

TRIANGLE BIKE LOOP

"If we want to encourage cycling commuting, we need to figure out how to create safe travel routes or maybe designated routes within at least the three main towns of Vergennes, Bristol, and Middlebury at first and work out from there."

Comment from Middlebury College Survey



Project Need

Recent road accidents in the region have confirmed the need for increased care measures, and surveys confirm that people on bikes AND people in cars are seeking enhanced safety on roads throughout the region. Increased safety would support both recreational and "everyday" bicycling throughout the region and well as bring environmental, economic and quality of life benefits to individual communities and the region as a whole.



Benefits of a Dedicated Bike Loop



Environmental

Active transportation means fewer cars on the road



Social Improved connectivity between communities



Health/Wellness

Better opportunities to integrate physical exercise into daily/weekly routines



Economic

Make our communities more desirable places to live and work, attract recreational riders to local shops and restaurants



Goals

The Triangle Bike Loop Master Plan will set the stage to retrofit and create a dedicated bike loop that will connect Addison County's three largest civic hubs of Middlebury, Bristol and Vergennes, while providing a safe and enjoyable rider experience, increasing connectivity between communities along the route (New Haven, Waltham, Weybridge), and establishing a sustainable and valued recreation resource.

- Promote safer co-existence between people on bikes and people in cars sharing the road
- Make bicycling on these roads more appealing to a wider range of people
- Connect natural, cultural, and recreational points of interest along and adjacent to the route(s)
- Build community acceptance of everyday walking and biking and support mutual respect and trust among all users of Addison County's roads

Objectives

- Determine a preferred route (or routes)
- Determine road upgrades needed to meet desired comfort level for both drivers and riders who share the road
- Determine additional enhancements (e.g. signs, kiosks) to increase driver and rider awareness and promote the route(s)
- Identify natural, cultural, and recreational points of interest along and adjacent to the preferred route(s) that should be promoted
- Cost estimates and implementation matrix with responsibility, phasing, and grant/funding info to facilitate efficient implementation of the plan



Route Analysis

Using the route proposed in the Middlebury College study as a starting point, the project team conducted a more detailed analysis and also reviewed some alternate routes.

The analysis utilizes the Bicycle Level of Traffic Stress (BLTS) methodology, which VTrans uses to evaluate the comfort of bicycling along Vermont's state roads. Built on the goal of creating a bicycle network that is accessible to novice bicyclists, the analysis uses three key inputs:

- Average Daily Traffic
- Shoulder Width
- Heavy Vehicle Percentage

BLTS 1: Welcoming to most bicyclists

- BLTS 2: Comfortable for most adult bicyclists
- BLTS 3: Comfortable for experienced and confident bicyclists
- BLTS 4: Uncomfortable for most bicyclists

The standard for this project is:

BLTS 2: Comfortable for most adult bicyclists

The BLTS 2 standard was selected to make the route more welcoming to a broader section of the population than is currently riding bikes on these roads. Achieving BLTS 1 would be prohibitively costly and not necessary for the typical bicyclist who can ride these distances.

In addition to the BLTS ratings, the route analysis included other factors, including sight lines and steep grades.



Route Analysis: Preliminary Route Options





Public Process

Community Workshop

The open house community workshop was held at the New Haven Town Offices on August 15, 2019. The event allowed community members to stop by and respond to questions about preferred routes, infrastructure improvements, and points of interest. Throughout the evening, around 50 people gave their feedback.

Survey

An online survey was launched in late-August that remained open for two months. The survey asked respondents to identify their preferred bicycle routes between Vergennes, Bristol, Middlebury, and New Haven. The survey received 90 responses.

Project Website

The project website was designed so that as the project progressed, community members could learn about new developments, review analyses, and provide feedback.



1.What is your preferred route between Middlebury and Vergennes?



MV (Weybridge Street, Morgan Horse Farm Road, Pearson Road, Green Street)

MV Alt 1 (Weybridge Street, Weybridge Road, Hamilton Road, Morgan Horse Farm Road, Pearson Road, Green Street)

MV Alt 2 (Weybridge Street, Weybridge Road, Quaker Village Road, Hallock Road, Maple Street)





Recommended Routes Map





Recommended Routes Table

| Route ID | Segment Name | Length (mi) | Surface Type | Speed Limit (mph) | AADT | Relative Traffic Volume | Existing Shoulder Width (feet) | Overall Roadway Width | Design Typology | Construction Costs | Notes |
|-----------------------------------|----------------------|-------------|-----------------|----------------------|-----------|-------------------------------|--------------------------------------|-----------------------------|---------------------------------------|--------------------|--|
| Vergennes - Bristol VB | Monkton Rd | 0.5 | Paved | 25 | 3794 | High | 2 | 26 | Convert existing sidewalk to 10' path | \$\$\$ | |
| | | 1.2 | Paved | 25-50 | 2100 | High | 1-3 | 24-28 | Shoulder widening | \$ | Add 2' (min.) to each shoulder, can be combined with a resurfacing project |
| | S. Middlebrook Rd | 1.0 | Paved | 35 | <500* | Low | 0 | 22 | Meets BLTS 2 | | Consider paving |
| | Plank Rd | 2.8 | Paved | 40 | 447 | Low | 0-3 | 22-28 | Meets BLTS 2 | | Public feedback indicates high speeds, consider traffic calming measures |
| | | 3.4 | Gravel | 35 | 447 | Low | N/A | 30 | Meets BLTS 2 | | Consider paving (plus traffic calming - see note above) |
| | | 0.9 | Paved | 30-35 | 447 | Low | 1-3 | 24-28 | Meets BLTS 2 | | Public feedback indicates high speeds, consider traffic calming measures |
| | North St | 0.8 | Paved | 30 | 2883 | High | 3-4 | 26-30 | Meets BLTS 2 | | Recommend painting 10' lanes |
| | | 10.5 | | | | | | | | | |
| Bristol - Middlebury BM | North St | 0.8 | Paved | 30 | 2883 | High | 3-4 | 26-30 | Meets BLTS 2 | | |
| | Plank Rd | 0.9 | Paved | 30-35 | 447 | Low | 1-3 | 24-28 | Meets BLTS 2 | | Public feedback indicates high speeds, consider traffic calming measures |
| | | 0.9 | Gravel | 35 | 447 | Low | N/A | 30 | Meets BLTS 2 | | Consider paving (plus traffic calming - see note above) |
| | Sawyer Rd | 1.2 | Paved | 40 | 425 | Low | 0-1.5 | 22-25 | Meets BLTS 2 | | |
| | East St | 2.5 | Paved | 40 | <500* | Low | 0 | 22 | Meets BLTS 2 | | |
| | Munger St | 4.3 | Paved | 35-40 | 904 | Medium | 0 | 22 | Shoulder widening | \$\$ | Add 2' (min.) to each shoulder, can be combined with a resurfacing project |
| | Painter Rd | 1.6 | Paved | 40 | 987 | Medium | 0 | 22 | Shoulder widening | \$ | Add 2' (min.) to each shoulder, can be combined with a resurfacing project |
| | Washington St Ext | 1.0 | Paved | 25-35 | 1973 | High | 1-3 | 24-28 | Advisory shoulder | \$ | Include traffic calming measures |
| | | 13.2 | | | | | | | | | |
| Middlebury - Vergennes MV | Weybridge St | 0.7 | Paved | 25-35 | 2011-2536 | High | 1-6 | 22-34 | Advisory shoulder | \$ | |
| | Pulp Mill Bridge Rd | 0.4 | Paved | 35 | 974 | Medium | 1 | 24 | Advisory shoulder | \$ | |
| | Morgan Horse Farm Rd | 3.4 | Paved | 30-40 | 598 | Medium | 0 | 22 | Adivsory shoulder | \$ | Include traffic calming measures and reduce speed limit to 35 mph |
| | Pearson Rd | 3.2 | Paved | 40 | 170-408 | Low | 0 | 22 | Meets BLTS 2 | | |
| | Green St | 3.2 | Paved | 40 | 556 | Medium | 0 | 22 | Advisory shoulder | \$ | Include traffic calming measures and reduce speed limit to 35 mph |
| | | 0.7 | Paved | 30 | 1112 | Medium | 0-2 | 22-26 | Convert existing sidewalk to 10' path | \$\$\$ | |
| | | 0.2 | Paved | 25 | 3600 | High | 2 | 26 | Village traffic calming | \$-\$\$ | |
| | | 11.8 | | | | | | | | | |
| New Haven - Middlebury NH-M | South St 1 | 4.1 | Paved | 35-40 | 437 | Low | 0 | 22 | Meets BLTS 2 | | Consider sharrows in village area |
| | River Rd | 0.3 | Paved | 40 | 1576 | High | 1 | 24 | Shoulder widening | \$ | Add 2' (min.) to each shoulder, can be combined with a resurfacing project |
| | Halpin Rd | 1.8 | Gravel | 30-40* | 270 | Low | N/A | 22-28 | Meets BLTS 2 | | Consider paving |
| | | 0.6 | Paved | 30-40* | 270 | Low | 1 | 24 | Meets BLTS 2 | | |
| | Washington St Ext | 1.0 | Paved | 25-35 | 1973 | High | 1-3 | 24-28 | Advisory shoulder | \$ | |
| | | 7.8 | | | | | | | | | |
| New Haven SPUR | North St | 2.3 | Paved | 40 | 420-590 | Low-Med. | 1 | 24 | Meets BLTS 2 | | Consider sharrows in village area |

Estimated Range of Construction Costs \$ = < \$200,000 \$\$ = \$200,000 - \$750,000 \$\$\$ = > \$750,000 All road segments, including those that "Meet BLTS 2" should be upgraded with signage to identify the bike route, and many road segments would also benefit from traffic calming devices.



Design Typologies - Shoulder Widening





Shoulder Widening

Shoulder width, in relation to traffic volume, is one of the primary determinants of bicyclist comfort levels on rural roads. Widening of 2'-3' to roads that lack a shoulder allows some roads on the proposed route to meet the criteria for BLTS 2. In general, a minimum shoulder width of 2' is required on roads with medium traffic flows, while a minimum of 3' shoulder width is required on roads with high traffic flows. While 2'-3' shoulders may meet the minimum requirements, 4' minimum shoulders should be considered where feasible to provide improved bicyclist comfort.

Where shoulders are at least 4' wide, rumble strips at the edge of the travel way should be considered to provide a tactile/auditory alert to both people in cars and people on bikes.



Design Typologies - Advisory Shoulder



Advisory Shoulders

Advisory shoulders create usable shoulders for bicyclists on a roadway that is otherwise too narrow to accommodate one (and where shoulder widening may not be feasible due to physical constraints/cost). The shoulder is delineated by dashed pavement marking and optional pavement color, and existing road centerlines are eliminated. Motorists may only enter the shoulder when no bicyclists are present and must overtake these users with caution due to potential oncoming traffic.

Note: Striping of advisory shoulders recommended in conjunction with a paving project (avoids need to remove centerline striping). Advisory shoulders are only suitable for vehicle speeds of 35 mph or less

Examples of this treatment can be found on Flynn Ave. in Burlington and Quaker St. in Lincoln, VT

Benefits:

- Provides a delineated but nonexclusive space available for biking on a roadway otherwise too narrow for dedicated shoulders.
- Minimizes potential impacts to visual or natural resources through efficient use of existing space.
- Increases predictability and clarifies desired lateral positioning between people bicycling or walking and people driving in a narrow roadway.
- May function as an interim measure where plans include shoulder widening in the future.



TRIANGLE BIKE LOOP

TRIANGLE

Design Typologies - Village Traffic Calming





Village Traffic Calming

Where bicyclist infrastructure like bike lanes are not feasible within a village/downtown area, traffic calming and pavement markings can help to improve bicyclist comfort levels. There are a number of low-cost traffic calming tools to consider, including speed humps, pavement speed limit markings, and reduced lane widths. Pavements markings such as "sharrows", in combination with bike route signs, let drivers and bicyclists know that they are sharing the road.

- A speed hump is a raised section of asphalt approximately 10 to 14 feet long and 3 to 4 inches high. Speed humps are typically used on lower speed residential streets in rural areas that are experiencing a high incidence of speeding and/or cut through traffic. Speed humps are not to be confused with speed bumps, which are much shorter and usually found in parking lots. Speed humps have been found to reduce injury crashes by 40 to 50 percent and speeds by nine mph.
- A pavement speed limit marking displays the posted speed limit on the pavement. It is used to emphasize the speed limit.
- Reducing lane width to as narrow as 10 feet can reduce speeds. This can be accomplished by restriping narrower lanes without reducing pavement width.

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Design Typologies - 10' Shared Use Path



Shared Use Path

A shared use path provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. Shared use paths can provide a lowstress experience for a variety of users using the network for transportation or recreation. When accommodating bicyclists on road in higher traffic village areas isn't feasible, widening existing sidewalks to be 8'-10' wide should be considered where practical. Shared use paths provide a comfort level beyond the criteria of BLTS 2.





Rural Traffic Calming

Although traffic volumes are relatively low for much of the proposed route, traffic calming in some locations could help improve safety for people on bikes, especially where limited shoulder space is available. Typical locations include:

- Speed transition areas (entering village/downtown areas)
- Locations with sightline issues
- Restricted road/shoulder width (e.g. bridges, advisory lane, etc.)

In addition to utilizing traffic control devices to reduce speed, improved speed enforcement may be desired in some areas.

Traffic Control Devices - Speed Reduction

Reducing the speed limit alone generally does not result in lower speeds. Installing or upgrading signs and pavement markings on an affected roadway can be a cost-effective measure to reduce speeding. Such improvements include:





Traffic Control Devices - Speed Reduction



Advisory Speed Signs

Installed with curve warning signs to recommend a safe speed for traversing a curve.



Speed Activated Signs

- When connected to a speed-measuring device, a speed feedback sign displays the speed at which a vehicle is traveling.
- Effective in speed transition areas (e.g., a school zone or in area with high volumes of non-motorized traffic).
- Found to reduce speeds between 2 and 10 mph.



Optical Speed Bars

- Used at spot locations or along a corridor to reduce speeding.
- Transverse pavement markings across the travel lane or along its edges placed with decreasing spacing in the direction of travel, make it seem to drivers that they are traveling faster than their true speed.
- They are placed in advance of a speed transition zone or other critical location.
- Found to reduce speeds by an average of two mph.



- A pavement speed limit marking displays the posted speed limit on the pavement.
- Warns the driver of a potentially hazardous curve.
- Meant to supplement advisory signs.









Maintenance Considerations

A number of the road enhancements recommended for this project have maintenance implications that should be considered prior to investment.

- Pavement markings (advisory lanes, "sharrows", speed limit markings, etc.) can only be effective if properly maintained, and they must be repainted regularly
 - Waterborne paint markings are relatively inexpensive but has the shortest lifecycle
 - Durable paint markings will last longer but can be considerably more expensive compared to waterborne paints
- Care must be taken when plowing over speed humps
- Shoulders and bike lanes should be periodically inspected to keep them free of loose dirt/gravel during the riding season to ensure a safe surface for road bikes





Bike Route Signage

Signage to identify the bike route to cyclists also helps to alert drivers to the presence of people riding bikes. Route signage with directional arrows is important at locations where the route turns onto a new road and at regular intervals as "confirmation" signage. Utilizing signage in conjunction with traffic control devices can reinforce the need for drivers to slow down.

Signage must be MUTCD compliant, even if not located on state highways.





In lower speed locations, "May Use Full Lane" signs can be used in conjunction with "sharrow" pavement markings to let drivers know that the road is for both people in cars and people on bikes. These signs are preferred over the more vague "Share the Road" signs.



Custom signs that brand the route can be used in conjunction with the larger "Bike Route" sign



Route Branding

Branding the route is essential to promote awareness to both the local communities and to visitors from outside the region.

Although a logo was developed to promote this study, final naming of the route and development of an associated logo will be an important future step. The route brand can be utilized for road signage, maps (online and printed), and for promotional materials.





Kiosks

Kiosks located at key rest locations like town greens are an excellent way to promote the route.

Typically they would include maps that depict the route and represent points of interest along it. They can also be a great place to communicate riding etiquette and promote local businesses.





Project Implementation

Village Traffic Calming

- Recommend additional study due to potential to impact stormwater drainage
- 3-5 year timeframe for completion after additional scoping phase starts

Convert Existing Sidewalk to 10' Path

- Recommend additional study due to potential for impacts to utilities, ROW, stormwater, etc.
- 3-5 year timeframe for completion after additional scoping phase starts

Minor Shoulder Widening

- No additional study required*
- Timeframe variable as these projects should be attached to resurfacing projects for most cost-effective implementation

Major Shoulder Widening

- Recommend additional study due to the likelihood of impacts to wetlands, culverts and ROW
- 5-10 year timeframe for completion after additional scoping phase starts

Advisory Shoulder

- No additional study required*
- 1-2 years.
 - ° If existing markings are waterborne paint, recommend waiting until road needs to be restriped to reduce/eliminate the need for removal of existing lines.
 - ° If existing markings are durable paint, they may need to be removed before the new markings can be implemented.



Route Branding and Signage

- Design of route identity/branding and wayfinding plan required (sign locations and design, including kiosks)
- 1-2 years.

Rural Traffic Calming

- No additional study needed
- Timeframe not limited by paving projects as these features can be added to existing roadways at any point. Pavement markings should be coordinated with annual repainting projects to ensure effective implementation.

*Projects will have to go through a competitive grant process. If VTrans funding is secured, projects will still need to be designed to VTrans standards whether or not they require additional study.

Consider less costly short-terms steps to establish the route, while working toward longerterm upgrades!

- Signing and marketing the route
- Painting to define lanes/shoulder where needed
- Rural traffic calming (e.g. speed activated signs)



Funding Overview

State funding is available for route improvements if there is enough support from the local communities! Demonstrating alignment between town departments, selectboards, and the ACRPC around these opportunities will be critical to secure funding.

If the ACRPC applies for the grants, they could potentially be applied to segments spanning multiple towns. The ACRPC can manage any necessary scoping studies and can help the municipalities come up with an equitable share of project costs. Segments that cross town lines will be more successful with the support of the ACRPC.

Since these are all local roads, any state funding for road improvement will likely come in the form of a Bicycle Pedestrian and/or Transportation Alternative grant administered by the VTrans Municipal Assistance Bureau (MAB).

Aspects of the project that are regional in nature, such as the route branding and signage, could be eligible for funding from sources such as:

- Better Connections Grant
- Municipal Planning Grant
- VOREC Community Grant

An important component to this project's success will be having a patient and persistent champion, or champions, who can keep momentum going and work across town lines. The Addison County Walk-Bike Council and the ACRPC are well positioned to encourage project momentum.



Thank You!





Funding for this study comes through the State of Vermont's Municipal Planning Grant Program administered by the Town of New Haven and coordinated by the Addison County Regional Planning Commission

