval, at least 3 seconds, for pedestrians to enter the crosswalk while the intersection traffic signal for vehicles remains red for parallel through and/or turning traffic.</p> <p>Exclusive or Protected mode - provides a timed interval exclusive to pedestrians and does not allow for vehicular traffic to concurrently enter the intersection.</p>

1.3 REVIEW OF SCENARIOS

For each of the four scenarios identified in Section 1.1, the use and application of the specific traffic control device remains unchanged and there would be no change to the order of right-of-way at intersections. Rather for each scenario the change under consideration relates to how a road user would proceed through the intersection. The following provides a description of how a bicyclist would proceed through an intersection under each scenario.

- (1) Treat a stop sign as a yield sign, known as ‘Stop-As-Yield’ or ‘Safety Stop’.

A bicyclist approaching a stop-controlled intersection would yield (slow in speed) and visually scan the intersecting roadway to determine if it is safe to proceed without making a complete stop. If no other road user is in or approaching the intersection, and therefore right-of-way per 23 V.S.A. § 1048 does not apply, the bicyclist may proceed through the intersection without making a complete stop. If, however, another road user is in or approaching the intersection and/or it is deemed not safe to proceed per 23 V.S.A. § 1048, the bicyclist would then come to a complete stop and proceed according to right-of-way.

- (2) Treat a flashing red light at a traffic signal as a yield sign.

A bicyclist approaching a signal-controlled intersection displaying a flashing red light would yield (slow in speed) and visually scan the intersecting roadway to determine if it is safe to proceed without making a complete stop. If no other road user is in or approaching the intersection, and therefore right-of-way per 23 V.S.A. § 1048 does not apply, the bicyclist may proceed through the intersection without making a complete stop. If, however, another road user is in or approaching the intersection and/or it is deemed not safe to proceed per 23 V.S.A. § 1048, the bicyclist would then come to a complete stop and proceed according to right-of-way.

- (3) Treat a steady red light at a traffic signal as a stop sign.

A bicyclist approaching a signal-controlled intersection displaying a steady red light would come to a complete stop and would be able to proceed through the intersection prior to the signal display of a steady green light if no other road user that lawfully has the right-of-way is in or approaching the intersection (23 V.S.A. § 1048).

(4) Proceed through a signalized intersection when a pedestrian signal is in a leading pedestrian interval phase, the walk or countdown phase, while the intersection traffic signal for vehicles remains red for parallel through and/or turning traffic.

The bicyclist would be able to proceed through the intersection prior to the signal display of a steady green light when a pedestrian signal is present and has begun the walk or countdown interval phase. Prior to proceeding through the intersection, the bicyclist would yield to any road user that lawfully has the right-of-way (23 V.S.A. § 1048).

1.4 WHY IS THIS ISSUE BEING EXPLORED?

Intersections are critical points of access for all roadway users and areas of higher risk for vehicle crashes (Blackburn et al. 2022). Provisions such as those reviewed in this report are being explored nationally as an opportunity to enhance safety and reduce risk by way of representing distinctions between operating a bicycle and a vehicle on a public roadway at controlled intersections.

Nationally ten states have adopted Stop-As-Yield provisions that address movements at stop signs and flashing red lights. Idaho was the first state to pass such a law in 1982 and therefore these provisions are often referred to as the “Idaho Stop Law”. Beyond the Stop-As-Yield provisions, individual states and/or local governments have considered and/or adopted some of the provisions reviewed; see Section 3.0 for detailed information.

The Stop-As-Yield provision has been referenced in published literature to a greater degree than the other provisions reviewed. The following are highlights from studies which reviewed Stop-As-Yield provisions (Mahdinia et al. 2024, Meggs 2010, Jackson et al. 2021, NHTSA 2023, Tekle 2017).

The direct benefits of these provisions are largely related to safety through reduced exposure time, increased visibility to drivers, maintained traffic flow, and reduced travel time.

- If a bicyclist is allowed to maintain momentum when there are no other road users at an intersection and/or allowed to proceed ahead of vehicles, it increases the visibility of the bicyclist, and an intersection is cleared at a faster rate.
- Momentum impacts both the time and energy needed for a bicyclist to get back up to speed after coming to a complete stop. Meggs (2010) identified this may cost a bicyclist up to five times the energy to maintain a constant speed on a road with frequent stops compared to one without them.
- Allowing a bicyclist to get in front of traffic increases the visibility of the bicyclist and

Report on the Operation of Bicycles at Controlled Intersections

- A bicyclist can actively mitigate risk with a faster response than a vehicle based on characteristics of the mode such as unhindered hearing, no blind spots, narrow turning radius, short stopping distance, lower speed and smaller overall size.

The indirect benefits of these provisions range from incentivized modal shift, improved public health, and gains in environmental impacts. These realized benefits could be additional gains based on the intent of these provisions.

- The increased visibility and reduced exposure time of a bicyclist in an intersection can lead to a reduction in the incidence of collisions with vehicles.
- A bicyclist may be incentivized to use lower volume roads with stop control based as opposed to higher volume roads.
- A modal shift from vehicles to bicycles for a portion of trips, equating to fewer vehicles on the road conducting those trips, results in overall reductions in trip time and congestion for road users and lower total emissions outputs.
- Additionally, these provisions would decriminalize a riding behavior that can be safely performed by the bicyclist.

There is however a lack of available research that can statistically document that the adoption of these provisions may correspond to a reduction in motor vehicle crashes involving bicyclists at controlled intersections. Based on current information, the National Highway Transportation Safety Administration (NHTSA) supports the Stop-As-Yield provisions as a preventative measure and stated, “these laws showed added safety benefits for bicyclists in states where they were evaluated, and may positively affect the environment, traffic, and transportation” (NHTSA, 2023).

During the 2024 legislative session, Local Motion, a statewide advocate for active transportation in Vermont, advocated for consideration of these provisions to improve safety for bicycle operators and reflect current bicycling convention. Following testimony from DPS and AOT, the House Transportation Committee requested a legislative study to allow for a pause on developing legislation to gain a better understanding of the need and outcomes of this law change².

² Provisions for road users at a steady red signal was not considered during the 2024 session.

2.0 EXISTING CONDITIONS

2.1 VERMONT LAWS DEFINE RULES OF THE ROAD

Defining the Class of Road User in Vermont

Vermont has laws that govern the rules and responsibilities of individuals that access public roadways. These laws provide uniform instruction to control the order of movement along public highways and ensure the safe and efficient travel of all users.

Vermont classifies individuals into three principal categories depending on the chosen device for travel: **Motor Vehicle**, **Bicycle** and **Pedestrian**. As the type of motorized and non-motorized options for individual travel continues to evolve, it is the responsibility of the individual to become informed on the category assigned to their chosen mode of travel and subsequently to review and adhere to the defined rules and responsibility.

As defined in Vermont law, a bicycle and motor vehicle are two distinct categories. The key distinction uses the difference in power, defined by the source of propulsion, to classify a mode³.

Bicycle = "...pedal-driven device propelled by human power having two or more wheels..." (19 V.S.A. § 2301(1))

Motor Vehicle = "...vehicles propelled or drawn by power other than muscular power..." (23 V.S.A. § 4(21))

For the purposes of structuring the set of rules that apply to individuals traveling on a roadway, Vermont law requires cyclists to respond to any official traffic control device by adhering to the same instructions as required by the driver of a motor vehicle minus any exceptions granted in statute⁴.

"Every person riding a bicycle is granted all of the rights and is subject to all of the duties applicable to operators of vehicles..." (23 V.S.A. §1136)

Nationally, as laws pertaining to the transportation network originated to explicitly address motor vehicles. The provisions for operators of bicycles are often defined the same as the rules granted to operators of motor vehicles unless otherwise provide for by law, despite the evident practical and operational differences between bicycles and motor vehicles. It should be further noted that as defined in statute (23 V.S.A §4(46(A)), 23 V.S.A §1136a), an electric shall be subject to all the rights and duties applicable to bicyclists.

³ For full statute citation see [Appendix B. Item 1. Definitions of Roadway Users](#)

⁴ For full statute citation see [Appendix B. Item 2. Rights & Responsibilities of Roadway Users](#)

2.2 PROVIDING FOR SAFETY AT INTERSECTIONS

As described in section 1.2, there are many intentions for using signs and signals to control traffic at an intersection (Text Box 1) which include to promote highway safety, inclusion and mobility of all road users, and efficiency by providing for the orderly movement of road users. The ability of a traffic control device in meeting these intentions is predicated on the requirement for all road users to adhere to the defined rules of the road per their mode of transport (motor vehicle, bicycle, or pedestrian).

Responsibilities of Road User Classes at Controlled Intersections

This section outlines the current requirements for road users by type of response expected from each road user and respective assignment of rights-of-way per type of traffic control. Table 3 details the response expected from an operator of a motor vehicle when approaching each type of traffic control. Table 4 details the responses expected from all road users during a leading pedestrian phase of a pedestrian signal. As stated in Section 2.1, Vermont statutes state a bicyclist is to adhere to the same requirements assigned to a motor vehicle at a controlled intersection.

TABLE 3. SUMMARY OF THE ROAD USER RESPONSIBILITY AND RIGHTS-OF-WAY AS ASSIGNED IN VERMONT LAW TO MOTOR VEHICLES⁵.

TRAFFIC CONTROL	YIELD SIGN	STOP SIGN & FLASHING RED LIGHT*	STEADY RED LIGHT
EXPECTED ACTION BY VEHICLE	SEE 23 V.S.A. § 1048 Slow the speed of vehicle and be prepared to stop, if necessary, to allow other road users (vehicles and pedestrians) the right-of-way before proceeding.	SEE 23 V.S.A. § 1048, § 1024 Come to a complete stop, and then proceed with caution according to right-of-way as detailed below. *Flashing red light includes either the application of a red intermittent flashing beacon or traffic signal in flashing mode.	SEE 23 V.S.A. § 1022 Come to complete stop, and ability to proceed is directed by signal. If continuing in same direction, may proceed once green signal is displayed. If turning, provided not prohibited, may cautiously enter intersection to make a turning movement.

⁵ For full statute citation see [Appendix B. Item 2. Rights & Responsibilities of Roadway Users](#)

Report on the Operation of Bicycles at Controlled Intersections

TRAFFIC CONTROL	YIELD SIGN	STOP SIGN & FLASHING RED LIGHT*	STEADY RED LIGHT
ASSIGNED RIGHT-OF-WAY	SEE 23 V.S.A. § 1048 Shall yield the right-of-way to: <ul style="list-style-type: none"> • Any vehicle in the intersection or approaching so closely as to constitute an immediate hazard to proceed. • Any pedestrian lawfully in or approaching the intersection If two vehicles approach at approximately the same time, the driver on the right has the right-of-way to proceed.		SEE 23 V.S.A. § 1022) Shall yield the right-of-way to: <ul style="list-style-type: none"> • Any pedestrian lawfully within an adjacent crosswalk • Other traffic lawfully using the intersection.

TABLE 4. SUMMARY OF THE ROAD USER RESPONSIBILITY AND RIGHTS-OF-WAY AS ASSIGNED IN VERMONT LAW DURING A LEADING PEDESTRIAN PHASE⁶.

TRAFFIC CONTROL	COUNTDOWN PEDESTRIAN SIGNAL WITH A LEADING PEDESTRIAN PHASE
EXPECTED ACTION BY ROAD USER	<p>PEDESTRIAN (SEE 23 V.S.A. § 1022, § 1023) – At a steady red signal, shall not enter the roadway unless otherwise directed by a pedestrian-control signal. Once a pedestrian signal begins the “Walk” interval, may proceed across the roadway in the direction of the signal.</p> <p>VEHICLE (SEE 23 V.S.A. § 1022) - Shall yield the right of way to pedestrians lawfully within an adjacent crosswalk or to other traffic lawfully using the intersection.</p> <p>BICYCLE (SEE 23 V.S.A. § 1136) - Subject to all duties applicable to vehicles, meaning a bicyclist shall follow the actions as provided for DRIVER.</p>
ASSIGNED RIGHT-OF-WAY	PEDESTRIAN (SEE 23 V.S.A. § 1023) - During the “Walk” interval, shall be given the right of way by all drivers.

Application of Controlled Intersections in Vermont

The statewide transportation network is comprised of state-maintained and municipal-maintained (local) public highways. The Agency operates and maintains traffic control devices (signals and signs) on state highway facilities excluding Class 1 Town Highways as these segments of state highway are maintained by municipalities. All types of traffic control devices listed in Table 1 are present on both state and local public highways⁷.

Based on AOT asset inventories for state-maintained highways, the following statistics provide context on the statewide applicability of these provisions under review at controlled intersections.

⁶ For full statute citation see [Appendix B. Item 2](#). Rights & Responsibilities of Roadway Users

⁷ For full statute citation see [Appendix B. Item 3](#). Communication of Messages to Roadway Users by type of Traffic Control Device

Traffic Control Signs – Stop and Yield Signage

Traffic control signs for yield and stop controlled intersections are present statewide.

Vehicular-Control Signal Indicators – Flashing Mode vs Steady Mode

Traffic signals are present statewide, and many maintained by the state are programmed to transition into a flashing mode for a set period in a 24-hour cycle, typically during late-night/early-morning hours (i.e. hours with low traffic volume). The application and timing of a flashing mode phase is dependent on the context of an intersection but may occur at any time.

Pedestrian-Control Signal Indicators at Signalized Crossways

Signalized pedestrian crossings are installed statewide to reduce turning movement conflicts at locations with high volumes of vehicles and pedestrians.

AOT maintains 187 signalized pedestrian crossings at 82 signalized intersections. More than one crossing may be present at the same intersection on different approaches.

- Chittenden County has the highest density of signalized crossings in the state.
- Ninety-one percent (91%) of state-maintained signalized crossings provide additional pedestrian control features to improve pedestrian safety.
- Seventy-seven (77) signalized crossings provide an exclusive phase for pedestrian crossings (pedestrians at all approaches of intersection can cross simultaneously).
- Ninety-three (93) signalized crossings provide a Leading Pedestrian Interval (LPI) for a period of at least 3 seconds, which is the standard minimum. Of note, 84 of the 93 signalized crossings provide a LPI for a period of at least 7 seconds.
- Seventeen (17) signalized crossings operate in a permissive mode⁸ and do not include these features.

Evidence-Based Analysis of Crashes and Citations⁹

Motor Vehicle Crashes that Involved a Bicyclist

To better understand if specific intersection conditions are associated with higher occurrences of vehicular crashes, the Agency conducted an evidence-based review of police-reported crashes involving motor vehicles and cyclists. The full data driven review of motor vehicle crashes is provided in **Appendix C**.

Over a ten-year period ranging from January 2014 through December 2023, 760 motor vehicle crashes occurred that involved a bicyclist; these crashes range in severity from property-damage-only crashes to crashes resulting in minor injuries, major injuries, and bicyclist fatalities. Crash

⁸ Permissive Mode is a mode of traffic control signal operation in which left or right turns by vehicles are permitted to be made after yielding to pedestrians, if any, and/or opposing traffic, if any (FHWA, 2023).

⁹ For the complete 10-year report of vehicle crashes involving bicyclists and a review of judiciary records, see **APPENDIX C. VERMONT HIGHWAY BICYCLE CRASH MEMORANDUM**.

Report on the Operation of Bicycles at Controlled Intersections

reports filed by law enforcement indicated that 415 crashes, or 55% of all bicycle-involved crashes, occurred at an intersection. Additional data analysis indicates that up to 75% of all bicycle crashes may have occurred at intersections.

Accounts of Bicyclist's Behavior at Intersections

Crash records are the most complete and verified for crashes classified as major crashes, which include crashes that resulted in a fatality (K) or suspected serious injury (A); 85 major crashes involving bicyclists occurred over this 10-year period. This subset of data was used to review the behavior of the bicyclists at different types of intersection. The accounts of a bicyclist's behavior are based on the reported actions made by the bicyclist just prior to the crash, this is determined by the investigator based on verbal or physical evidence. The following interpretations are based on information recorded on the major crashes of motor vehicles that involved bicyclists from 2014-2023.

A comparison of the recorded actions taken by the bicyclist just prior to the crash at 3-way intersections (T-intersection) and 4-way intersections identified the following statistics:

- More bicyclists were reported to have conducted 'No Improper Action' at 3-way intersections (38%) than at 4-way intersections (14%).
- Bicyclists were reported to have conducted an 'Improper Crossing' at a similar rate for 3-way intersections (19%) compared to 4-way intersections (20%).
- More bicyclists were reported to have conducted either a 'Failure to obey traffic signs/signals' or 'Failure to yield right-of-way' at 4-way intersections (38%) than 3-way intersections (8%).

A comparison of the recorded actions taken by the bicyclist just prior to the crash at controlled intersections (stop or signal) versus no control present, identified the following statistics

- At 4-way intersections, an improper action by the bicyclists occurred in a greater proportion (57%) when the intersection was signal controlled. The improper actions recorded were 'Improper Crossing', 'Failure to yield right-of-way', 'Failure to obey traffic signs/signals', and 'Darting'.
- At 3-way intersections, an improper action by the bicyclists occurred most often (50%) when the intersection was stop controlled.

The evidence-based review identified that most bicycle crashes occurred at intersections and provided some insights and trends on bicyclist behavior. However, further statistical analysis was limited due to the small sample size and gaps in the reported data.

Citations and Violations of Law Issued to an Operator of a Bicycle

Law enforcement personnel can issue a citation to a bicyclist for a violation of statutes. Statutes identify the provisions for which a person who violates the subsection shall be subject to a civil penalty. An unknown factor in this review is quantifying the interaction between law enforcement

personnel and bicyclists that resulted in public education of laws and did not result in a recorded citation.

A review of judiciary records was conducted to identify citations given to bicyclists that were documented in the period of 2014 to 2023 that were not associated with motor vehicle crashes. A total of 85 citations were provided by a Vermont Judiciary public data request. These citations were recorded for violations of statute that are not relevant to this study, see Appendix C for further information.

The crash reporting form provides fields for investigators to record information of a citation and/or violation with codes to reference pre-defined infractions. No citations or violations were recorded for the bicyclists involved in the 760 motor vehicle crashes reviewed. This result should not be interpreted that a bicyclist was not at fault in any of these crashes but rather that these crashes were not coded by the investigator to indicate that the bicyclist was at fault.

2.3 EDUCATION OF ALL ROAD USERS ON RULES FOR A SHARED ROADWAY

Statewide Safety Education Programing

In Vermont, a network of entities collectively work together on outreach and education to encourage safe bicycling from a variety of perspectives – highway safety, accessibility, modal shift, general health and well-being. Generally, education programming for attitude and behavior change is performed through ongoing efforts such as *Drivers Education* and *Event Programs* such as Bike Smart and Walk Smart curriculum which teach kids to how to safely ride a bike and walk and *cyclical education campaigns* which provide a timed punch of outreach.

TEXT BOX 2. EXAMPLES OF CURRENT EDUCATIONAL PROGRAMMING AND CAMPGAINS IN VERMONT.

DRIVERS EDUCATION	DRIVE WELL VERMONT CAMPAIGN
YOUTH BIKE SMART/WALK SMART PROGRAMS	WATCH FOR ME VT CAMPAIGN
ADULT BIKE SAFETY PROGRAMS	OUR ROADS, OUR SAFETY CAMPAIGN

Vermont Department of Motor Vehicles

The Vermont Department of Motor Vehicles (DMV) is responsible for dissemination and maintenance of programs that provide education to drivers on operator rules and highway safety and set requirements for educator certification used by public schools (overseen by Agency of Education) and private entities (overseen by DMV) which offer young adult and adult driver education curriculum. In addition, DMV disseminates education on the topic of roadway safety broadly through media campaigns, sharing messaging from relevant state agency partners as well as national organizations. For example, a campaign currently promoted by DMV is the Federal Motor Carrier Safety Administration’s *Our Roads, Our Safety*, a national safety campaign

Report on the Operation of Bicycles at Controlled Intersections

to encourage road users to share the road safely with large trucks and buses. This campaign provides tips and awareness for bicyclists and pedestrians of the safety challenges inherent with large vehicles such as lingering in blind spots, providing space for wide turns and required long stopping distances.

Vermont Agency of Transportation

The Vermont State Highway Safety Office (SHSO), an entity within AOT, facilitates and supports a statewide network of local, state and non-profit entities to promote safe travel behavior on Vermont roadways with federal grants¹⁰. The SHSO achieves this critical role by fostering and expanding local partnerships with state agencies, law enforcement agencies, and private partners. The programs administered through the SHSO are designed to educate drivers, passengers, pedestrians, bicyclists and motorcyclists about highway safety. These programs employ the use of countermeasures that focus primarily on the modification of behavior and attitude. The following are examples of activities conducted by the Agency and partners funded by the AOT administered grant program.

- SHSO educates the public on laws and best practices through the Drive Well Vermont campaign; the current campaign period from 2022-2026 broadcasts messages over a variety of channels including social media, radio, TV and several other digital sources.
- Local Motion and Vermont Department of Health are supported to conduct behavior altering activities which include media and public outreach as well as instructional programming to teach best practices for travel along a roadway safely.
- Law enforcement agencies are supported to conduct safety education programming such as facilitating events that teach skills for safe walking and biking.
- Vermont Highway Safety Alliance (VHSA), a non-profit volunteer organization, represents a diverse mix of private and public entities. These partners coordinate and collaborate on highway safety to influence a broad audience and conduct education at community events such as the Champlain Valley Fair as well as events that target a specific audience like a High School Road User Safety Fair.

¹⁰ Vermont SHSO administers the state's federal grant program for the National Highway Traffic Safety Administration (NHTSA).

3.0 STATE OF PRACTICE IN OTHER STATES

3.1 STATE ADOPTION OF BICYCLIST SPECIFIC PROVISIONS

To date eleven states have adopted provisions that define responsibilities for operators of bicyclists at traffic-controlled intersections that are different than motor vehicles (Table 3). Ten states allow for Stop-As-Yield conditions, five states allow for stop control at steady red lights and one state permits bicycles to utilize pedestrian signals. While the expected action from a bicyclist approaching an intersection would now differ from the expected action from a driver, in all instances the adherence to the assigned right-of-way at an intersection is to be upheld.

TABLE 5. SUMMARY OF THE STATES THAT HAVE CURRENTLY ADOPTED SIMILAR PROVISIONS FOR BICYCLISTS AT TRAFFIC CONTROLLED INTERSECTIONS

	IF PROVISION WAS ENACTED (YEAR ENACTED)			
	Treat Stop Sign as Yield Sign	Treat Steady Red Signal as Stop Sign	Utilize Pedestrian LPI Signal	State Statute Citation
ARKANSAS	Yes (2019)	Yes (2019)	No	§ 27.51-1803
CALIFORNIA	No	No	Yes (2024)	§ 21456
COLORADO	Yes (2022)	Yes (2022)	No	§ 42-4-1412.5
DELAWARE	Yes (2017)	No	No	§ 4196A
IDAHO	Yes (1982)	Yes (1982, 2006)	No	§ 49-720
MINNESOTA	Yes (2023)	No	No	§ 169.222
NORTH DAKOTA	Yes (2021)	No	No	§ 39-10.1-05.1
OKLAHOMA	Yes (2021)	Yes (2021)	No	§ 47.11-202.1
OREGON	Yes (2020)	No	No	§ 814.414, 814.416
UTAH	Yes (2021)	Yes (2015)	No	§ 41-6a-902, 41-6a-1105(5)
WASHINGTON	Yes (2020)	No	No	§ 46.61.184, 46.61.190

Illustrations of Provisions from Other Jurisdictions

Most state statutes mirror the uniform vehicle code model as a base language for motor vehicle provisions. This section identifies excerpts of state statutes from states with these provisions adopted that provide further specificity and reference to aid interpretation and clarity of provisions related to the regulation of individuals operating bicycles at traffic-controlled intersections that are different than motor vehicles.

Connect Related Provisions

Commonly provisions provided specifically for bicyclists are contained within a standalone chapter and language will clearly state any deviations and exceptions of duties applicable under other provisions in statute. The following is an example of this from Idaho’s State Code.

TEXT BOX 3. IDAHO STATE CODE EXCERPT.

<p>Title 49: Motor Vehicles, Chapter 7: Pedestrians & Bicycles,</p>	<p>49-714(1). “Every person operating a vehicle propelled by human power or riding a bicycle shall have all of the rights and all of the duties applicable to the driver of any other vehicle under the provisions of chapters 6 and 8 of this title, except as otherwise provided in this chapter and except as to those provisions which by their nature can have no application.”</p>
<p>Section 714. Traffic Laws Apply to Persons on Bicycles and Other Human-Powered Vehicles.</p>	

If statutes that define the bicyclist responsibilities at a controlled intersection are provided for in a section separate from the motor vehicle driver, a reference to the relevant chapters or sections can provide a clear context. The Idaho statute above (49-714(1)) refers to Chapters 6 and 8, which respectively are ‘Rules of the Road’ and ‘Signs, Signals and Markings’. The Utah statute below references the specific provision for bicycle exemptions in the provisions applicable to motor vehicles. However, the section applicable for bicyclists does not include this circular reference back to the motor vehicle provisions.

TEXT BOX 4. UTAH STATE CODE EXCERPT.

<p>Title 41: Motor Vehicles, Chapter 6a: Traffic Code Part 9: Right of Way</p>	<p>41-6a-902(2)(a). “Except as provided in Section 41-6a-1105, or when directed to proceed by a peace officer, every operator of a vehicle approaching a stop sign shall stop...”</p>
<p>Section 902. Stop or Yield Signs</p>	
<p>Title 41: Motor Vehicles, Chapter 6a: Traffic Code Part 11: Bicycles & Other Vehicles, Regulation of Operation</p>	<p>41-6a-1105(5)(b). “Except as provided in Subsection (6), an individual operating a bicycle approaching a stop sign may proceed through the intersection without stopping at the stop sign if...”</p>
<p>Section 1105. Operation of bicycle or moped on and use of roadway -- Duties, prohibitions.</p>	

Clarify Applicability of Provisions

In the Oregon state code, provisions define the allowances for proceeding through an intersection followed by stating the actions which would be considered a violation of these provisions.

TEXT BOX 5. OREGON STATE CODE EXCERPT.

<p>Volume 19: Utilities, Vehicle Code, Watercraft, Aviation Title 59: Oregon Vehicle Code Chapter 814: Pedestrians</p> <p>Section 814.414. Improper entry into intersection controlled by stop sign</p>	<p>(1) A person operating a bicycle who is approaching an intersection where traffic is controlled by a STOP SIGN may, without violating ORS 811.265, do any of the following without stopping if the person slows the bicycle to a safe speed:</p> <ul style="list-style-type: none"> (a) Proceed through the intersection. (b) Make a right or left turn into a two-way street. (c) Make a right or left turn into a one-way street in the direction of traffic upon the one-way street. <p>(2) A person commits the offense of improper entry into an intersection where traffic is controlled by a STOP SIGN sign if the person does any of the following while proceeding as described in subsection (1) of this section:</p> <ul style="list-style-type: none"> (a) Fails to yield the right of way to traffic lawfully within the intersection or approaching so close as to constitute an immediate hazard; (c) Fails to exercise care to avoid an accident; or (d) Fails to yield the right of way to a pedestrian in an intersection or crosswalk under ORS 811.028.
<p>Section 814.416. Improper entry into intersection controlled by flashing red signal</p>	<p><i>The language in this section mirrors the provisions shown for 814.414 but replaces the traffic control of “stop sign” with “flashing red signal”.</i></p>

Minnesota did not pass provisions to enable the scenario to treat a steady red light at a traffic signal as a stop sign. The draft language considered for legislation in 2023 intended to provide clarification stating this condition applies when “there is not a vehicle in the vicinity”.

TEXT BOX 6. LANGAUGE PROPOSED IN MINNESOTA’S 2023 LEGISLATIVE SESSION

<p>Proposed language, not adopted in Minnesota</p>	<p>A bicycle operator who approaches a traffic control signal with a steady red indication, including a circular red signal or red arrow signal, must slow to a speed that allows for stopping before entering the intersection or the nearest crosswalk. Notwithstanding subdivision 1 and section 169.06, subdivision 5, if there is not a vehicle in the vicinity, the operator:</p> <ul style="list-style-type: none"> (1) may make a right-hand turn, or a left-hand turn onto a one-way roadway, without stopping; and (2) must otherwise perform a complete stop and then may make a turn or proceed through the intersection before the traffic control signal indication changes to green.
--	---

At the time of this report, California is the only state that had been identified as having passes a provision to grant bicyclists the right to proceed through a signalized intersection when a pedestrian signal is in a leading pedestrian interval phase. California’s adopted provisions are provided as an excerpt in Text Box 7. Additionally, this provision has been adopted by local jurisdictions; two jurisdictions identified include New York City, NY¹¹ and Burlington, VT¹².

TEXT BOX 7. EXCERPT OF PROVISIONS PERTAINING TO BICYCLIST’S USE OF PEDESTRIAN SIGNALS.

California Vehicle Code Division 11: Rules of the Road Chapter 2: Traffic Signs, Signals, and Markings Article 3: Offenses Related to Traffic Devices	21456.(a) If a pedestrian control signal showing the words “WALK” or “WAIT” or “DON’T WALK” or other approved symbol is in place, the signal shall indicate as follows: (1) A “WALK” or approved “Walking Person” symbol means a pedestrian facing the signal may proceed across the roadway in the direction of the signal, but shall yield the right-of-way to vehicles lawfully within the intersection at the time that signal is first shown. Except as otherwise directed by a bicycle control signal described in Section 21456.3, the operator of a bicycle facing a pedestrian control signal displaying a “WALK” or approved “Walking Person” symbol may proceed across the roadway in the direction of the signal, but shall yield the right-of-way to any vehicles or pedestrians lawfully within the intersection.
--	--

3.2 OUTLOOK SINCE BECOMING LAW

Synthesis of safety outcomes (crashes) after adoption

A handful of before and after comparisons have been conducted to identify if the Stop-As-Yield law resulted in fewer crashes. In Idaho, Meggs 2010 found that bicycle injuries from vehicle crashes declined by 14.5% in the year following the law adoption, though this statistic encompasses multiple types of collisions. A review conducted by Bike Delaware¹³ for a 30-month period before and after the passage of this law identified that crashes involving bicycles specifically at stop-controlled intersections fell by twenty-three percent (23%). Mahdinia et al. (2024) conducted the most recent study to quantify outcomes from Stop-As-Yield traffic laws; this before-after study compared data from five states with these provisions to a subset of states without. This comparison did not find a significant change in cyclist crashes at the state level between the states that have or have not adopted these provisions. Their findings align with other available literature conclusions, there is no consensus regarding whether a stop-as-yield law would affect safety positively or negatively based on an analysis of crash records.

¹¹ 2019 passage of law in New York City to allow for bicyclist to follow pedestrian control signals. [The New York City Council - File #: Int 1457-2019](#)

¹² 2021 passage of law in Burlington to allow bicycle use of pedestrian control signals. [Article 20-4. TRAFFIC-CONTROL DEVICES](#)

¹³ Bike Delaware. Delaware Yield Crash Data. Retrieved from: <https://www.bikede.org/delaware-yield-crash-data/#page-content>.

Synthesis of efforts taken to educate the public on changes to law

Every state has a State Highway Safety Office (SHSO), which is the entity that administers the federal highway safety grant program from NHTSA. A SHSO may be within a state agency or may be a separate entity. Regardless of the association of the SHSO, all states have a network of traffic safety partners that work together. Due to the nature of these partnerships, entities other than the Agency and/or Department of Transportation (DOT) may take the lead on efforts to educate the public on the rules of the road and safe behavior.

Four of the ten states that have adopted Stop-As-Yield provisions, are structured with the SHSO as an entity within the DOT (Colorado, Idaho, North Dakota and Oregon). In the other six states the SHSO is affiliated with other state entities such as the State Police, Department of Safety and Homeland Security, Department of Public Safety and in one state it is an independent entity.

Based on direct communication with four DOTs and a review of state annual reporting for the NHTSA program, public education on law changes such as the Stop-As-Yield would have been incorporated into broader education campaigns that targeted rules of the road programming for all road users as well as those focused on vulnerable road users (VRU; bicyclists and pedestrians). Among these DOTs, the SHSO was noted as the entity that would have the lead role to engage and educate the public on relevant statutory changes. The DOTs with a SHSO that is external to the DOT were less directly involved in safety education.

Following the 2020 enactment of the Stop-As-Yield law in Oregon, the DOT/SHSO led the development of a public safety education campaign specific to this new provision. The campaign was comprised of a digital tool-kit¹⁴ along with hardcopy material for dissemination by the DOT and partners; the intent was to relay information through social media, website content and public presentations. Oregon DOT also ran enhanced messaging delivered through various formats including TV PSAs streamed online, transit ads on buses, at transit stops and stations, and radio. This enhanced content ran for a period following the onset of the rule adoption with a subsequent refresher campaign in CY2024 as a PSA delivered online through social media and streaming platforms¹⁵.

¹⁴ [Oregon DOT: Bicycling, Pedestrian and Safe Routes to School Safety Digital Tool Kit](#)

¹⁵ ODOT PSA video - <https://www.youtube.com/watch?v=LCTqx2HA4N0>

4.0 DIRECT AND INDIRECT IMPACTS

To identify potential effects that could result from a change in law, AOT utilized a Working Group to confer on the report objectives and outcomes. AOT also worked in close coordination within AOT to assess existing conditions, communicated with other state DOTs regarding safety education campaigns (Section 3.0), and conducted targeted interviews with representatives for DMV and law enforcement. A full summary of stakeholders engaged during the study is provided in Appendix A.

This section provides the direct and indirect impacts, identified over the course of this review from the perspectives of AOT, DMV and DPS in consideration of the following statement.

Identify the immediate impacts to the Agency, if Vermont state law permitted individuals operating a bicycle at intersections, under specific traffic control conditions, rights and responsibilities that differed from those applicable to individuals operating a motor vehicle.

These impacts were identified as applicable if Vermont law were to adopt one or more of the applicable provisions. The focus was to capture immediate impacts, there may be additional considerations not identified in this report.

4.1 VERMONT LAWS

This action would require a change to statute and would necessitate careful consideration of proposed language to ensure the provisions provide a clear interpretation of road user responsibilities. The statutes directly applicable to these provisions are provided in Title 23: Motor Vehicles, Chapter 13: Operation of Vehicles.

Fundamentally, if the rights and responsibilities of bicyclists at intersections were to be modified, the following subchapters should clearly convey the rules and responsibilities for each road user.

Title 23: Motor Vehicles,	Subchapter 2: Traffic Signs, Signals, and Markings
Chapter 13: Operation of Vehicles	Subchapter 4: Right-Of-Way
	Subchapter 12: Operation of Bicycles, EPAMDS, and Play Vehicles

Provisions should address how each road user is to proceed in their direction of travel, identify the exemptions applicable to specific road users, and convey what actions, as applicable, that are a violation of statute.

4.2 INFORMING THE PROFESSIONALS

This action would require dissemination of information to a broad range of professionals statewide. Programmatically, this would necessitate coordination within AOT, DMV, and DPS to ensure changes to laws are conveyed to all relevant representatives in safety education, enforcement and vehicle administration. Table 6 identifies the primary stakeholder groups from

these agencies who should be notified regarding changes to motor vehicle law that pertain to the rules and responsibilities of road users.

TABLE 6. PRIMARY STAKEHOLDERS TO RECEIVE AND PROGRAMMATICALLY DISTRIBUTE INFORMATION

ENTITY	STAKEHOLDER	PROGRAMS TO INFORM
ALL	Agencywide	General Awareness
AOT	Highways Division, Operations & Safety Bureau, Safe Systems Section, State Highway Safety Office	Safety Education Programming Enforcement Programming
DMV	Driver Education Division	Driver’s Education Curriculum Driver Schools and Trainers
DMV	Enforcement & Safety Division, Investigative Section, Education & Safety Unit	School Bus Driver Training Pupil Transportation Safety
DPS	Vermont State Police	Officer Training and Professional Development (Policy Academy, In-service Training, etc.)

The response of each state agency to a change in a motor vehicle law, is highly dependent on the content and language of the law. Each state agency would review the new language and quantify the impact (direct and indirect), and the necessary response.

Personnel

All three state agencies have stakeholders that are responsible for the conveyance of motor vehicle laws and guidance for safe travel on highways. Following the adoption of new laws, primary stakeholders would be informed of legislative outcomes through various agency and organizational communication.

Programmatic

These primary stakeholders would determine the scope necessary to further disseminate the information and integrate it, as needed, into programmatic material and training.

Illustrative Example: Response to Address a Minor Change in Law

The following narrative provides a recent example of how information was programmatically conveyed for a minor change in law. Effective July 1, 2024, it became a requirement for operators of motor vehicles to provide 4-feet of clearance when passing a vulnerable road user. This safe passing law was proposed and updated by the legislature in the 2024 session and marks a stride forward for highway safety provisions for vulnerable road users. However, this law modified an existing law which provided a 4-foot passing provision as a recommendation. Therefore, the final change in the language itself was very minor; the language to enable this rule consisted of striking the word “recommended” to become a requirement. Safety education providers were able to swiftly address the law change given the limited context of the provision and ability to adapt current programming.

AOT – The SHSO partners who conducted vulnerable road user safety education, such as the Vermont Department of Health (VDH) and Local Motion, both engaged in activity to inform the public. The VDH updated existing Watch for Me VT campaign materials which were distributed through marketing channels and on display at the 2024 Champlain Valley Fair. Local Motion messaged the law change to constituents through social media, blog posts and email distribution.

DMV – Based on the change in language consisted of removing one word; DMV was able to address this change in law with minor revisions to the driver manual and exam. It should be acknowledged that upon identifying necessary updates to content in the driver manual and/or exam, all mechanisms which convey the content are similarly reviewed and updated as need. Currently, driver education materials are available in 15 languages, printed material, and as an online tutorial with audio instruction.

DPS – An update to laws is incorporated, as applicable, into law enforcement trainings for new recruits in the Police Academy as well as incorporated into in-service training provided to the in-field officers (approximately 1400 personnel) as continuing education.

4.3 INFORMING THE PUBLIC

Education of All Users of Public Roadways

This action would require dissemination of information to state agency partners, such as the VHSA, as well as the need to broadcast it widely to the traveling public through integration into existing and future efforts that educate all road users. As identified in Table 6, there are many stakeholders and programs that would need to review and adapt resources to address changes to law that impact vulnerable road users. Public messaging on road safety can be categorized generally as messaging that informs a road user on the laws (rules of the road) and those that promote and encourage safe practices for traveling in the roadway (driving, walking and biking). The content being conveyed is the same but the way it is conveyed changes depending on the intended audience the stakeholder wants to reach. Both categories of public messaging will need to be addressed. As stated in Section 4.2 the degree of impact will vary based on content and language of a law change.

From the perspective of the VT SHSO, if changes to the law occur that differ from current road user practice and/or conflict with existing campaign materials, the SHSO would need to enlist partners responsible for vulnerable road user safety education to develop new content. As it relates to the provisions reviewed in this report, changes to the law to adopt one or more of these provisions would necessitate an evaluation of all campaign materials and development of new or supplemental materials. A common phrase for conveying highway safety has been the simplistic “same road, same rules”, therefore at a minimum all materials that describe how a bicyclist is to travel on a roadway would need to be revised.

Currently all highway safety education programmatic efforts conducted by the SHSO and partners under the NHTSA grant program, are tied to an annual work plan that aligns with the federal fiscal year. Each entity applied for and received funding to support specific activities. It would then be

anticipated that requests to develop new public education content would need to be align with the Notice of Funding Opportunity (NOFO) of the NHTSA Discretionary Safety Grant Program. The typical timeline for the NHTSA grant program is a NOFO released in April, proposals due in May, and activity may commence in October.

4.4 SAFETY OUTCOMES

According to the evidence-based information gathered for this report, the data recorded to date (motor vehicle crash reports and judiciary records) does not provide the detail necessary to correlate to the scenarios reviewed in this report. Therefore, the Agency cannot state whether the implementation of these provisions would result in improved safety outcomes, defined as a reduction in the number of motor vehicle crashes involving bicyclists at intersections and citations to road users at intersections.

5.0 SUMMARY

While the evidence-based analysis presented in this report did not clearly define a safety benefit, there are assumed safety benefits that would be attained from the reduced bicyclist exposure time and increased bicyclist visibility. Legislation allowing increased bicyclist permission at controlled intersections would result in required actions by multiple stakeholders surrounding legislation development, information dissemination to professionals, as well as a multi-pronged approach to inform and educate the public. A central connection identified in this report is that the National Highway Traffic Safety Administration federal grant program serves as the primary program which supports the development and implementation of highway safety education efforts in Vermont. Consequently, to be at the ready to conduct education and outreach at the onset or prior to a future change in state, timing both for the development of material and alignment of this activity with the NHTSA grant program cycle are important factors for consideration.

APPENDIX A. STAKEHOLDER ENGAGEMENT

The following stakeholders were engaged and consulted during the development of this report. Stakeholders are grouped based on level of involvement.

Study Working Group:

These Stakeholders met as a full Working Group twice (9/30/24 and 12/6/2024) and consultations with individual members occurred from May through December 2024. The initial meeting conferred on the intended elements of the report and the final meeting review the status to date and identified impacts.

NAME	ORGANIZATION	VIEWPOINT
Amanda Holland	AOT-HWY-OSB	Active Transportation
Sommer Bucossi	AOT-HWY-OSB	Active Transportation
Jesse Devlin	AOT-HWY-OSB	Safe Systems Approach
Ian Degutis	AOT-HWY-OSB	State Traffic Engineer
Mario Dupigny-Giroux	AOT-HWY-OSB	Crash Data Management
Geoffrey Hash	AOT-HWY-OSB	Crash Data Management
Mandy Shatney	AOT-HWY-OSB	Crash Data Management
Lt. Paul Ravelin	DPS – Vermont State Police	Enforcement
Evelyn McFarlane	AOT-HWY-OSB	Safety Education
Alison LaFlamme	AOT-HWY-OSB	Safety Education
Andrea Spinale	VDH – Emergency Preparedness, Response, and Injury Prevention	Safety Education
Stephanie Busch	VDH – Emergency Preparedness, Response, and Injury Prevention	Safety Education
Jonathon Weber	Local Motion	Safety Education

AOT – Agency of Transportation, HWY – Highway Division, OSB – Operations and Safety Bureau, VDH – Vermont Department of Health, DPS – Department of Public Safety

Additional Stakeholder Engagement:

- VT Department of Motor Vehicles, Matthew Kostik (December 2024)
- VT AOT State Highway Safety Office, Law Enforcement Liaisons, Bill Jenkins and Kevin Lane (December 2024)
- VT Active Transportation Partner meetings held on September 12, 2024, and December 12, 2024. Partners engaged include AARP, Local Motion, VT Natural Resources Council, VT Public Transit Authority, VT Association of Planning and Development Agencies, VT League of Cities and Towns, Sierra Club, VT Department of Housing and Community Development, and VT Department of Health.
- Regarding safety education campaigns, DOT personnel in the following states provided comment: Arkansas, Minnesota, Oregon, and Washington.

APPENDIX B. TOPIC RELEVANT VERMONT LAW

The statutes provided below have been obtained from the online database of the Vermont Statutes and reflect information posted as of December 2, 2024. Please refer to the Vermont Statutes for the official text at <https://legislature.vermont.gov/statutes/>.

ITEM 1: Excerpts pertaining to Definitions of roadway users

Title 19: Highways – Chapter 23: Bicycle Routes and Sidewalks

Title 23: Highways – Chapter 1: General Provisions

19 V.S.A. § 2301. Definitions

As used in this chapter:

- (1) “Bicycle” means every pedal-driven device propelled by human power having two or more wheels on which a person may ride, including a so-called pedal vehicle that may have an enclosed cab.

23 V.S.A. § 4. Definitions

Except as may otherwise be provided by law, and unless the context otherwise requires in statutes relating to motor vehicles and enforcement of the law regulating vehicles, as provided in this title and 20 V.S.A. part 5, the following definitions shall apply:

- (21) “Motor vehicle” includes all vehicles propelled or drawn by power other than muscular power, except farm tractors, vehicles running only upon stationary rails or tracks, motorized highway building equipment, road making appliances, snowmobiles, tracked vehicles, motor-assisted bicycles, electric bicycles, or electric personal assistive mobility devices.
- (46) (A) “Electric bicycle” means a bicycle equipped with fully operable pedals, a saddle or seat for the rider, and an electric motor of less than 750 watts...(B) An electric bicycle is not a motor vehicle and is a vehicle to the same extent that a bicycle is a vehicle. (C) Electric bicycles shall be regulated in accordance with section 1136a of this title.
- (67) “Pedestrian” means any individual afoot or operating a wheelchair or other personal mobility device, whether motorized or not, and including an electric personal assistive mobility device.
- (81) “Vulnerable user” means a pedestrian; an operator of highway building, repair, or maintenance equipment or of agricultural equipment; a person operating a wheelchair or other personal mobility device, whether motorized or not; a person operating a bicycle or other nonmotorized means of transportation (such as roller skates, rollerblades, or roller skis); a person operating a motor-assisted bicycle or an electric bicycle; or a person riding, driving, or herding an animal.

ITEM 2: Excerpts pertaining to Rights and Responsibilities of roadway users

Title 23: Motor Vehicles – Chapter 13: Operation of vehicles

– Subchapter 2: Traffic Signs, Signals, and Markings

– Subchapter 5: Pedestrians' Rights & Duties

– Subchapter 12: Operation of Bicycles, EPAMDS, and Play Vehicles

23 V.S.A §1021 - Obedience to traffic-control devices

(a) The driver of any vehicle shall obey the instructions of any official traffic-control device applicable to him or her placed in accordance with this chapter unless otherwise directed by an enforcement officer, subject to the exceptions granted in this chapter.

23 V.S.A §1058 – Duties of pedestrians

All pedestrians shall obey the instructions of all traffic control devices that are applicable to them and all instructions of enforcement officers relating to control of traffic.

23 V.S.A §1136 – Application of subchapter; rights and obligations of bicyclists under other laws

(c) Every person riding a bicycle is granted all of the rights and is subject to all of the duties applicable to operators of vehicles, except as to those provisions that:

- (1) are inconsistent with provisions that specifically address the rights and duties of vulnerable users generally or bicyclists specifically; or
- (2) by their very nature can have no application.

23 V.S.A §1136a – Electric bicycles

(a) Except as provided in this subsection, electric bicycles shall be governed as bicycles under Vermont law, and operators of electric bicycles shall be subject to all of the rights and duties applicable to bicyclists under Vermont law.

ITEM 3: Excerpts pertaining to Communication of Regulatory and Warning Messages to Roadway Users by type of Traffic Control Device

TITLE 23: MOTOR VEHICLES – CHAPTER 13: OPERATION OF VEHICLES

– SUBCHAPTER 2: TRAFFIC SIGNS, SIGNALS, AND MARKINGS

23 V.S.A §1022 – Traffic-control signals

(a) Whenever traffic is controlled by traffic-control signals exhibiting different colored lights, or colored lighted arrows, successively one at a time or in combination, only the colors green, red, and yellow may be used, except for special pedestrian signals carrying a word legend, and the signals shall indicate and apply to drivers and pedestrians as follows:

- (1) Green signal.
 - (A) Vehicular traffic facing a circular green signal may proceed straight through or turn right or left unless a sign prohibits either turn. Vehicular traffic, including vehicles turning right or left, shall yield the right of way to other vehicles or to pedestrians lawfully within the intersection or on an adjacent crosswalk at the time the signal is

exhibited.

- (B) Vehicular traffic facing a green arrow signal, shown alone or in combination with another signal, may cautiously enter the intersection only to make the movement indicated by the arrow, or such other movement as is permitted by other signals shown at the same time. Vehicular traffic shall yield the right of way to pedestrians lawfully within an adjacent crosswalk or to other traffic lawfully using the intersection.
- (C) Unless otherwise directed by a pedestrian-control signal, as provided in section 1023 of this title, pedestrians facing a green signal may proceed across the roadway within any marked or unmarked crosswalk, but not when the sole green signal is a turn arrow.

(2) Steady yellow signal.

- (A) Vehicular traffic facing a steady yellow signal is thereby warned that the related green signal is being terminated or that a red signal will be exhibited immediately thereafter, when vehicular traffic shall not enter the intersection.
- (B) Pedestrians facing a steady yellow signal, unless otherwise directed by a pedestrian-control signal as provided in section 1023 of this title, are advised that there is insufficient time to cross the roadway before a red signal is shown, and no pedestrian shall then start to cross the roadway.

(3) Steady red signal.

- (A) Vehicular traffic facing a steady circular red signal alone shall stop at a clearly marked stop line, but if none, shall stop before entering the crosswalk on the near side of the intersection.
- (B) Except when a sign is in place prohibiting a turn, vehicular traffic facing any steady red signal may cautiously enter the intersection to turn right, or to turn left from a one-way street into a one-way street, after stopping as required by subdivision (A) of this subdivision (3). This traffic shall yield the right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection. No motorist shall turn right when facing a red arrow signal indication unless a regulatory sign is present that permits this movement.
- (C) Unless otherwise directed by a pedestrian-control signal as provided in section 1023 of this title, pedestrians facing a steady red signal alone shall not enter the roadway.

23 V.S.A §1023 – Pedestrian-control signals

Whenever special pedestrian-control signals exhibiting the words "Walk" or "Don't Walk" are in place the signals indicate as follows:

- (1) "Walk": pedestrians facing the signal may proceed across the roadway in the direction of the signal and shall be given the right of way by all drivers.
- (2) "Don't Walk": no pedestrian shall start to cross the roadway in the direction of the signal, but any pedestrian who has begun his crossing on the "Walk" signal shall proceed to a sidewalk or a safety island while the "Don't Walk" signal is showing.

23 V.S.A §1024 – Flashing signals

(a) Whenever a flashing red or yellow signal is used in a traffic sign or signal, it requires obedience by vehicular traffic as follows:

- (1) Flashing red: When a red lens is illuminated with rapid intermittent flashes, drivers shall stop before entering the nearest crosswalk at an intersection or at a limit line when marked, or, if there are none, before entering the intersection, and the right to proceed is subject to the rules applicable after making a stop at a stop sign.
- (2) Flashing yellow: When a yellow lens is illuminated with rapid intermittent flashes, drivers of vehicles may proceed through the intersection or past the signal only with caution.

23 V.S.A §1025 – Standards

(a) The U.S. Department of Transportation Federal Highway Administration’s Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), as amended, shall be the standards for all traffic control signs, signals, and markings within the State. Revisions to the MUTCD shall be adopted according to the implementation or compliance dates established in federal rules.

(d) The standards of the MUTCD shall apply for both State and local authorities as to traffic control devices under their respective jurisdiction.

(e) Traffic and control signals at intersections with exclusive pedestrian walk cycles shall be of sufficient duration to allow a pedestrian to leave the curb and travel across the roadway before opposing vehicles receive a green light. Determination of the length of the signal shall take into account the circumstances of persons with ambulatory disabilities.

ITEM 4: Excerpts pertaining to Assignment of Right-of-Way to Road Users at Intersections.

TITLE 23: MOTOR VEHICLES – CHAPTER 13: OPERATION OF VEHICLES – SUBCHAPTER 4: RIGHT-OF-WAY

23 V.S.A. § 1046. Vehicle approaching or entering intersection

(a) When two vehicles approach or enter an intersection from different highways at approximately the same time, the driver of the vehicle on the left shall yield the right of way to the vehicle on the right.

(b) The right-of-way rule declared in subsection (a) of this section is modified at through highways as otherwise provided in this chapter and as follows:

- (1) Whenever enforcement officers are present, they have the full power to regulate traffic.
- (2) Operators shall approach and enter intersecting highways slowly, with due care to avoid crashes.

23 V.S.A. § 1048. Stop or yield intersections

(a) Preferential right of way at an intersection may be indicated by “stop” signs or “yield” signs.

(b) Except when directed to proceed by an enforcement officer or traffic-control signal, every driver of a vehicle approaching a stop intersection indicated by a stop sign shall stop at a clearly marked stop line, but if none, before entering the crosswalk on the near side of the intersection, or, if none, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. After having stopped, the driver shall yield the right of way to any vehicle that has entered the intersection from another highway or that is approaching so closely on said highway as to constitute an immediate hazard during the time when such driver is moving across or within

the intersection.

(c) The driver of a vehicle approaching a yield sign shall in obedience to the yield sign slow down to a speed reasonable for the existing conditions and, if required for safety to stop, shall stop before entering the crosswalk on the near side of the intersection, or, if none, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway. After slowing or stopping, the driver shall yield the right of way to any vehicle in the intersection or approaching on another highway so closely as to constitute an immediate hazard during the time the driver is moving across or within the intersection. However, if the driver is involved in a collision with a vehicle in the intersection, after driving past a yield sign without stopping, the collision shall be deemed prima facie evidence of the driver's failure to yield right of way.

ITEM 5: Excerpts pertaining to documenting motor vehicle crashes

TITLE 23: MOTOR VEHICLES – CHAPTER 13: OPERATION OF VEHICLES
– SUBCHAPTER 11: MISCELLANEOUS RULES

23 V.S.A. § 1129. Crashes; reports

(a) The operator of a motor vehicle involved in a crash in which someone is injured or there is total property damage of \$3,000.00 or more shall make a written report concerning the crash to the Commissioner on forms furnished by the Commissioner. The written report shall be mailed to the Commissioner within 72 hours after the crash. The Commissioner may require further facts concerning the crash be provided upon forms he or she furnishes.

(b) As used in this section, the word “crash” only refers to incidents and events in which the motor vehicle involved comes into physical contact with an individual or object, including another motor vehicle.

TITLE 23: MOTOR VEHICLES – CHAPTER 15: POWERS OF ENFORCEMENT OFFICERS
– SUBCHAPTER 1: GENERAL PROVISIONS

23 V.S.A. § 1603. Investigation of crashes

The Commissioner of Public Safety shall immediately after receiving notice of a crash where a personal injury occurs, and, in case of notice of a crash where an injury occurs to property, may cause such crash to be investigated by an enforcement officer, and where such investigation reveals facts tending to show culpability on the part of any motor vehicle owner or operator, he or she shall cause such facts to be reported to the State's Attorney of the county where the crash occurred.

23 V.S.A. § 1603a. Reports of crashes

(a) All crashes involving a commercial motor vehicle or any vehicle displaying a hazardous materials placard shall be reported to the Agency of Transportation by appropriate law enforcement personnel on forms and in a manner prescribed by the Secretary of Transportation.

(b) Law enforcement officers who investigate motor vehicle crashes other than those involving vehicles described in subsection (a) of this section shall forward a report to the Agency of Transportation within 30 days after the crash is investigated on forms prescribed and furnished

Report on the Operation of Bicycles at Controlled Intersections

by the Secretary of Transportation and approved by the Attorney General with respect to any matter affecting the substantive rights of any person.

[23 V.S.A. § 1603b. Agency of Transportation repository for crash reports filed by law enforcement; Department of Motor Vehicles repository for operator crash reports](#)

The Agency of Transportation shall be the crash data repository for reports submitted by law enforcement agencies in the State. The Department of Motor Vehicles shall be the repository agency for all operator crash reports.

APPENDIX C. VERMONT HIGHWAY BICYCLE CRASH MEMORANDUM

This report is a statistical review of reported motor vehicle crashes that involved bicyclists in Vermont during the ten-year period of 2014 through 2023. The statistics are based on the “State of Vermont Uniform Crash Report” documentation of an incident submitted by local and state law enforcement officers and integrated into the State Web Crash reporting tool maintained by the Agency of Transportation (AOT; 23 V.S.A. § 1603b). An Officer investigating a crash is the primary source of data for Vermont’s vehicle crash records system (23 V.S.A. § 1603, § 1603a). The information submitted by the Officer will provide the basic data for crash prevention and selective enforcement programs. The State Web Crash tool receives reports from all state, county and local law enforcement agencies. At a minimum, a crash report should be completed on any crash whereby a person is injured or killed, or where the total damage to all property is to the extent of \$3,000 or more (23 V.S.A. § 1129). However, all crash occurrences are encouraged to be reported as all crash data is used in safety initiatives and highway analyses.

The AOT Operations and Safety Bureau, carried out an analysis of vehicle crash reports and vulnerable road users, specifically bicyclists, to assist in the *Report on the Operation of Bicycles at Controlled Intersections*. The two sources of information accessed to inform this analysis were the reported motor vehicle crashes (Web Crash tool) and citation data for perspective on law enforcement from a judiciary public records request.

This study represents the best efforts of the analysts who were unbiased and objective regarding the study’s outcome. This memo also identifies issues with data quality and impacts to interpretation and analysis.

C.1. VEHICLE CRASH TRENDS INVOLVING BICYCLISTS: 2014 – 2023

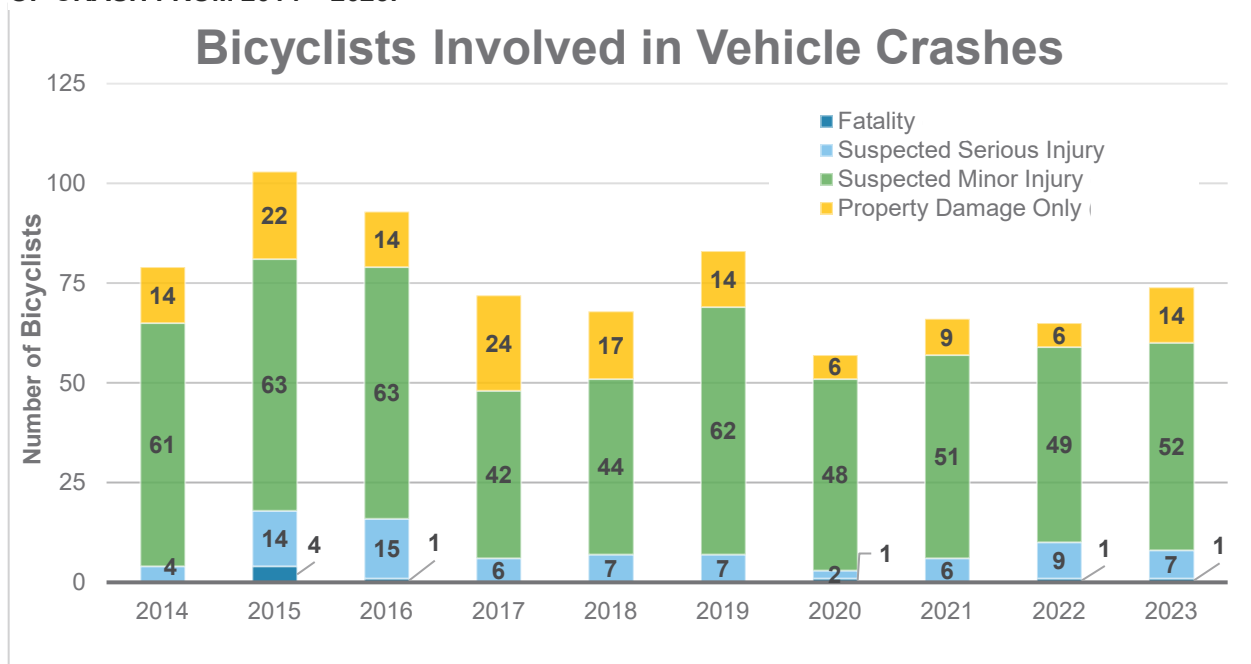
In the ten-year period from 2014 through 2023, there were **760** motor vehicle crashes that involved a bicyclist on Vermont’s public roads, see Figure C-1.

415 or 55% of all crashes were reported to have taken place at intersections. However, results from initial data analysis indicated it may be closer to 75% of crashes occurred at intersections.

59% of the total cyclist crashes and 39% of all major crashes occurred in Chittenden County greater Burlington area (Burlington, South Burlington, Colchester, Essex, Williston, and Winooski).

85 were classified as major crashes, incidents that result in a cyclist fatality (**8**) or suspected serious injury of cyclist (**77**).

FIGURE C- 1. NUMBER OF MOTOR VEHICLE CRASHES THAT INVOLVED BICYCLISTS BY TYPE OF CRASH FROM 2014 – 2023.



Behavioral Factors Contributing to Events

A crash report captures characteristics of the environment and roadway as well as characteristics pertaining to the operator of the motor vehicle and all other persons involved. Investigators record actions identified as the factor(s) that led to the crash occurring; these actions are recorded for drivers (Contributing Circumstances) and for a vulnerable road user (pedestrian or bicyclist) if involved in a crash (Pedestrian Cycle Action).

Person Type 'Driver', Field 'Contributing Circumstance'

Of the **85 major motor vehicle crashes** involving cyclists, the most common circumstances recorded as a contributing factor from the driver's perspective were:

No improper driving (i.e., no contributing circumstances from the driver perspective);

Inattention; and

Failed to yield right of way.

Figure C-2 provides the relative frequency of the reported contributing circumstances from the driver perspective. For each operator involved in a crash, a primary and secondary circumstance may be recorded. The fields, *Contributing Circumstances 1* and *2*, highlight certain driver actions, states of mind/awareness/intoxication, and distraction. These fields however are not required for non-fatal crashes; resulting in a high number of reports with these fields left as blank (NULL).

FIGURE C- 3 RELATIVE FREQUENCY OF REPORTED CONTRIBUTING CIRCUMSTANCES FROM THE MOTORIST PERSPECTIVE FOR ALL MAJOR CRASHES FROM 2014-2023.

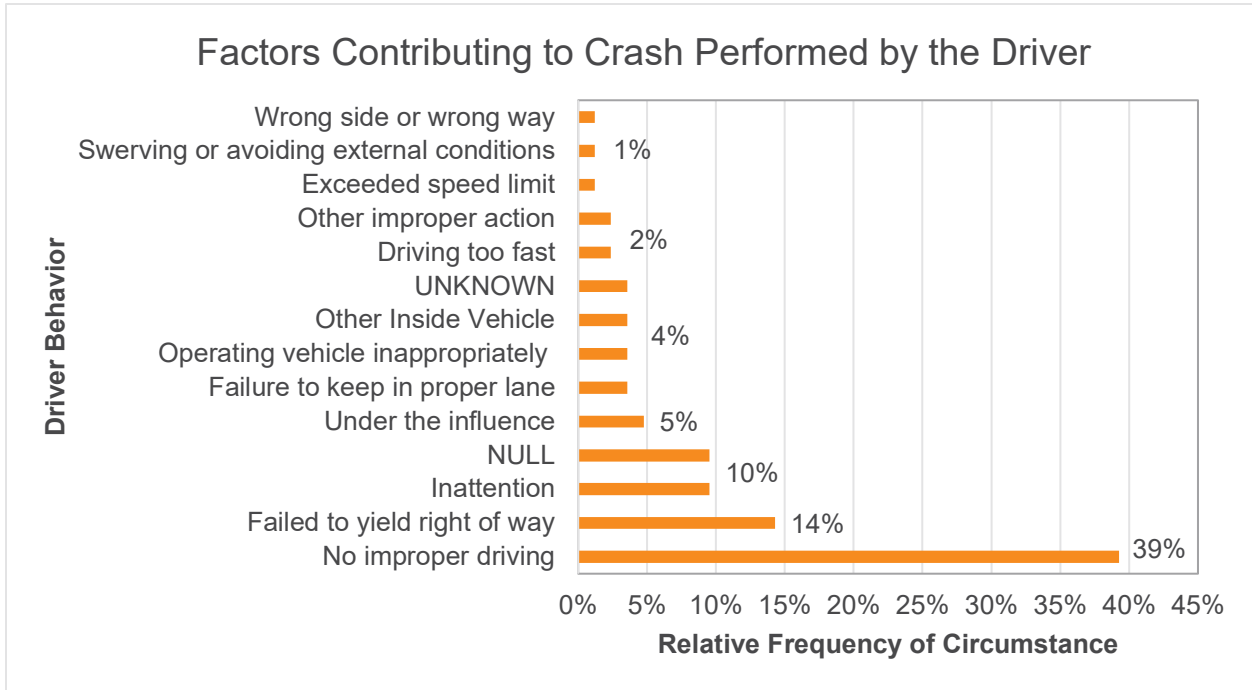
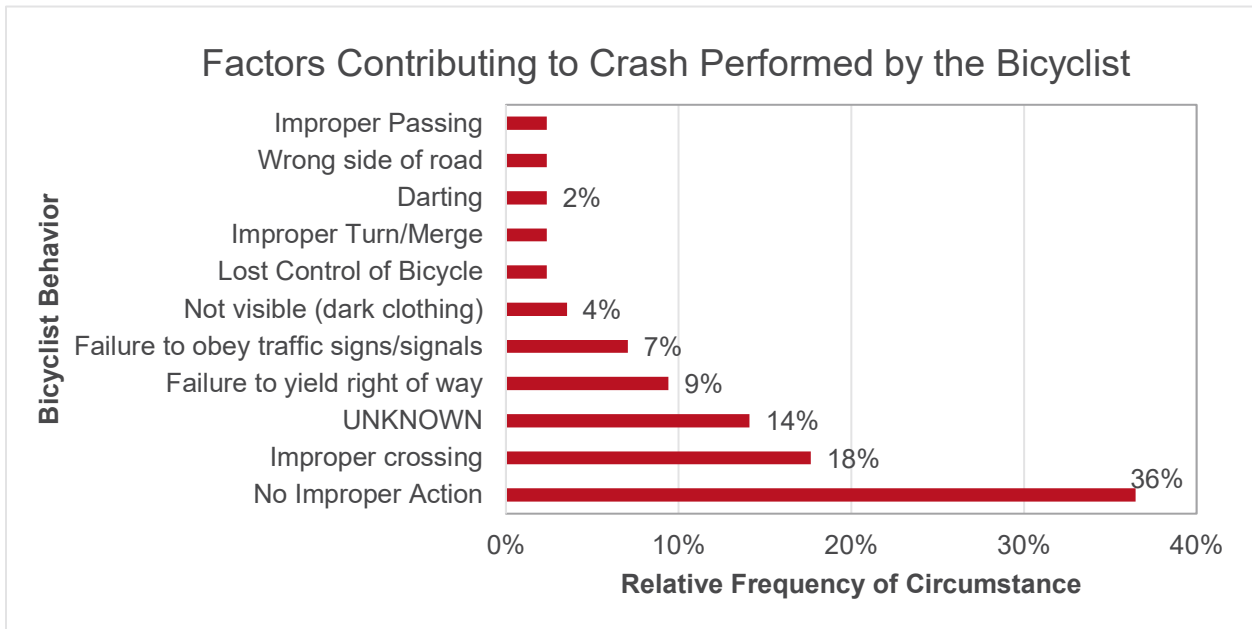


FIGURE C- 2. FIGURE C-3: RELATIVE FREQUENCY OF REPORTED CONTRIBUTING ACTIONS FROM THE BICYCLIST PERSPECTIVE FOR ALL MAJOR CRASHES FROM 2014-2023.



Person Type 'Cyclist', Field 'Pedestrian/Cyclist Action'

The field 'Pedestrian Cycle Action' is the only non-narrative field for active transportation modes that offers behavior information and can convey whether a cyclist is at fault for a crash. However, this is not a required field, therefore it was sparsely populated for the vehicle crashes categorized as Property Damage Only (PDO) or those that reported at least one minor injury. This field was consistently provided for major crashes (fatalities and serious injuries); a summary of this data subset is provided below.

Based on records from the 85 major crashes (fatalities and serious injuries), as shown in Figure C-3, the following explanations can be made regarding action taken by the cyclist prior to the crash.

- **49%** of crashes identified an improper action on the part of the cyclist.
- **36%** of crashes were preceded by no improper action on the part of the cyclist.

Of the 49 crashes where an improper action prior to the crash was attributed to the cyclist, the following actions were more frequently recorded as contributing factors.

- **18%** of crashes were preceded by an improper crossing.
- **7%** of crashes were preceded by a failure to obey traffic control.
- **9%** of crashes were preceded by a failure to yield the right of way.

Characteristics of Infrastructure at Crash Location

Cyclist Location

Cycle Location is used to best describe where the cyclist was located at the time of the crash. Most of the major crashes (i.e., fatal and serious injury) occurred on public highways, either along the roadway or at intersections.

- **65%** of the cyclists were in the roadway (**40**) or on the shoulder/roadside (**15**).
- **24%** of the cyclists were at intersections (**20**) with or without crosswalks.

Road Characteristics

One obstacle in the dataset was the lack of consistency in appropriately populating fields related to intersections. The "*Intersection Related*" field was left blank (*NULL*) for all cyclist crashes **68%** of the time and **73%** of the time for major crashes. To better understand where crashes took place, information was linked from the *Cycle Location* field and the *Road Characteristics* field and displayed in Figure 4.

- Across all cyclist crashes from 2014-2023, **51%** occurred near a roadway intersection (T-intersection or four-way intersection) while **25%** occurred away from any sort of junction.
- Of the crashes that resulted in a cyclist fatality; **2** of the **8** cyclist fatalities occurred near a roadway junction (T-intersection or Y-intersection).

Report on the Operation of Bicycles at Controlled Intersections

- **47%** (40) of all serious injury crashes occurred near an intersection (four-way intersection or T-intersection) while **29** (**38%**) occurred away from any sort of junction.

FIGURE C- 4. ROAD CHARACTERISTICS FOR ALL CYCLIST CRASHS AND MAJOR CRASHES ONLY FROM 2014-2023.

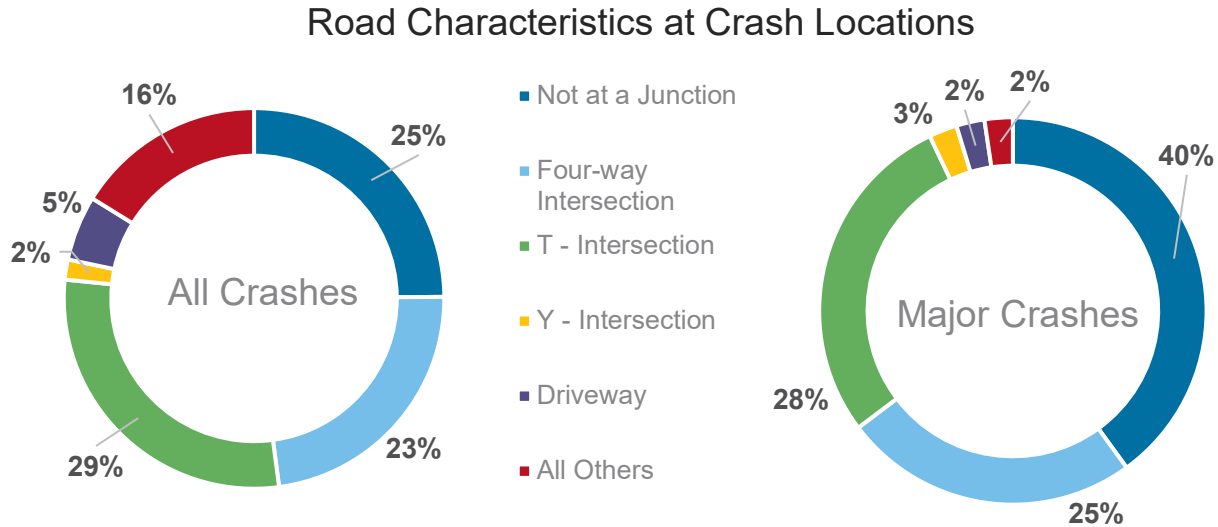
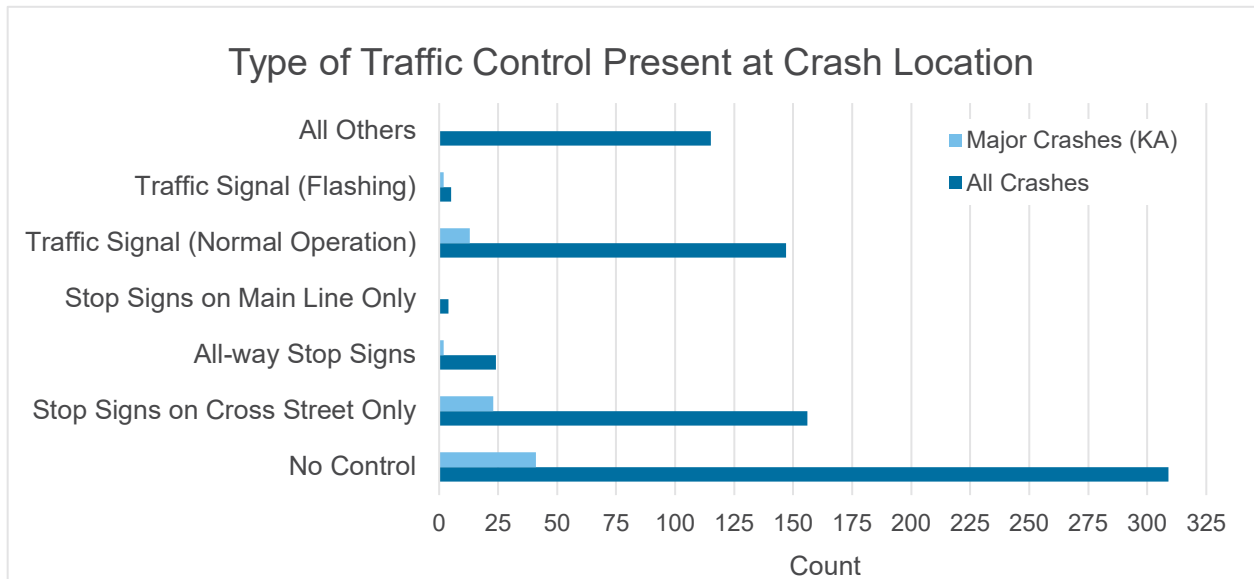


FIGURE C- 5. TYPE OF TRAFFIC CONTROL PRESENT AT ALL CYCLE CRASH LOCATIONS.



Type of Traffic Control Device

The type of traffic control device (signs or signals) present at the scene of the crash is a required field for crashes that result in an injury or fatality and provides another view of where crashes are occurring. See Figure 5 for more detail.

- From 2014-2023, there was no traffic control device present for **41%** of all cyclist crashes which includes the 88% of fatal crashes and 44% of the suspected serious injury crashes.
- **25%** of all cyclist crashes and **32%** of all major cyclist crashes took place at a location with a stop sign or its equivalent (i.e., stop signs on cross streets only or main line only, all-way stop signs, and traffic signal flashing).

C.2. CITATION INFORMATION

A review of judiciary records was conducted to identify citations or violations given to bicyclists documented in the period of 2014 to 2023 that were not associated with motor vehicle crashes. A total of 85 citations were provided by the Vermont Judiciary public data request. The following information is not assumed to be a comprehensive summary of vulnerable road user-relevant citations issued to either cyclists or motorists in this ten-year period.

In the period from 2014 through 2023, when it came to cyclist infractions:

- Montpelier issued the most citations in the ten-year period
- **12 of 13** citations in Montpelier were *application of bicycle regulations to parents and children*
- **9 of the 10** citations St. Albans issued were for *equipment on bicycle (required)*
- *Clinging to motor vehicles* has been cited **20** times distributed across law enforcement agencies

In terms of motorist citations in which motorist actions affected cyclists:

- Burlington Police issued **5** carelessly following or passing vulnerable user citations
- Statewide in the ten-year period there were **36** citations issued to motorists involving carelessly following, passing, or turning left toward vulnerable users
 - **23** citations for carelessly following or passing vulnerable user
 - **13** citations for Vehicle turning left-vulnerable user

The crash reporting form provides fields for investigators to record information of a citation and violation with codes to reference pre-defined infractions. No citations or violations were recorded when the person-type was 'cyclists' for the 760 motor vehicle crashes reviewed. This result should not be interpreted as a bicyclist was not at fault in any of these crashes but rather that these crashes were not coded by the investigator as bicyclist was at fault.

C.3. DATA PROCESSING

Even with the noticeable number of null and unknown fields, crash data are in general more reliable and complete for major (i.e., fatal and injury) crashes than for property damage only (PDO) or minor injury crashes. As a part of this effort, the Agency performed several data processing techniques for all non-major crash records (675 crashes) to verify or predict null and unknown fields based on text provided in the crash narrative as well as address data inconsistencies. The post-processing methods applied to these records were successful at completing records for simple categories, but additional review of individual records would be required to complete records for more detailed categories. For example,

- To determine whether the crash occurred at an intersection, responses in related fields and report narrative would be reviewed. Of note, a field added to the form in 2017 provides a checkbox for “intersection related” and could be used for future determinations depending on the nature of its applicability (required or optional).
- To identify the type of traffic control present at the crash location, verification of each record is needed to reconcile blank fields as well as contradictory information between fields (e.g., one field may state *stop signs on cross streets only* and another *not at a junction* for the same record).

To better inform future analysis, the Agency’s Data and Analysis Section is currently taking a three-pronged approach to addressing the data inconsistencies that make an accurate analysis so challenging. First, we are working with the Agency’s database managers to create a clean dataset. Using cleaning scripts developed in Python, we are creating tables of data that are more complete and error-free. Second, we are working on a program to screen incoming data that agencies are capturing in the field, determining where errors, incompletions, and inconsistencies are most common, and providing feedback to law enforcement on how to better record data. And third, we will be providing improved training where necessary on how to most efficiently and precisely capture data as well as big-picture explanations as to why accuracy is so important. A final step, pending all privacy issues are fully addressed, would be to utilize artificial intelligence (AI) to dig deeper into our data, especially into our narratives.

REFERENCES

- Blackburn, L., M. Dunn, R. Martinson, P. Robie, & K. O'Reilly. (2022, April 1). Improving Intersections for Pedestrians and Bicyclists Informational Guide. (Report No. FHWA-SA-22-017). United States. Federal Highway Administration. Retrieved from <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa22017.pdf>
- FHWA. (2023, December 1). Manual on Uniform Traffic Control Devices for Streets and Highways [11th Edition]. United States. Department of Transportation. Federal Highway Administration. Retrieved from https://mutcd.fhwa.dot.gov/kno_11th_Edition.htm
- Jackson, S., Retting, R., & Miller, S. (2021, August). *Impact analysis of bicycle safety laws* (Report No. DOT 813 123). National Highway Traffic Safety Administration.
- Mahdinia, I., Griswold, J. B, Unda, R., Sohrabi, S., & Grembek, O. (2024). Evaluate the Safety Effects of Adopting a Stop-as-Yield Law for Cyclists in California. *UC Office of the President: University of California Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/64h2s9cj>
- Meggs, J. N. (2010, August). *Bicycle safety and choice: Compounded public cobenefits of the Idaho law relaxing stop requirements for cycling*. University of California, Berkley. <https://denver.streetsblog.org/wp-content/uploads/sites/14/2018/02/idaho-law-jasonmeggs-2010version-2.pdf>
- National Highway Traffic Safety Administration (NHTSA). (2023, March). Bicyclist Safety Facts: Bicyclist “Stop-As-Yield” laws and Safety Fact Sheet. Retrieved from https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-03/Bicyclist-Yield-As-Stop-Fact-Sheet_032123_v5_tag.pdf
- Tekle, A. M. (2017, October 30). Roll on, cyclist: The Idaho rule, traffic law, and the quest to incentivize urban cycling, *Chicago-Kent Law Review* 92(2). <https://scholarship.kentlaw.iit.edu/cklawreview/vol92/iss2/8>