

VTRANS ON-ROAD BICYCLE PLAN: PHASE 1 REPORT



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Joe Segale	Agency of Transportation
Gerry Slager	VBT Bicycling and Walking Vacations
Ken Valentine	Agency of Transportation
Jason Van Driesche	Local Motion



1.0 EXECUTIVE SUMMARY

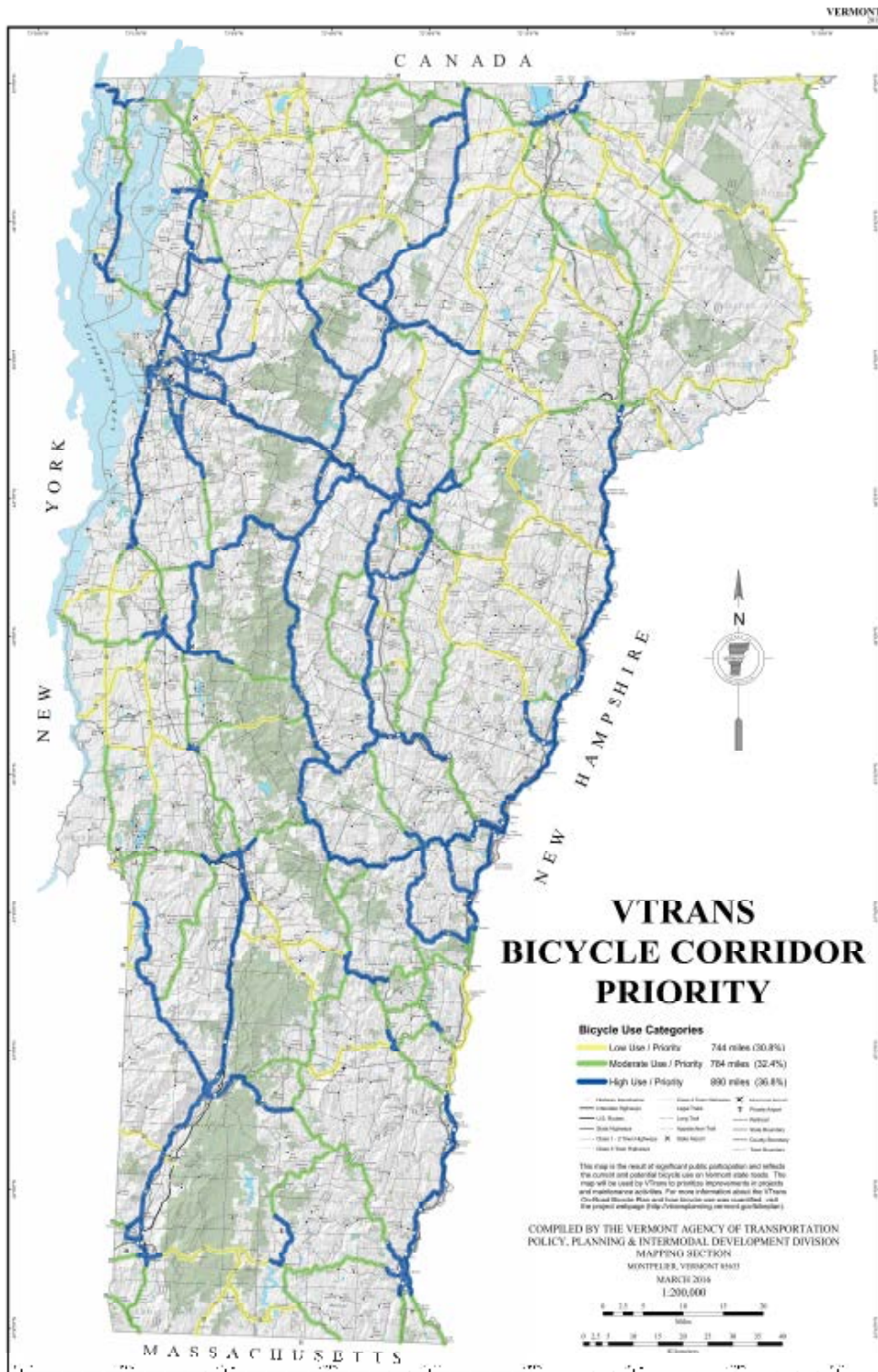
This report discusses the first phase of a multi-phase project. The overall goal of the On-Road Bicycle Plan is to develop a comprehensive improvement plan that identifies opportunities to enhance bicycle conditions on state roads designated as high-use priority bicycle corridors. The Plan will assist VTrans in understanding where to focus limited resources towards bicycle improvements and allow better integration into Agency projects and activities.

The focus of this first phase is to categorize state roads into high-, moderate- and low-use corridors based on current and potential bicycle use. Bicycle use was determined based on land use patterns, bicycle access to state roads, and current and potential bicycle use through a combination of stakeholder outreach and quantitative analysis.

Public participation significantly contributed to determining bicycle use on state roads. The foundation for ensuring diverse input was a broad set of stakeholders on the stakeholder committees. These individuals ranged from representatives of Vermont's bicycle touring community to members of VTrans Maintenance and Operations Bureau. Public input for the current phase (Phase 1) of this project was extensive and included StravaMetro data for 10,459 users in Vermont, a crowdsourced interactive map (aka the Wikimap) input from 2,123 unique users, and participation from over 350 individuals at three different statewide meetings or via email comment. These numbers do not include participants who watched the archived videos of the three statewide public meetings available on the project website. As of 21 March 2016 the recorded videos of the public meetings had been watched 285 times.

The final product of Phase 1 is the VTrans Bicycle Corridor Priority Map (shown in Figure 1) which is the result of the aforementioned criteria and public input in combination with a qualitative smoothing process using VTrans' experience managing state roads. A high-resolution, large-format version of the map is available for download on the project website: <http://vtransplanning.vermont.gov/bikeplan>.

FIGURE 1: VTRANS BICYCLE CORRIDOR PRIORITY MAP



2.0 INTRODUCTION

Given funding constraints and a growing importance in planning for bicycle use, the Vermont Agency of Transportation (VTTrans) is undertaking an effort to prioritize maintenance activities and capital improvements in relation to bicycling on state roads. Typically, planning for bicycle needs is challenging due to sparse count data and unknown latent bicycle demand. This project developed a GIS-based analysis that supports the need to plan for bicycle use on state roads amidst funding constraints by categorizing current and potential bicycle use on state roadways using data that is readily available or easy to gather.

The process described in this document accounts for bicycle use as a form of transportation and for recreation¹ by combining land use data, data from an online application used for tracking bicycle trips, and crowdsourced public opinion data for the entire state. This method allows VTTrans to assess on-road bicycle facilities prioritization along all roadways within its jurisdiction using a universal framework.

This report discusses the first phase of a multi-phase project. The overall goal of the project is to develop a comprehensive improvement plan that identifies opportunities to enhance bicycle conditions on state roads designated as high-use priority bicycle corridors.

The focus of this first phase is to develop a robust methodology to group state roads into three categories based on their location, connectivity, and current and potential bicycle use through a combination of stakeholder outreach and quantitative analysis. The specific plans for future phases are still being determined but are anticipated to identify critical infrastructure deficiencies and gaps in the high-use bicycle corridors and identify specific improvements (e.g., signage, striping, widening, etc.) to address the identified gaps in the high-use bicycle corridors.

2.1 | DEFINITIONS

Throughout this project, language has been chosen carefully to describe particular topics clearly. Feedback from Public Meeting 2 indicated some of those terms were confusing. As such, certain terms have been defined, modified, or changed to improve the clarity of the communication. The key terms are:

- Use: Current or potential riding on state roadways by people riding bicycles. This term replaces desirability and priority.
 - Current Bicycle Use: where people ride bicycles now
 - Potential Bicycle Use: where people are likely to ride bicycles based on public input and land use access/patterns, if conditions were improved
- Transportation trip: A bicycle trip that serves a purpose, such as doing errands, commuting to work or school, or visiting a friend. This term replaces utilitarian riding/trip.
- Recreation trip: A bicycle trip taken for exercise or enjoyment of the outdoors.

¹ The dominant purpose of a **Transportation** trip is utilitarian, such as doing errands, commuting to work or school, or visiting a friend. The dominant purpose of a **Recreation** trips is for exercise or enjoyment of the outdoors.

- Crowdsourced interactive map: An online map on which visitors could provide feedback about their use of roads in the state for bicycling. This term replaces Wikimap.

3.0 PUBLIC OUTREACH EFFORTS

Public input was a critical component of this project's Phase 1. Eliciting input from a geographically- and categorically-diverse stakeholder group was critical. As such, the project involved multiple methods of engaging the public. These methods included targeted outreach to bicycle communities, broad outreach to the public, and multiple interface methods to reach as many Vermonter bicycle riders as possible to encourage their participation.

Public input for the current phase of this project (Phase 1) included:

- Collection of StravaMetro² data for 10,459 Strava app users in Vermont over the course of one year. This data set includes riding routes and times stripped of personal information for every ride recorded with Strava in the state between 1 September 2013 and 31 August 2014.
- Crowdsourced interactive map (aka the Wikimap) input from 2,123 users
- Three Statewide Public Meetings using Vermont Interactive Technologies facilities and broadcast to the web with attendance of
 - 66 participants (including 12 web participants) at meeting #1,
 - 52 participants (including 14 web participants) at meeting #2, and
 - 69 participants (including 17 web participants) at meeting #3.
- A stakeholder group that included representatives from the Regional Planning Commissions, VT Department of Tourism & Marketing, VT Agency of Commerce & Community Development, Vermont Bike & Pedestrian Coalition / Local Motion, VBT Bicycling & Walking Vacations, Green Mountain Bicycle Club, and American Council of Engineering Consultants
- An Internal Working Group comprised of VTrans staff representing the Policy and Planning section, Bicycle and Pedestrian Program, Maintenance and Operations Bureau, Project Delivery Bureau, Municipal Assistance Bureau, Planning and Research Bureau, and the Chief Engineer of the Highway Section.
- A dedicated email address (Vermontbike@gmail.com) for project comments that received 169 email correspondences
- The VTrans On Road Bicycle Plan project website that included:
 - Archived videos of statewide public meetings, watched a combined total of 285 times.
 - Key project information
- Project materials were provided to state libraries throughout Vermont to post statewide public meeting information on their bulletin boards and social media pages.

² An on-line application used by individuals to track trips made by bicycle.

- Working with Local Motion (a statewide bicycle and pedestrian advocacy organization) and the State’s eleven regional planning commissions (RPCs) to do targeted outreach statewide.

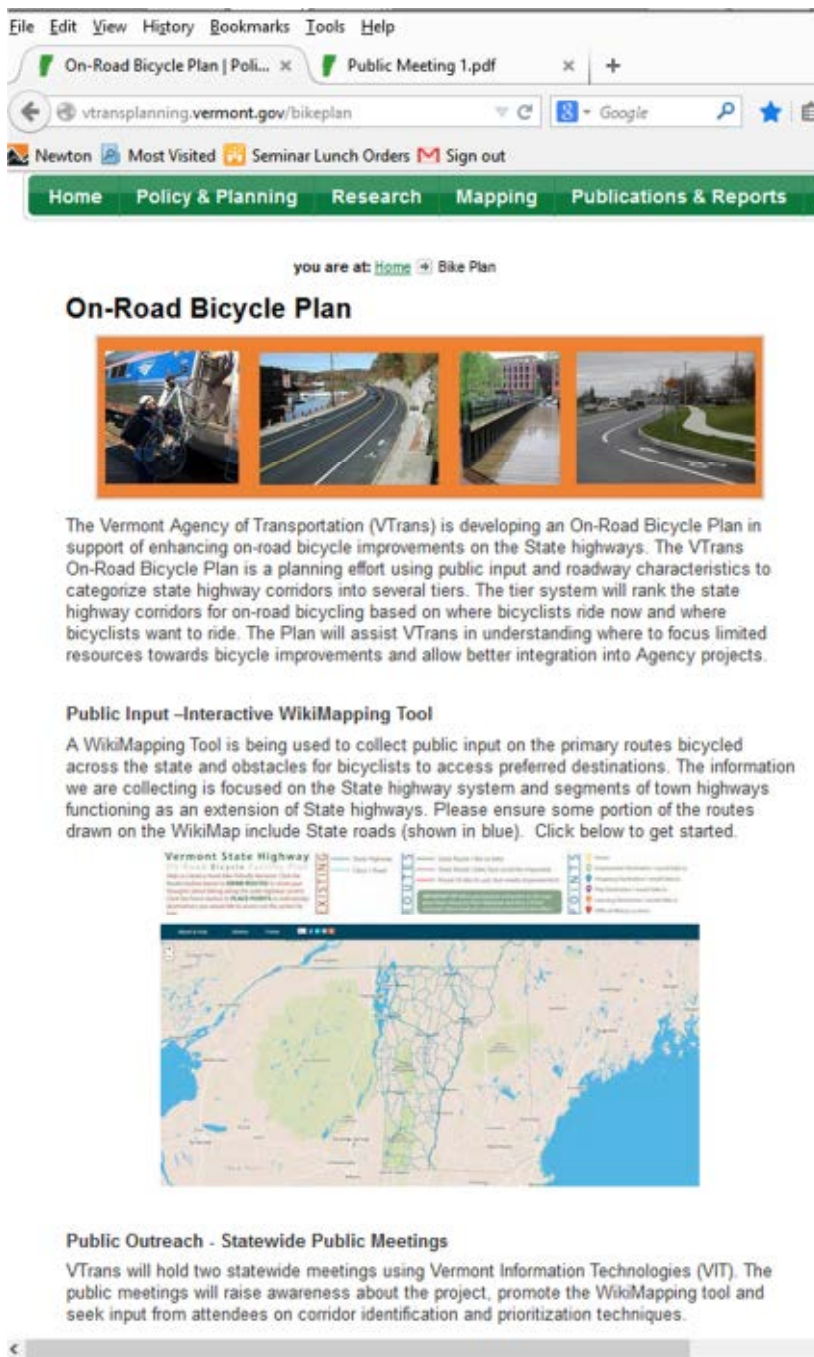
Table 1 summarizes the number of participants by engagement mode for the three public meetings.

TABLE 1: NUMBER OF PARTICIPANTS BY ENGAGEMENT MODE FOR THE THREE PUBLIC MEETINGS

	IN-PERSON	ONLINE	YOUTUBE	TOTAL
Public Meeting 1	54	12	56	122
Public Meeting 2	38	14	162	214
Public Meeting 3	52	17	67	136
TOTAL	144	43	285	472

The core of the public outreach was a project website and email address. The project website was developed and hosted by VTrans, with input from the consultant team. The website allowed for a stable central location for recording and disseminating project information. The design was intentionally simple, focusing on critical information including key dates, recent project information, and links to the project crowdsourced interactive map. The website included flyers about public meetings (available in Appendix A) and video recordings of the meetings. A snapshot of the website is shown below in Figure 2.

FIGURE 2: SCREENSHOT OF THE PROJECT WEBSITE



The other core aspect of the public outreach was a project email address. The project email address was a Gmail account (vermontbike@gmail.com) that members of the consultant team and VTrans project managers could monitor, ensuring prompt and accurate responses to all inquiries. 169 emails were received through this account. The emails were categorized into topics as shown in Table 2.

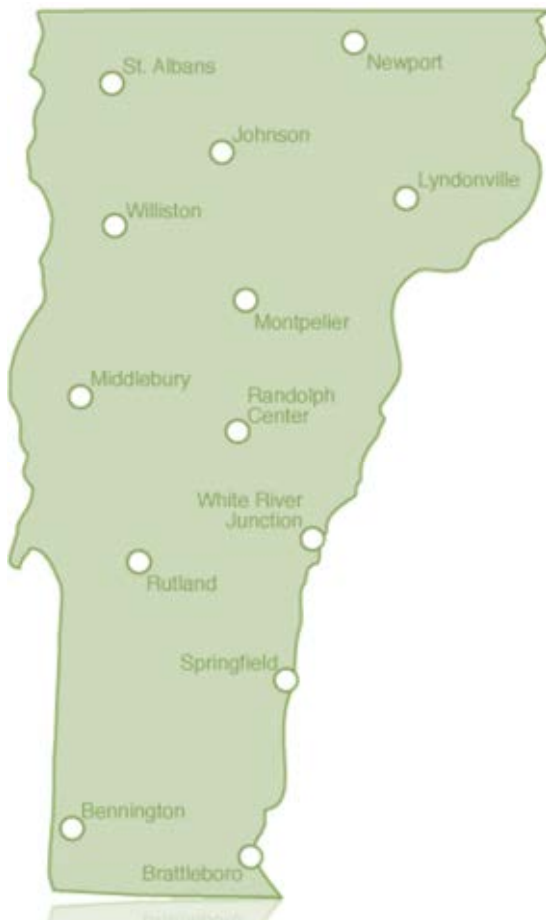
TABLE 2: FREQUENCY OF COMMENTS BY CATEGORY TO THE PROJECT EMAIL ACCOUNT

Category	Frequency
Data for crowdsourced interactive map (WikiMap)	30
Desirability clarification	11
Draft map feedback	60
General feedback outside project scope	20
Meeting information	16
Policy/project structure	9
Press	1
Providing input	53
Resistance to bicycle use on roads	2
Strava	1

A third component of the project outreach was leveraging Local Motion, a statewide bicycle and pedestrian advocacy organization, as a project partner to ensure broad distribution of project information to their email list and to their Walk and Roll News subscribers. Their email mailing list includes over 5,000 “non-bounce” contacts. Regular notifications via email and through press releases were shared before and after critical dates for the project. The Walk and Roll News articles are included in Appendix A.

The fourth component of the public outreach was using the Vermont Interactive Technologies (VIT) facilities to host the public meetings. These facilities allowed the project to host statewide public meetings in Montpelier and broadcast the meetings to VIT’s 13 facilities throughout the state (Figure 3). Regional planning commission staff attended the remote locations and served as proxy hosts to help ensure the meeting went smoothly and made the meeting feel more connected. The meetings were also live webcast so people who could not attend in person could still participate, watching via the internet and sharing their questions using the live chat feature. Lastly, these meetings were also recorded, and the recordings were posted on the project website.

FIGURE 3: VERMONT INTERACTIVE TECHNOLOGIES' (VIT) 13 LOCATIONS THROUGHOUT THE STATE (SOURCE: VIT)



Another important source for public participation was the project’s crowdsourced interactive map (aka WikiMap). This map was available for public comment for approximately 2 months, during which time users could identify state roads they prefer to ride and state roads they avoid along with their common bicycling destinations. Users could add comments to specific locations on the map via points and lines or build upon previous users’ input with their own comments. Users could also indicate support for or disagreement with existing input with voting buttons to Agree or Disagree on content. During the data collection period over 2,100 unique users left input on the map. The geographic distribution and intensity of the user input to the crowdsourced interactive map was used to identify active interest in bicycle riding – places where the potential demand was likely to be acted upon.

Many of the public outreach tools for this project relied on the public’s use of modern technology, and the project team was sensitive to reducing barriers for those with limited access to the internet. As such, the project team developed flyers and distributed these and project information to libraries throughout the state. These flyers are available in Appendix A. The consultant team also input data directly into the crowdsourced interactive map for anyone with difficulty doing so.

In the end, this project succeeded in gathering extensive public input, and the results of the project were shaped significantly by this input. Input following Public Meeting 1 focused on the crowdsourced interactive map. The public interacted with the map, and those that had difficulty doing so contacted the project team to provide their input via other methods. Input following Public Meeting 2 and 3 varied in subject matter. To ensure all of this input was addressed, the project team developed documents detailing responses to each comment or class of comments including the various project changes made in response to public input. These responsiveness documents are included in Appendix C.

4.0 DATA SOURCES

This project relies on a variety of geographic data. To serve the project's needs, the data required:

- fine enough resolution to be valid at the scale of a bicycle trip and
- extents broad enough to cover the entire study area.

Many common data sources, including Census data, do not meet these requirements. Some data are only available for heavily populated counties, and some are not consistent across the state, which is often the case for geographic data in rural locations.

Of the data used in this project some are freely available, some are purchased, and some are gathered specifically for this project. The data falls into three broad categories: roadway data, bicycles as transportation data, and recreational cycling data.³

4.1 | ROADWAY DATA

The analysis presented in this study uses freely available roadway centerline data. For this project, a subset of the Vermont Agency of Transportation's (VTrans') master centerline shapefile is used. Specifically, only state roads and Class 1 Town Highways are included. The State has jurisdiction over state roads. While the State does not control Class 1 Town Highways, they are a critical part of the road network. Additionally, most limited access highways are excluded, because bicycles are prohibited from riding on them in Vermont. However, some state-managed limited access roads were included, such as VT 289 and the St. Albans State Highway, because a suitable adjacent alternative bicycle facility does not exist in those locations.

The resulting roads file comprises all of the segments to be categorized for bicycle use.

4.2 | TRANSPORTATION BICYCLING DATA

The purpose of this analysis is to determine where people do and want to ride bicycles throughout the state. For transportation riding, this process means determining trip origins and destinations. The three data sets used to determine the origin and destinations were:

³ The dominant purpose of a **Transportation** trip is utilitarian, such as doing errands, commuting to work or school, or visiting a friend. The dominant purpose of a **Recreation** trips is for exercise or enjoyment of the outdoors. There is much crossover between transportation and recreation bicycling, sometimes even on a single ride. However, we distinguish the two because travel behavior, preferred routes, and appropriate facility types can be different.

1. E-911 point locations,
2. bicycling statistics from the 2009 National Household Travel Survey to determine typical bicycle trip lengths and frequencies by land use category, and
3. an online crowdsourced interactive mapping tool gathered the public's value of the roadways for riding.

4.2.1 ORIGIN AND DESTINATION SITE LOCATIONS

For this study a point shapefile of 911-relevant locations across the state is used to identify all of the potential origin and destinations in the state⁴. This data includes a field that describes the type of land use⁵ at each point's location. Some descriptors are specific, e.g. "Single Family Dwelling," while others are more general, e.g. "Commercial." This data does not include information on the size of each land use, so a point labeled "Commercial" could be a small office building or a large department store.

Each point location is assigned into the following five land use categories based on its description (Table 3):

- Work,
- Errands,
- Leisure,
- School, and
- Residence.

Some location types could fall into multiple categories. For example, since people work and shop at Retail Facilities, these location types are labeled with both the Work and Errands land use categories. The School location type is labeled with the Work and School land use categories, since people work and attend classes at these location types. Table 3 below illustrates the different land use categories associated with seven example location types.

⁴ http://maps.vcgi.org/gisdata/vcgi/packaged_zips/EmergencyE911_ESITE.zip Accessed June 23, 2014

⁵ Land use refers to the type of activity occurring on a parcel. For example, land use can include residential, industrial, commercial, educational, or recreational activities.

TABLE 3: LAND USE CATEGORIES ASSOCIATED WITH SEVEN EXAMPLE LOCATION TYPES

Location Type	Land Use Categories				
	Work	Errands	Leisure	School	Residence
Retail Facility	X	X			
School	X			X	
Commercial	X	X			
Picnic Area			X		
Health Clinic	X	X			
Single Family Dwelling					X
Apartment Building					X

4.2.2 NATIONAL HOUSEHOLD TRAVEL SURVEY

Understanding the use of bicycling as transportation requires understanding how many bicycle trips a destination category will generate and how far people will ride to access that destination. Different types of destinations will generate different numbers of trips on proximate roadways, and the destinations' areas of influence will be different. For example, people are generally willing to bike farther for work than for shopping, but a retail store may generate more bicycle use than an office building because more people travel to shop than to commute. A literature review revealed some variation between estimates of average bicycle trip length depending on purpose, but all trips are generally between 2 and 7 miles. Most available research studies focused on work-based trips, although some studies mentioned other trip purposes.

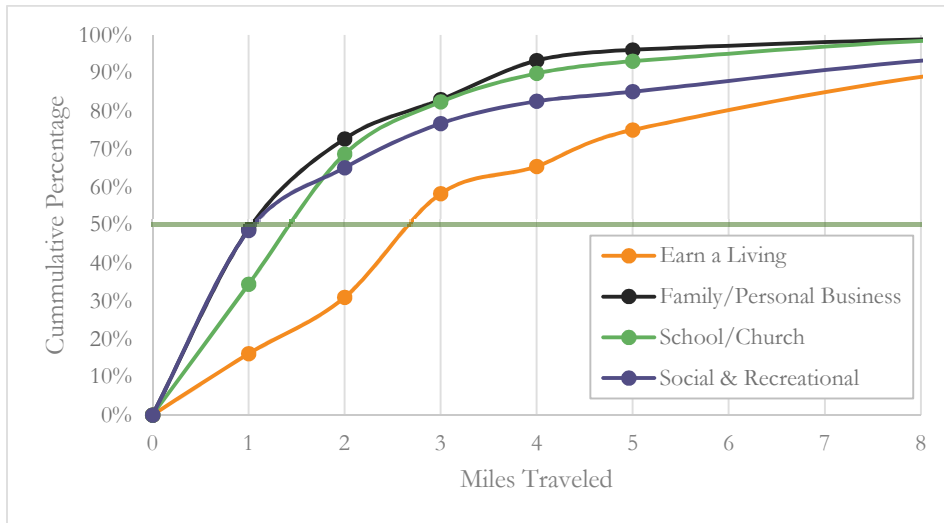
The dataset with the most complete description of trip distance based on trip purpose was the 2009 National Household Travel Survey (NHTS)⁶. Bicycle trips in this dataset are categorized into four destination types:

- Work,
- Errands,
- Leisure, and
- School.

Each destination type is determined to have an area of influence threshold based on its fiftieth percentile trip distance (Figure 4). For example, the distribution of trip distances for work-based trips has a fiftieth percentile of 2.5 miles, which means that 50 percent of work-based bicycle trips in the NHTS are 2.5 miles or shorter. Based on the cumulative distribution functions of the trip distances for the four destination types, the thresholds for work, errands, leisure, and school are 2.5 miles, 1 mile, 1 mile, and 1.5 miles, respectively.

⁶ <http://nhts.ornl.gov/det/Extraction3.aspx> Accessed Jan. 21, 2015

FIGURE 4: CUMULATIVE PERCENTAGE OF BICYCLE TRIPS, BY TRIP TYPE, AS TRIP DISTANCE INCREASES (DATA FROM NHTS)



The NHTS data was compared to the Vermont subset. The sample size of the Vermont subset for bicycle trips was not large enough to make meaningful conclusions for the On Road Bicycle project, but it was used to review the National data. Consistent with other studies, the Vermont data was similar to the larger NHTS sample but showed slightly longer trip distances. To address the longer distances observed in Vermont, the national average travel distances were used for trip lengths, and that distance is applied to both homes and destinations. In effect, this step increases the length people travelled by bicycle included in the analysis, but practically the land uses are frequently considerably closer. This method was the most straightforward way to count both ends of a trip, use a data-driven rationale, and also allow for Vermont’s tendency toward longer trip making.







4.2.3 CROWDSOURCED INTERACTIVE MAPPING TOOL (WIKIMAP)

A major component of the public engagement process for the VTrans On-Road Bicycle Plan was a crowdsourced interactive map (Wikimap). The map provided the public the opportunity to draw points and lines in real time, which represented key factors related to the State Road system important to the planning process. These factors are described below.




The objective in developing the point and line designations was to provide the public with specific features to gather key information. While all roads in the state could be commented on, users were asked to focus their input on the State Road system or connections to the State Road system. The interactive map included six point classes and three line types as input features. Together, these features provided information about the potential and current bicycle use of Vermont state roads for bicycling.

Destinations along roadways can be used to inform the potential bicycle use of a given road segment, in that a roadway with more destinations has more potential bicycle use, generating more trips than a stretch of road with fewer destinations. The public was provided with six point classes to choose from, five of which were used to indicate various destinations they do bicycle to or would like to

bicycle to, as well as one point class to indicate specific spot locations where bicycling is uncomfortable. These classes included:

-  Home
-  Employment Destination I would/do bicycle to
-  Shopping Destination I would/do bicycle to
-  Play Destination I would/do bicycle to
-  Learning Destination I would/do bicycle to
-  Difficult Bicycling Location

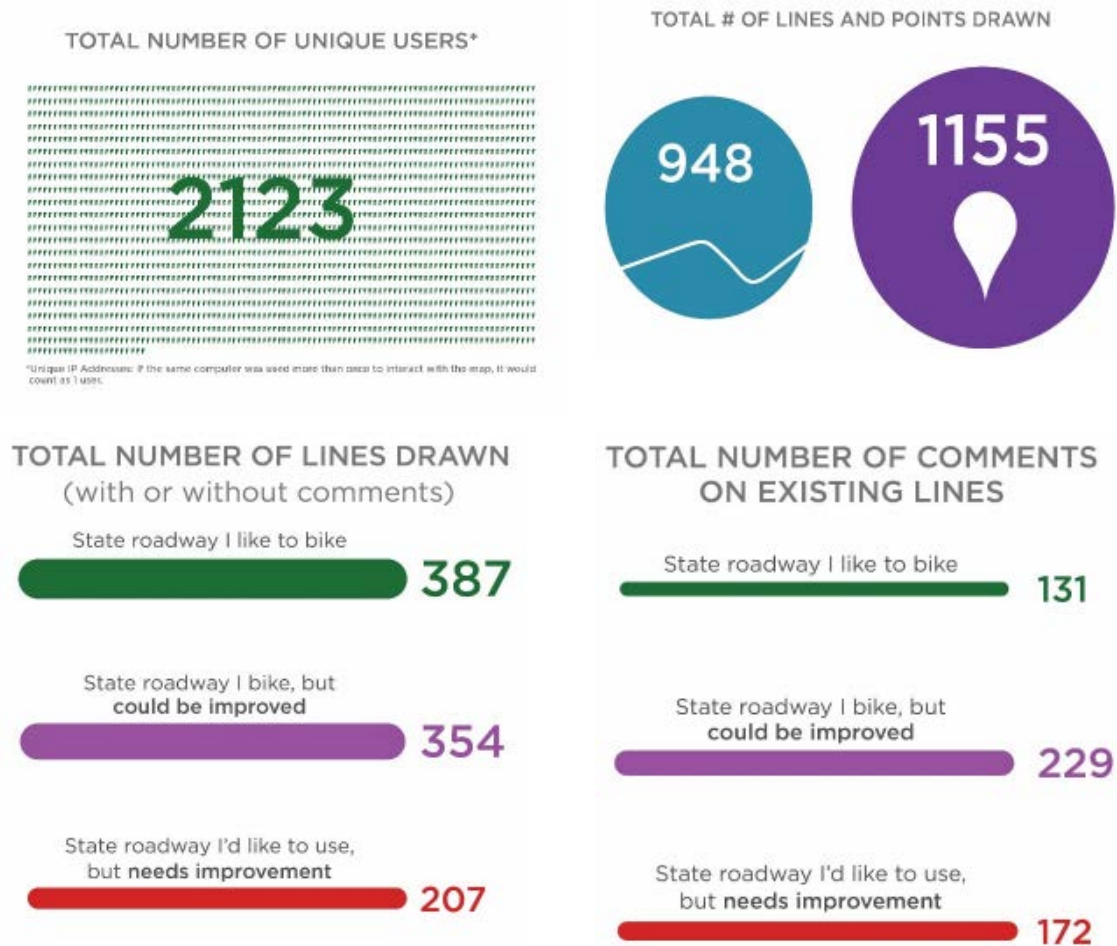
Three line types could be drawn on the crowdsourced interactive map (WikiMap). These three categories covered current and potential bicycle use of each road segment. For example, the road segments currently used are noted by the first two line types (State roadway I like to bike and State roadway I bike, but could be improved). The third line type indicated a road segment with potential bicycle use (State roadway I'd like to use, but needs improvement). The line types are listed below:

-  State roadway I like to bike
-  State roadway I bike, but could be improved
-  State roadway I'd like to use, but needs improvement

Users could provide input three different ways, none of which were mutually exclusive. Users could draw new points and lines on the map, leave a comment on an existing point or line on the map, or “agree” or “disagree” with a point or line that was already drawn by a voting button to Agree or Disagree with prior input. The total input on a road segment was used to scale the analytical scores by public input intensity. Features that received more public responses were considered a higher priority to the general public than features that received fewer responses.

The map provided a diverse set of input features and generated a valuable data set. The land use-based analysis projected potential bicycle use on state roads (discussed above in Section 4.2.1 and 4.2.2). The crowdsourced interactive map data provided information about where people do ride or were more likely to ride in the future. The map was distributed through several channels, available for input for 2 months, and participation was overwhelmingly successful, with over 2,100 unique users providing input. The infographics in Figure 5 display the number and type of interactions users had with the map.

FIGURE 5: CROWDSOURCED INTERACTIVE MAPPING TOOL (WIKIMAP) SUMMARY STATISTICS



4.3 | RECREATIONAL BICYCLING DATA

Recreational bicycling trips were considered separately from transportation bicycle trips. Unlike riding for transportation, recreational cycling typically does not have a set destination that can be extrapolated from existing data sources. Routes are often chosen for reasons that are hard to quantify or predict such as scenic beauty, steep or mild terrain, or a particular cyclist’s sense of safety. Consequently, estimating recreational cycling use is most easily gathered from observational data or personal experience. The analysis presented here uses data purchased from Strava Inc., interviews with bicycle touring professionals, and input from the crowdsourced interactive mapping tool noted above to estimate recreational trips.

4.3.1 STRAVA DATA

The data product StravaMetro (purchased from Strava Inc.) tracks cyclists who use the Strava app as they ride, and the trips of all users are compiled into the StravaMetro dataset for a particular area.

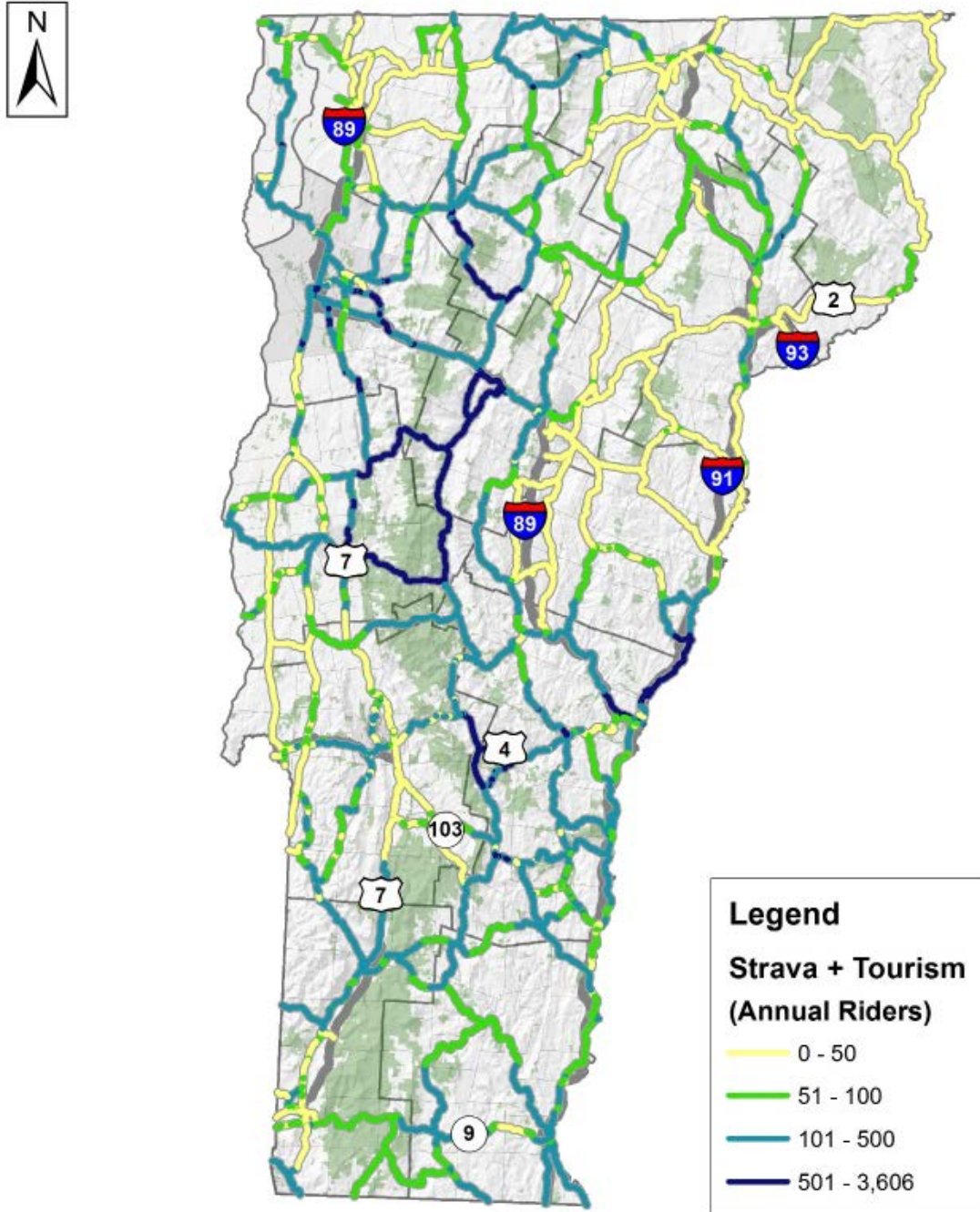
The data used for this project was collected on 10,459 distinct Strava users who rode in Vermont between September 1, 2013 and August 31, 2014. The total number of trips on each road segment over that one-year period is used for this project, although StravaMetro data distinguishes trips by time of day, day of the week, or time of year.

The Strava data only represents riders that use the app. However, Strava Inc. has found the number of riders on a road is often proportional to the number rides captured by the Strava app. In Vermont the StravaMetro data over the time period available appeared heavily influenced by recreational riders given the riding routes and time of day patterns observed. This influence was leveraged to estimate recreational trips.

4.3.2 INTERVIEWS WITH TOURING PROFESSIONALS

As bicycle touring is an important component in bicycle ridership in Vermont, leaders of touring companies were interviewed to understand the riding patterns of their tour groups. The input from the interviews with the touring companies regarding trip routes and numbers of riders were included in the recreation analysis (provided in Section 5.2). Figure 6 shows the number of riders observed in the joined Strava and tourism data.

FIGURE 6: ANNUAL RIDERSHIP ON VERMONT ROADS FROM STRAVAMETRO AND TOURING COMPANY DATA



5.0 DEMAND ESTIMATION

To estimate the total current and potential use by cyclists on the state roadways, two types of bicycle riding are estimated: transportation trips and recreational trips. The current and potential bicycle use associated with these types of trips are estimated independently and then combined to create an overall score. The resulting scores are grouped to categorize road segments as High Use, Moderate Use, and Low Use based on current and potential bicycle use on a road segment.

5.1 | TRANSPORTATION USE ESTIMATION

Transportation trip demand is derived from land use information, as this type of bicycle riding is driven by a rider's need to get from place to place. The land use information comes from the E-911 point data described in Section 4.2.1. The area of influence for each land use point is the typical riding distance identified in Section 4.2.2 associated with any of its associated destination types (Work, Errands, Leisure, and School – see Table 3). Then the trip frequency of each destination type is calculated and a corresponding weight is applied to the scores. Next, the influence of each point on each segment of roadway is calculated to determine how much access each segment provides to the various destination types. Finally, this access score is weighted by the crowdsourced interactive mapping (aka. WikiMap data) tool to estimate potential transportation bicycle use.

5.1.1 TRIP DISTANCE THRESHOLD AND DESTINATION ACCESS

The NHTS data were evaluated to determine the typical bicycle trip lengths for various transportation trip types. These trip lengths are applied to the E-911 point data to determine the number of points within an acceptable access distance to the available land use. Based on the cumulative distribution functions of the trip distances for the four destination types, the thresholds for work, errands, leisure, and school are 2.5 miles, 1 mile, 1 mile, and 1.5 miles, respectively (see Figure 4).

To calculate the number of proximate destinations for each road segment a raster analysis is used where pixels are 0.124 miles square. For example, consider a pixel that is within 1 mile of a high school, 1.5 miles of pharmacy, and 2 miles of an office building. All three destinations can serve as work destinations and are within the work threshold (2.5 miles). The high school is close enough to bicycle to according to the school threshold (1.5 miles), but the pharmacy is further than the errands threshold (1 mile). Therefore, this pixel would be considered to provide access to three work destinations and one school destination (the school is counted as both a work and a school destination).

According to a 2008 study⁷, almost 90% of bicycle trips begin at the cyclist's home, so residences serve as the origins of these potential bicycle trips. A greater number of residences within a destination's threshold would mean that a greater number of bicycle trips are possible. To account for this, the number of residences within each destination's threshold are multiplied by the number of that destination. To continue the above example, assume three houses are within 1 mile of the pixel and 2 apartment buildings are 2 miles from the pixel, so 3 residences are within the school

⁷Royal, D., and D. Miller-Steiger. Volume II: Findings Report National Survey of Bicyclist and Pedestrian Attitudes and Behavior. Publication DOT HS 810 972, NHTSA, U.S. Department of Transportation, 2008.

threshold (1.5 miles) and 5 residences are within the work threshold (2.5 miles). This hypothetical pixel's unweighted destination scores are listed in Table 4.

TABLE 4: EXAMPLE UNWEIGHTED DESTINATION SCORES

Trip Type	Threshold Distance (mi)	Destinations in Threshold Distance	Residences in Threshold Distance	Score
Work	2.5	3	5	15
Errands	1	0	3	0
Leisure	1	0	3	0
School	1.5	1	3	3

5.1.2 TRIP FREQUENCY AND ACCESS SCORE

The quantity of each type of trip in the NHTS can be used to determine the relative frequency of each type of trip. Assigning work-based trips a frequency of 1, the observed relative frequency of errands, leisure, and school are 1.4, 4.9, and 0.5, respectively (O_d in Equation 1). The NHTS trip frequencies indicate leisure-based trips occur almost 5 times more often than work-based trips, and school-based trips occur about half as often.

The destination scores describe the number of destinations a pixel may provide access to, but some destinations will be accessed more often than others. For example, a small office building will only be accessed by the people who work there, but a similarly sized retail store will be accessed all day by customers. Therefore, the destination scores are weighted to account for the difference in how often riders access them. Equation 1 shows how these weights (w_d) are determined.

EQUATION 1

$$w_d \left(\frac{T_d}{T_{work}} \right) = O_d$$

The weights are based on the total number of points for each destination type (T_d) in the E911 point file. The ratio of T_d to the total number of work destination points (T_{work}) multiplied by the weight w_d is set equal to the observed relative trip frequency from NHTS (O_d). w_d will vary depending on the point data that is used. For the Vermont E911 data, w_d for work, errands, leisure, and school are 1.00, 1.74, 2.79, and 4.90 respectively.

To calculate the final access score⁸, each road segment is assigned the median value of the pixels along that segment for each destination type. These destination scores are multiplied by their respective weight w_d , then these four scores are summed to compute the access score for that

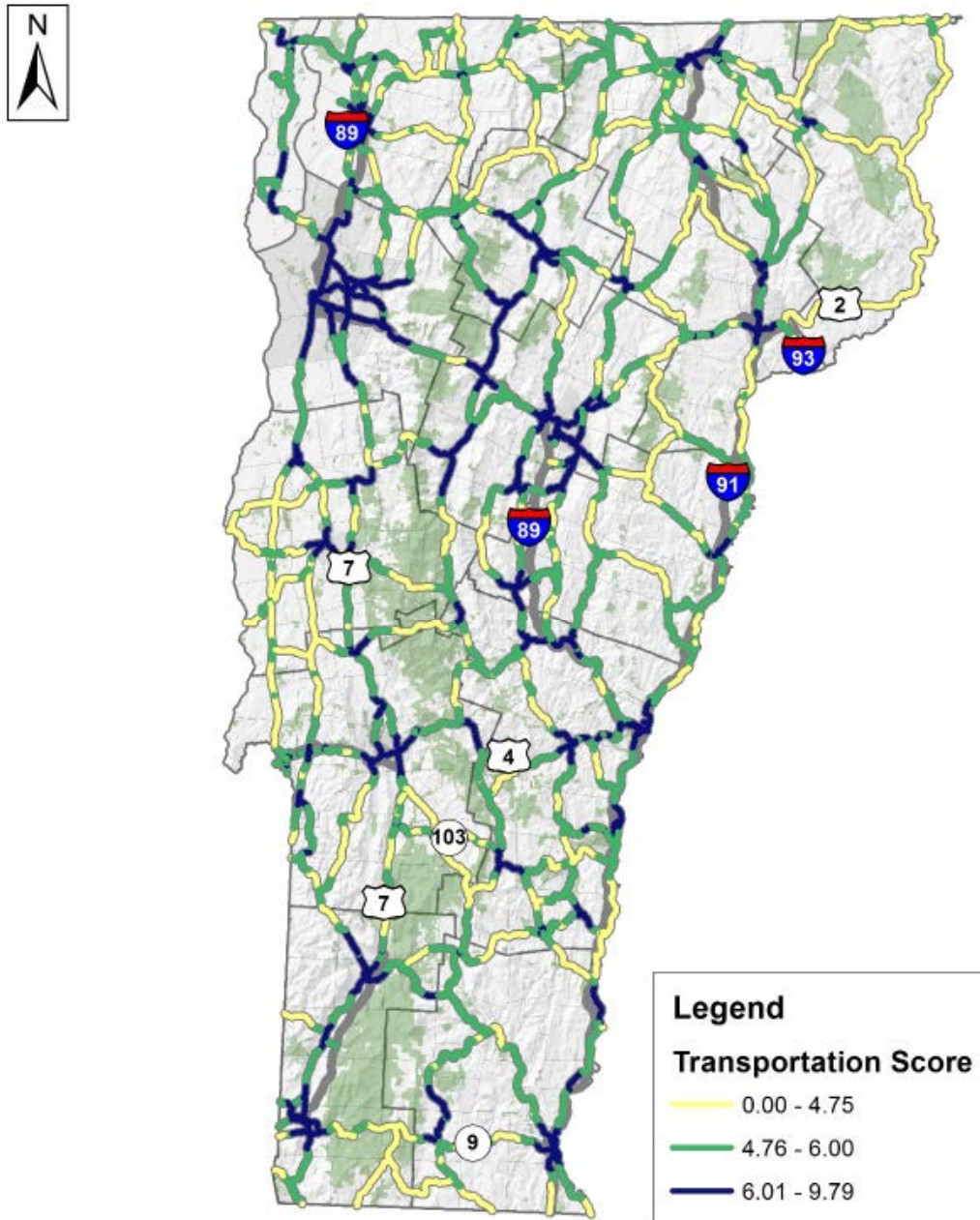
⁸ The access score reflects the relative amount of land use access each road segment provides.

segment. For the previous example, the access score equals 29.7 (Work: 1.00×15 + Errand: 1.74×0 + Leisure: 2.79×0 + School: 4.90×3). Lastly, the score is transformed with a base-10 logarithm. The access score and the recreation score were orders of magnitude apart. The log base-10 transform gave the scores similar scales.

5.1.3 TRANSPORTATION USE SCORE

The final step of computing the transportation use score was converting access to state roads into estimated bicycle use. The access score describes how much bicycle access a road segment provides to destinations, but it does not account for where people will use that access. Using the crowdsourced interactive mapping tool (aka. WikiMap), people commented on specific roadways, and agreed or disagreed with those comments. The access score is increased between 0 and 30 percent to reflect active bicycling interest depending on the amount of public input on a particular road segment. The result is the transportation use score shown in Figure 7.

FIGURE 7: TRANSPORTATION USE SCORES



5.2 | RECREATIONAL USE ESTIMATION

People ride bicycles for many reasons other than transportation: exercise, relaxation, seeing nature, and competitive cycling to name a few, and each reason encourages cyclists to make different route choices. This variety of preferences makes it difficult to predict where people will ride for recreation, so the method estimates recreational demand based on where people are riding now or where they say they would like to ride if the roads were in better shape. The three data sources included in the

analysis are StravaMetro data, interviews with touring companies, and a subset of the crowdsourced interactive map responses. The StravaMetro data and the information gleaned from interviews with touring companies indicate current bicycle use on the roads for recreational riding. Determining potential recreation use on state roads relied on a subset of the crowdsourced interactive map responses (responses of “State roadway I’d like to use, but needs improvement”).

5.2.1 OBSERVED RECREATION DATA

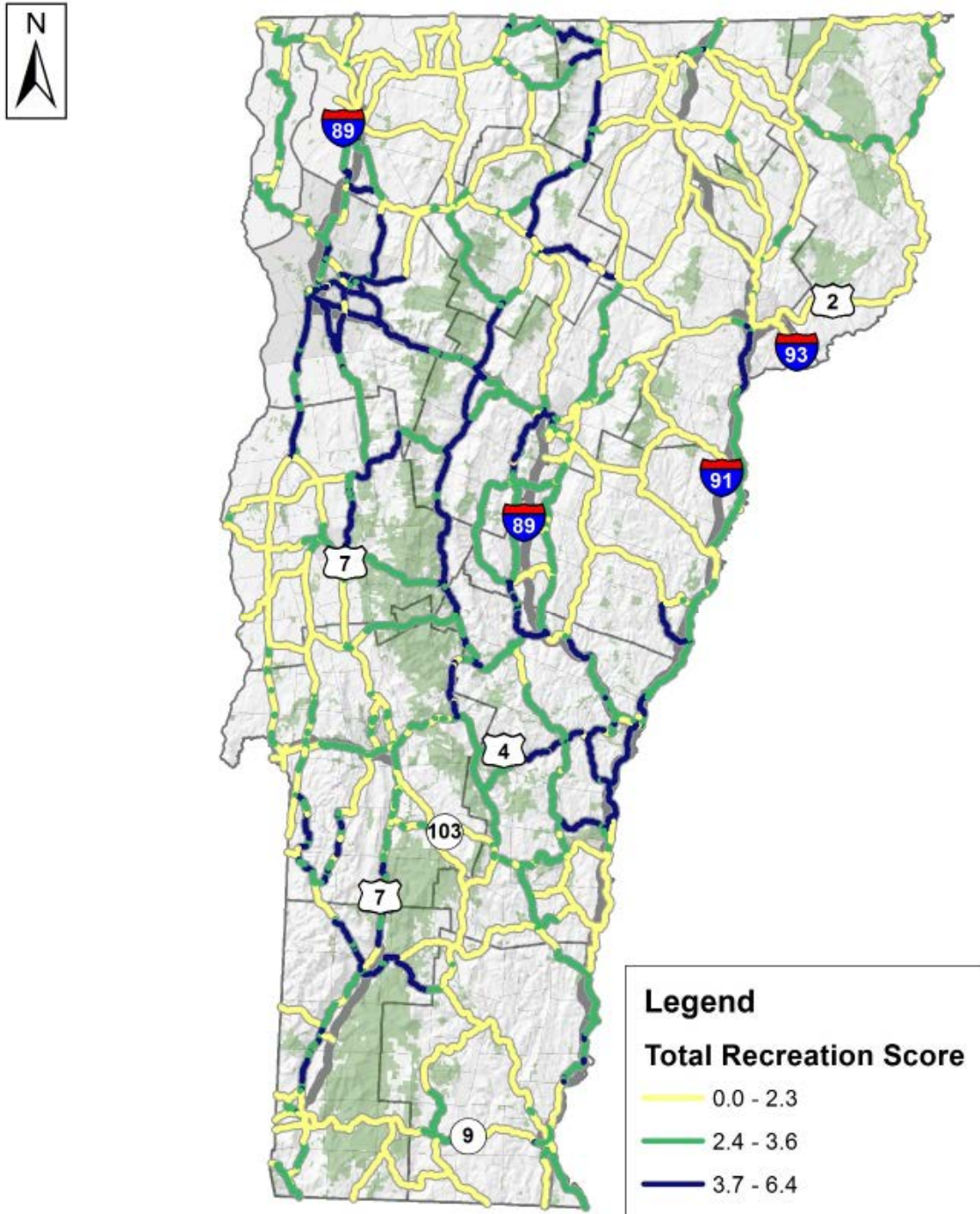
The primary source of data for the recreational riding was the StravaMetro data sample. For this analysis, the total number of riders observed in a year on each road segment was used. The number of riders on each segment ranged from none to over 3600. To protect the proprietary touring data, the number of touring riders on a road was added to the number of Strava riders on a road. The touring routes were mostly located on roads that already had high Strava counts. Like the access score, the number of observed riders including StravaMetro counts and touring company data is transformed with a base-10 logarithm.

5.2.2 POTENTIAL BICYCLE USE

The StravaMetro data and touring data observes where people are currently riding recreationally, but these data sources do not capture where people would choose to ride if the roads were friendlier to bicycling. To support efforts to make roadway improvements that would induce new bicycle use, this analysis leveraged the crowdsourced interactive map to identify road segments where users would like to ride but do not due to roadway conditions. Comments from the project’s second Statewide public meeting that discussed this methodology stressed there were roads avid cyclists would be riding if they were improved, but those roads had few cyclists on them now.

To supplement the Strava and touring data, roads that had been marked as “State roadway I’d like to use, but needs improvement” in the crowdsourced interactive map were included in the recreational data. Road segments are divided into 4 ranks based on their number of comments where segments with more comments earn a higher rank. Rank 0, 1, 2, and 3 roads receive 0, 1, 2, and 3 points in addition to their transformed StravaMetro/touring score. The total recreation scores are shown in Figure 8.

FIGURE 8: RECREATION USE SCORES



5.3 | OVERALL BICYCLE USE SCORE AND USE CATEGORIES

After estimating transportation use and recreational use, these scores are combined to produce the overall bicycle use score. This overall score is then divided into three categories of high, moderate and low use, to determine the priority bicycle corridors.

5.3.1 COMBINING TRANSPORTATION AND RECREATION USE

As mentioned in Sections 5.1.2 and 5.2.1, a log base-10 transform of the access and StravaMetro/touring scores ensured the two riding type scores would have similar scales. Public input emphasized that transportation and recreation riding were equally important throughout the state, therefore the recreation use score is weighted to ensure the maximum recreation score was equal to the maximum transportation use score.

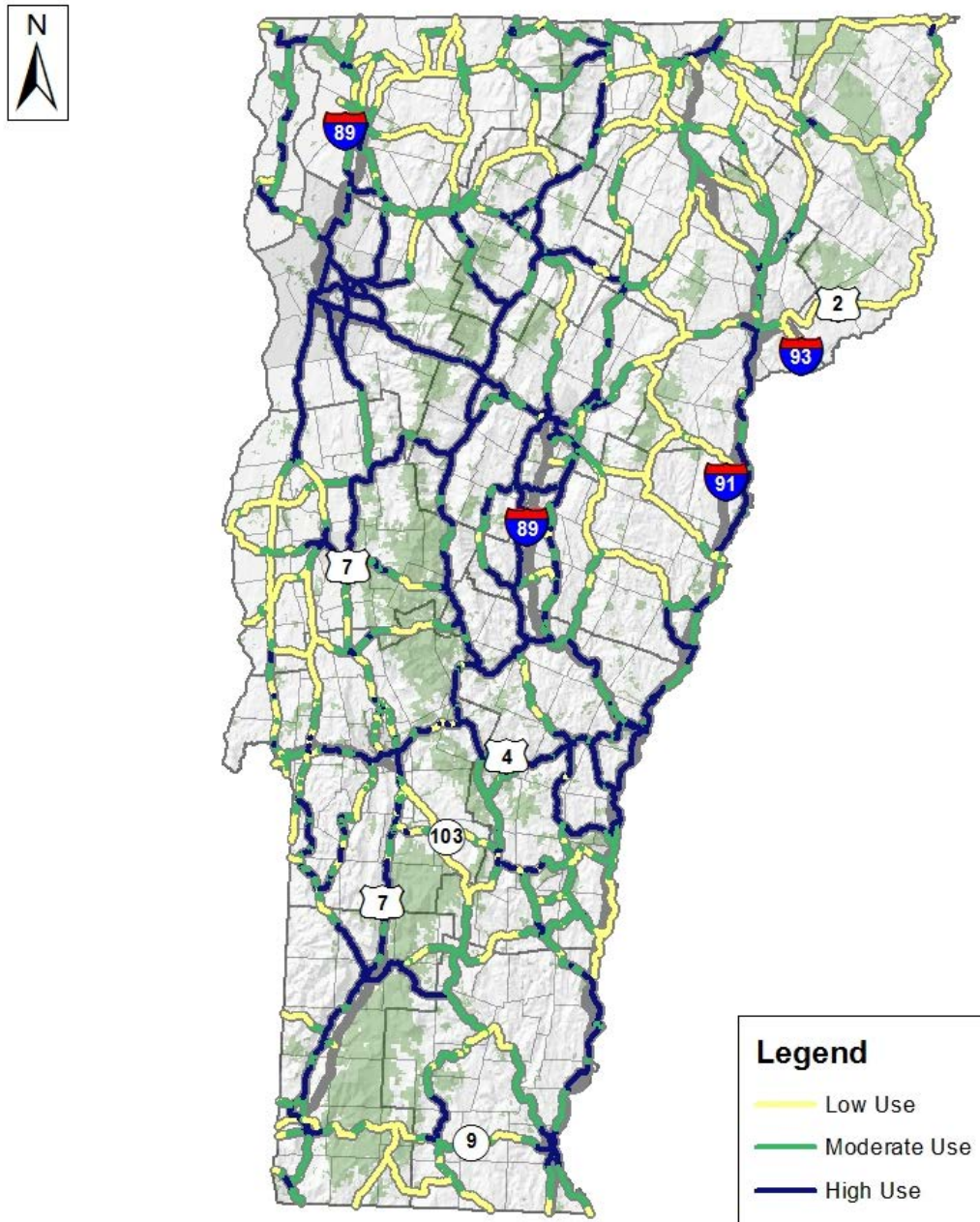
The overall bicycle use score is found by adding the weighted recreation use score to the transportation use score. This overall bicycle use score describes the amount of current and potential bicycling use each road segment has relative to other segments. Higher scores denote higher current or potential bicycle use. However, these scores should not be interpreted as a prediction of the number of riders on a segment and should not be used in conjunction with different scores outside of this methodology.

5.3.2 BICYCLE USE CATEGORIES

The last step in the methodology is to divide the roadways into three categories of high, moderate, and low bicycle use. The segments are ranked by overall bicycle use score, and score thresholds are determined so each category contains roughly one-third of the State's roadway mileage⁹. Figure 9 shows the State roadways with the bicycle use categories assigned.

⁹ The analysis does not include interstate highways or limited access highways with alternative routes.

FIGURE 9: BICYCLE USE CATEGORIES FOR THE STATE ROADWAYS



Most of the high use roads are near town centers, while many of the low use roads are in the less populated sections of the state. There are also sections of roadway, such as US 4 running east-west along the center of the map, that alternate between different bicycle use categories. This happens when the overall bicycle use scores along a corridor are close to the cusps of two thresholds' scores. A smoothing process, described below in Section 5.4, refined the initial categories to ensure more cohesion along corridors.

5.4 | SMOOTHING PROCESS

The methodology outlined throughout this report used the VTrans GIS road layer. This data layer divides the roadways into segments based on roadway characteristics, with segments ranging in length from 0.001 miles to 4.88 miles. Bicycle use scores and categories were assigned by segment. As such, some short sections of roadway differ in bicycle use category from their adjacent sections due to:

- An intersections with a local road commonly used for bicycling.
- A final segment score at the threshold between cutoff points for two bicycle use categories.
- Land use density changes along a corridor.

An example of this variation is shown in Figure 10.

FIGURE 10: EXAMPLE OF BICYCLE USE CATEGORY VARIATION ACROSS A CORRIDOR



To address the variation in bicycle use scores along corridors, VTrans undertook a smoothing exercise to introduce consistency along a corridor where appropriate. The Smoothing process used a combination of professional judgement, experience with managing state roads, and the following guidelines:

- Blend very small segments with adjacent segments
- Use logical connections or termini, including
 - intersections with major state or local roads,
 - roads known to be a suitable alternative to a state route, and
 - roads known as popular routes with bicyclists.
- Account for significant land use changes, such as
 - municipal boundaries or city limits
 - existing school or recreation area, etc.
- Account for resort or significant trip generators, such as
 - tourist destinations
 - four-season resorts

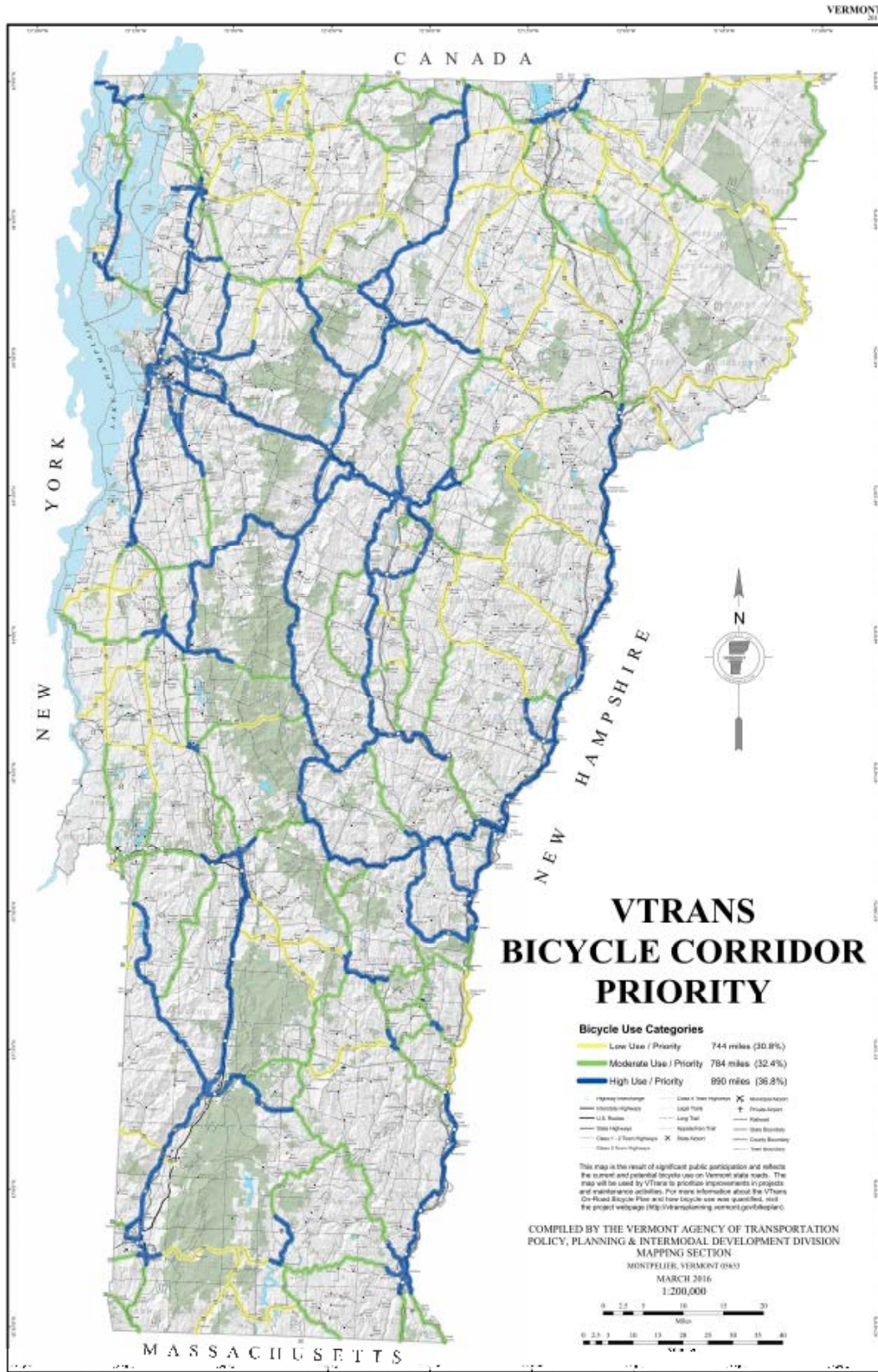
- Account for international or state border crossings
- Account for designated Scenic Byway, Rail Trail or existing signed bicycle route

The percentage of road miles in each category before and after the Smoothing process is shown below in Table 5. The resulting map is the Final VTrans Bicycle Corridor Priority map and is shown in Figure 11. A high-resolution, large-format version is available for download on the project website: <http://vtransplanning.vermont.gov/bikeplan>.

TABLE 5: PERCENTAGE OF ROAD MILES IN EACH BICYCLE USE CATEGORY, BEFORE AND AFTER THE SMOOTHING PROCESS

Bicycle use categories	Percent of Miles	
	Before Smoothing	After Smoothing
High use	33%	37%
Moderate use	33%	32%
Low use	33%	31%

FIGURE 11: VTRANS BICYCLE CORRIDOR PRIORITY MAP



5.5 | VALIDATION PROCESS

An important part of developing this tool was validating the results. First, the results were shared with the stakeholder group – a panel of individuals familiar with bicycling in Vermont. Then the results were shared with the State’s bicycling community through a statewide public meeting. In both meetings, participants were asked to comment on the methodology and on the results. Overall, participants indicated the methodology was sound and the process captured the high use roadways in Vermont. In some cases, participants indicated certain roadways should be higher priority than what the preliminary results showed. Comments from these meetings were used to refine the methodology and to inform how the resulting map would be used. A third meeting presented the Draft VTrans Bicycle Corridor Priority Map and discussed the next phases.

In the end, this project succeeded in gathering extensive public input, and the results of the project were shaped significantly by this input. Input following Public Meeting 1 focused on the crowdsourced interactive map. The public interacted with the map, and those that had difficulty doing so contacted the project team to provide their input via other methods. Input following Public Meeting 2 and 3 varied in subject matter. To ensure all of this input was addressed, the project team developed documents detailing responses to each comment or class of comments including the various project changes made in response to public input. These responsiveness documents are included in Appendix C.

6.0 SUMMARY

This report discusses the first phase of a multi-phase project. The overall goal of the VTrans On-Road Bicycle Plan is to develop a comprehensive improvement plan that identifies opportunities to enhance bicycle conditions on state roads designated as high-use priority bicycle corridors. The Plan will assist VTrans in understanding where to focus limited resources towards bicycle improvements and allow better integration into Agency projects and activities.

The focus of this first phase is to categorize state roads into high-, moderate- and low-use corridors based on current and potential bicycle use. Bicycle use was based on land use patterns, bicycle access to state roads, and current and potential bicycle use through a combination of stakeholder outreach and quantitative analysis.

Public participation significantly contributed to determining bicycle use on state roads. The foundation for ensuring diverse input was a broad set of stakeholders on the steering committees. These individuals ranged from representatives of Vermont’s bicycle touring community to members of VTrans Maintenance and Operations Bureau. Public input for the current phase (Phase 1) of this project was extensive and included StravaMetro data for 10,459 users in Vermont, a crowdsourced interactive map (aka the Wikimap) input from 2,123 unique users, and participation from over 350 individuals at three different statewide meetings or via email comment. These numbers do not include participants who watched the archived videos of the three statewide public meetings available

on the project website. As of 21 March 2016 the recorded videos of the public meetings had been watched 285 times.

The final product of Phase 1 is the VTrans Bicycle Corridor Priority Map (shown in Figure 11) which is the result of the aforementioned criteria and public input in combination with a qualitative smoothing process using VTrans experience managing state roads.


6.1 | RECOMMENDATIONS FOR POTENTIAL APPLICATIONS

This method provides a broad view of the entire state, and its results can be used in a number of ways to make infrastructure more bicycle friendly while respecting financial constraints. It can be helpful for large-scale planning efforts as well as informing local capital improvements, and the results can be used for both short-term and long-term projects.

As projects move through the Agency’s scoping, design, and construction process, the Bicycle Use categories can help staff identify whether they expect high bicycle use within a particular project. Knowing which roads are designated as high use bicycle corridors can help the Agency decide when to approve additional expenditures – such as justifying widening shoulders when a retaining wall is required. Traffic management plans can be design to account for locations where high bicycle use is anticipated. In addition to capital projects, regular maintenance, such as street sweeping, shoulder striping, and filling potholes can be prioritized on roads expected to experience heavier bicycle traffic.

As a long term goal, the tool can be used to set performance targets and identify gaps in high use bicycle corridors. For example, the Agency may target a specific bicycle level of service for each bicycle use category. VTrans can measure its performance by what percentage of roadways meet the pertinent standard, and it can focus attention on gaps in bicycle facilities along high use bicycle corridors, prioritizing projects that fill those gaps.

APPENDIX A. PROJECT FLYERS & WALK AND ROLL NEWS




VTrans On-Road Bicycle Plan

Improving Vermont roads to work better and be safer for all bicyclists -- families, commuters and recreational riders.

The Vermont Agency of Transportation (VTrans) wants to know where you ride and where you want to ride, so we can improve state roads where we need it most! Make sure to:

1. **Mark your calendar to attend the project's public meetings on December 9, 2014 from 6-8 pm and April 30, 2015 from 6-8 pm.**
2. **Add your information to the On-Road Bicycle Plan WikiMap online at vtransplanning.vermont.gov/bikeplan**
3. **Tell your friends and neighbors to participate.** Share this information on your local Front Porch Forum or other venues where you connect with the community.



Phase 1: (Now - Summer 2015) Create a tiered system of bicycle corridors based on use and desirability
Phase 2: Identify critical gaps in the most desirable bicycle corridors
Phase 3: Identify improvements to be considered to address gaps in the most-desirable bicycle corridors

About Phase 1 of the Plan
Over the next six months, and with YOUR help, VTrans and our partners will:


- Collect information from the public about where they ride and where bicyclists want to ride on State roads.
- Use this information to identify several tiers of bicycle corridors ranging from most desirable for bicycling to the least desirable for bicycling; and
- Set the stage for where we should focus needed bicycle improvements.

How can I attend the public meetings?
To best reach Vermonters, VTrans will broadcast both meetings throughout the state using Vermont Interactive Technologies (VIT). Find a VIT location near you at www.vitlink.org/HTML/Locations.htm. For those who cannot make it to a VIT location, VIT will stream the meeting live at www.vitlink.org/streamingmedia/vtcvitopen.php

December 9th 6-8 pm: Attend at any VIT site (excluding Rutland, White River Junction and Lyndonville).
April 30th 6-8 pm: Attend at any VIT site.

Learn more: vtransplanning.vermont.gov/bikeplan

Contact VTrans Planning Coordinators:
Sommer Bucossi at 802-828-3884 & Amy Bell at 802-828-2678 or at vermontbike@gmail.com



VTrans On-Road Bicycle Plan Public Meeting

WHY: To raise awareness about the project, promote the project's WikiMap and seek input from attendees on bicycle corridor identification and prioritization techniques.

WHEN: December 9, 2014 from 6:00-8:00 pm

WHERE: Vermont Interactive Technology Sites (VIT)
(excluding Rutland, White River Junction and Lyndonville)
VIT Site Directions: <http://www.vitlink.org/location-directions>

VIT will stream the meeting live for viewing from anywhere at:
www.vitlink.org/streamingmedia/vtcvitopen.php

[Rutland Regional Planning Commission](#) will be hosting the event



Questions?

Contact VTrans Planning Coordinators :

Sommer Bucossi at 802-828-3884 or Amy Bell at 802-828-2678 or at bikevermont@gmail.com





Vermont On-Road Bicycle Plan

Improving Vermont roads to work better and be safer for all bicyclists -- families, commuters and recreational riders.



Phase 1: (Now - Summer 2015) Create a tiered system of bicycle corridors based on use and desirability
Phase 2: Identify critical gaps in the most desirable bicycle corridors
Phase 3: Identify improvements to be considered to address gaps in the most-desirable bicycle corridors

How can I attend the public meeting?

VTrans will broadcast the meeting throughout the state using Vermont Interactive Technologies (VIT).

Find a VIT location across the state near you: www.vitlink.org/HTML/Locations.htm.

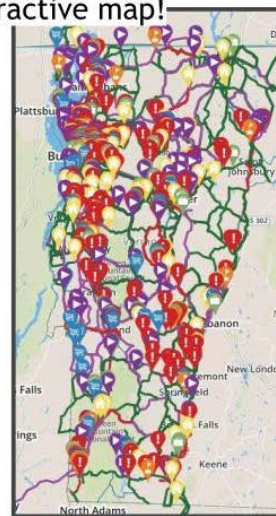
Stream the meeting live at: www.vitlink.org/streamingmedia/vtcvitopen.php

Learn more: vtransplanning.vermont.gov/bikeplan

Vermont Agency of Transportation (VTrans) is hosting a public meeting on **April 30, 2015 from 6-8 pm**

Come learn about:

- the draft map showing priority bicycle corridors on State roads
- how statewide bicycle corridors were grouped according to their desirability
- how we included input from over 2,100 visitors to the interactive map!



Contact VTrans Planning Coordinators:

Sommer Bucossi at 802-828-3884 & Amy Bell at 802-828-2678 or email us at vermontbike@gmail.com

Hip Hip Hooray for a Statewide On-Road Bicycle Plan!

URL: <http://www.localmotion.org/news/walknroll/2496-hip-hip-hooray-for-a-statewide-on-r...>

Walk 'n Roll News Archives

Hip Hip Hooray for a Statewide On-Road Bicycle Plan!

The VT Agency of Transportation (VTrans) is eager for input from Vermonters as they work to create an [On-Road Bicycle Plan for state highways and Class 1 roads](#) throughout Vermont from Brattleboro to Newport and St. Johnsbury to Burlington. The On-Road Bicycle Plan is part of the goal to improve Vermont roads so that they work better and are safer for all bicyclists -- families, commuters and recreational riders.

VTrans On-Road Bicycle Plan Phases:

Phase 1: (Now - Summer 2015) *Where do you ride, and want to ride?* Create a tiered system of bicycle corridors based on use and desirability.

Phase 2: *What can be better?* Identify critical gaps in the most desirable bicycle corridors.

Phase 3: *How do we make it better?* Identify improvements to be considered to address gaps in the most-desirable bicycle corridors based on use and desirability.



Many other states have adopted statewide bicycle plans, including: Oregon, Washington, North Carolina, and Colorado. In 2008, Vermont adopted the Pedestrian and Bicycle Policy Plan. While that plan focused on bicycle and pedestrian vision and policies, the current effort will map a statewide network and identify priorities so that people have access to safe roads for bicycling. The concept of a system with multiple tiers is similar to that which VTrans uses for winter plowing operations. The highest tier (the most frequently used roads), get plowed first. This is one way the system has worked well to best allocate the agency's operations and resources, safely getting Vermonters where they need to go. Creating a plan that categorizes bicycle routes in the network into tiers by desirability and use will help VTrans prioritize transportation improvements and make the most of its limited available resources.

About Phase 1 of the Plan. Properly identifying a statewide bicycle network involves gathering and analyzing large quantities of data about biking in Vermont. Between now and June 2015, VTrans will be working on Phase 1 of the plan with transportation consultants RSG and Alta Planning + Design, with outreach and technical support from Local Motion. The cutting edge analysis includes modeling Bicycle Level of Service (LOS) (i.e. how comfortable the road is for bicycling), and incorporating crowdsourced data from the ride-mapping application Strava, as well as input from as many Vermonters as possible. Over the next six months VTrans and its partners

will:

- Collect information from the public about where they ride, and where they want to ride on State roads;
- Use this information to identify several tiers of bicycle routes ranging from most desirable for bicycling to the least desirable for bicycling; and
- Set the stage for where we should focus needed bicycle improvements.

Get Involved! To make sure that VTrans is able to improve state roads where bicyclists need it most, VTrans needs to know: Where do and your family CURRENTLY ride? Where would you LIKE to ride? Where WOULD you ride if conditions were BETTER? Make sure to:

1. **Mark your calendar to attend the project's public meetings** on December 9, 2014 from 6-8 pm and April 30, 2015 from 6-8 pm. See below for how to attend.
2. **Add** information about where you ride and want to ride to the [On-Road Bicycle Plan WikiMap](#).
3. **Tell your friends and neighbors to participate.** Share this information on your local Front Porch Forum, via email or [hang up a flyer](#) in your town!

Public Meeting Locations. VTrans will be broadcasting both public meetings throughout the state using Vermont Interactive Technologies (VIT). There are two ways to participate:

- At a [VIT location near you](#). We encourage as many people as possible to attend at a VIT location as you will be able to interact with other meeting participants and there will be on-site technical support.
 - December 9th 6-8 pm: Attend at any VIT site (excluding Rutland, White River Junction and Lyndonville)
 - April 30th 6-8 pm: Attend at any VIT site
- Anyone with an Internet connection can also stream the meeting live [at this link](#).

To learn more, watch for future Walk and Roll News articles and visit the [project website](#). Contact VTrans Planning Coordinators: Sommer Bucossi at 802-828-3884 and Amy Bell at 802-828-2678 or [via email](#).

VTrans On-Road Bike Plan Public Meeting Rescheduled!

URL: <http://www.localmotion.org/news/walknroll/2504-vtrans-on-road-bike-plan-public-mee...>

Walk 'n Roll News Archives

VTrans On-Road Bike Plan Public Meeting Rescheduled!

As many of you are aware, the first public meeting for the statewide VTrans On-Road Bicycle Plan was cancelled due to the massive snowstorm that swept through Vermont, leaving the state a winter wonderland. Not to worry! **The public meeting has been rescheduled for Wednesday, January 7th from 2:00 to 4:00 PM statewide.**



While we understand that the time change from an evening to an afternoon meeting may not be ideal for many of you who are at work during the day, be assured that there are still several ways to participate and provide comments to VTrans about where you and your family ride bikes, where you want to bike and where you would bike if conditions were different. For more background about the project goals and phases, read [this article from October's Walk and Roll News](#) and visit the [VTrans On-Road Bicycle Plan website](#).

The options for participating in the public meeting rescheduled for January 7th are:

1. Attend the meeting at a Vermont Information Technologies (VIT) site. [Click here](#) for directions to all VIT sites statewide.
2. [Stream the meeting live](#) from home or work. You will be able to provide comments via live streaming. (Note: the link will not be live until the meeting begins.)

If you are unable to attend the meeting on January 7th:

A video recording of the meeting will be available on the [VTrans On-Road Bicycle Plan website](#) following the January 7th statewide meeting. Public comments on this stage of the process are being collected until February 14th, 2015.

You can contact VTrans Planning Coordinator **Amy Bell** at:

[802-828-2678](tel:802-828-2678) or vermonthike@gmail.com with questions and comments, and also contact Katelin Brewer-Colie, Complete Streets Project Manager at Local Motion for project information at katelin@localmotion.org.

Remember, in the meantime, you can continue to visit the [project Wikimap](#) and add information about where you and your family bicycle and where you would ride if conditions were different and to comment on others' input to date. This will help inform VTrans' prioritization of state highway bicycle corridors across the state from Burlington to St. Johnsbury and Newport to Brattleboro! Go into About & Help and "View Options" to click to see only your own comments on the map (more

than 1000 individuals have added content to the map!).

Thanks for helping to create a plan that makes Vermont roads more bike friendly for everyone - families, commuters and recreational riders!

Helping Make Vermont Roads Work Better for Everyone!

URL: <http://www.localmotion.org/news/walknroll/2541-by-katelin-brewer-colie-complete-st...>

Walk 'n Roll News Archives

Helping Make Vermont Roads Work Better for Everyone!

By Katelin Brewer-Colie, Complete Streets Project Manager

Vermont bikers: you are nothing less than amazing! Since January, more than 2,100 of you shared your thoughts with VTrans about where you ride now and where you would like to see conditions improve on state highways and Class I town highways! Local Motion works closely with the Vermont Agency of Transportation (VTrans) through a variety of programs to help make Vermont roads work better and be safer for all bicyclists -- families, commuters and recreational riders alike.

Local Motion has been assisting VTrans, and consultants RSG and Alta Planning+Design, on the [VTrans On-Road Bicycle Plan](#). The objective of the plan is to develop a comprehensive improvement plan to enhance bicycle accommodations on the highest-ranked bicycle corridors on the state highway system.

Phase 1 of the project is expected to wrap up this summer, and project leaders are ready to present the draft map of priority bicycle corridors on state highways across Vermont, helping to identify where investments should be prioritized to make Vermont's state roads safer and easier to bike.

This map is the result of months of data collection and analysis, including information gathered through extensive outreach to Vermonters who currently ride a bike and who would like to bike more, Strava application data, and conversations with stakeholders including the tourism industry, businesses, and advocates.

The draft map groups bicycle corridors on state highways across Vermont based on their desirability. Desirability refers to where Vermonters and visitors currently ride and want to ride bikes. Quantifying desirability involves analysis of many factors, including locations with potential travel demand (work, leisure, errands, schools), public opinion (from the interactive map and public meeting), and recreational demand (based on Strava and tourism). It's a complex process and one that is sure to result in making Vermont's state roads safer and easier to bike.

To learn more and to provide feedback to VTrans about the draft map of priority bicycle corridors and about how the corridors were grouped, plan to attend the upcoming public meeting!

How can you help? Mark your calendar for the public meeting on **April 30, 2015 from 6:00 pm to 8:00 pm**. See below for how to attend.

Tell your friends and neighbors to participate. Share this information

on your local Front Porch Forum, via email or [hang up a flyer](#) in your town!

Public Meeting Locations. VTrans will be broadcasting the public meeting throughout the state using Vermont Interactive Technologies (VIT). There are two ways to participate:

- At a [VIT location near you](#). We encourage as many people as possible to attend at a VIT location as you will be able to interact with other meeting participants and there will be on-site technical support.
- Stream the meeting live from anywhere with Internet [at this link](#).

To learn more, visit the [project website](#). Contact VTrans Planning Coordinators: Sommer Bucossi at 802-828-3884 and Amy Bell at 802-828-2678 or [via email](#).



APPENDIX B. ADDITIONAL CROWDSOURCED INTERACTIVE MAP (WIKIMAP) INFORMATION

OVERVIEW OF USE

Some important caveats should be noted about the use and interpretation of the map data. Overall, the map should not be taken as a scientific survey, nor should the results of the analysis be treated as empirical data. Although efforts were taken to encourage users to place comments along the analysis roadways, data was gathered from all parts of the state along all different types of roads. Also, with these types of maps, more data is generated in areas with higher population densities. Therefore, input was skewed towards more metropolitan areas, especially around Burlington, but high participation rates were observed throughout the state. Overall, the map is an effective tool for public engagement that produces useful information that can be used by all types of agencies to make transportation decisions.

For planning purposes, the data can be useful to show where there are activity ‘hot spots’, or where there are concentrations of live, work, play and learn destinations. When looking at these hot spots from a local or regional perspective, links between the hot spots can be identified, and these links can be seen as key corridors to be connected. The data can also be used to identify problem areas, as indicated by red lines and where spot improvements are needed. If the only links between activity generators are problem areas, then improvements along these corridors can be prioritized.

For implementation purposes, areas with high concentrations of comments can be used to inform the prioritization of projects, as well as how the projects develop. The data can be referenced before a project construction begins to identify the perceived conditions of the route. Specifically, implementation plans can be tailored to counter any of the negative characteristics of the road.

In addition to providing some of the key takeaways from the online map, the raw map data will be provided in electronic format to VTrans in SHP (compatible with ArcMap), KML (compatible with Google Earth), and Excel formats. A short tutorial of how to use the data will be included when the data is delivered.

QUALITATIVE FINDINGS





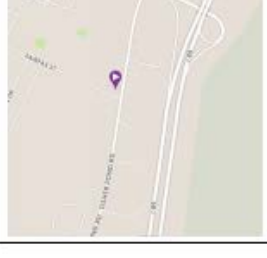
Users could provide input three different ways, none of which were mutually exclusive. Users could draw new points and lines on the map, leave a comment on an existing point or line on the map, or also simply “agree” or “disagree” with a point or line that was already drawn. The option to “agree” or “disagree” was a particularly informative data point used to develop a prioritization methodology to analyze a portion of the map data.

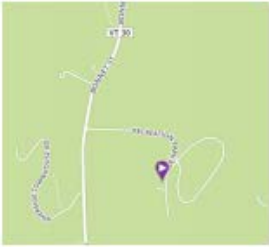




Within the map, pre-existing points and lines could be agreed or disagreed with. Features that received more net likes were considered a higher priority to the general public than features that received fewer instances of agreement. With so much data generated by the map, inspecting all of the data was not possible given the scope of this project, but ranking points and lines by the net like score was seen as a satisfactory option to prioritize comments based upon a consensus of

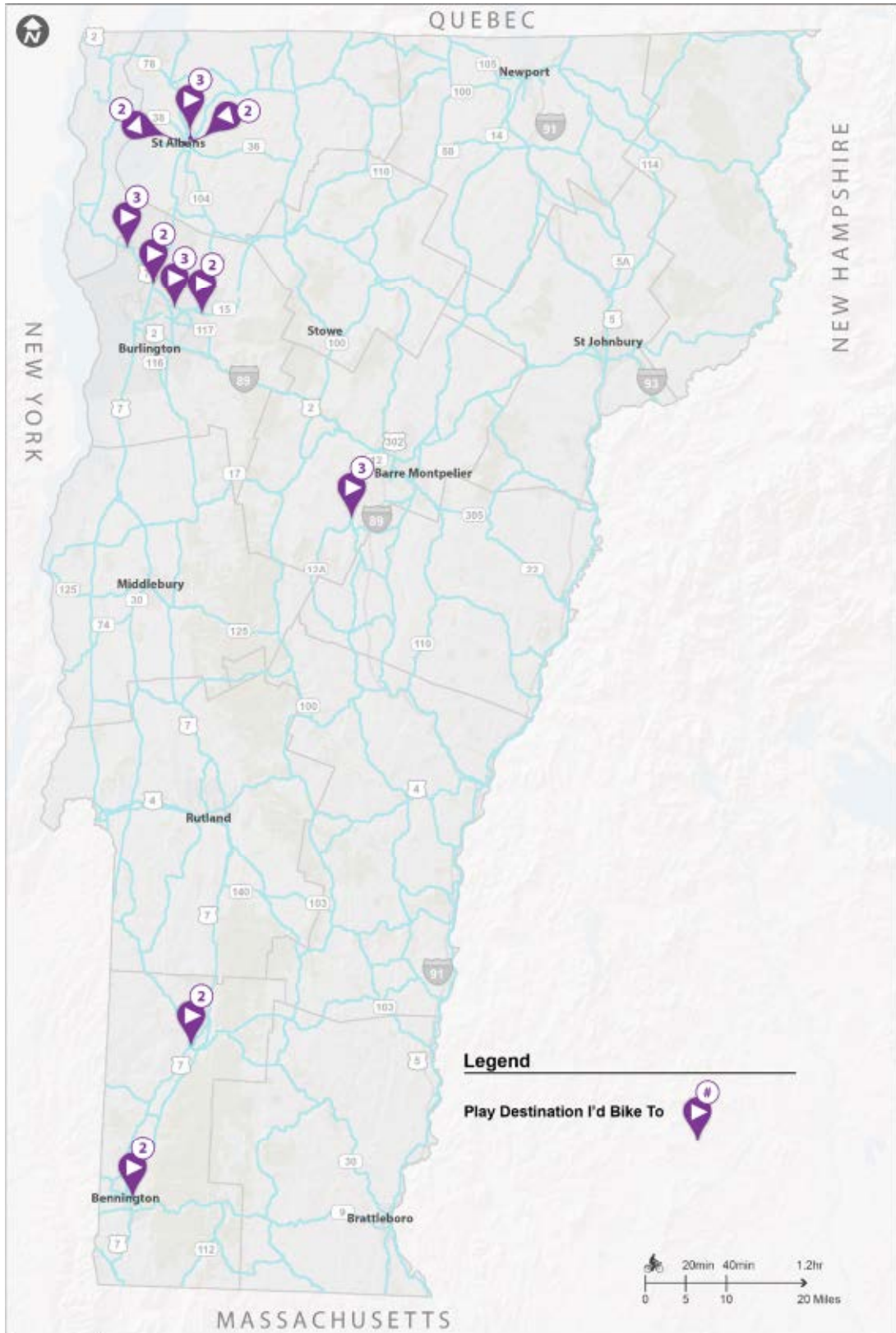
importance. This method provided an efficient method to identify specific features created within the map for a more thorough analysis.




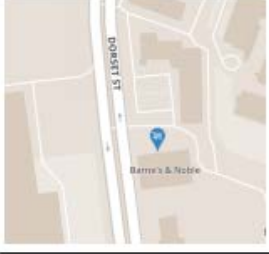

This memorandum presents the Top 10 features from each class, ranked according to the net like score. To be included within the Top 10, the feature needed to be placed along an analysis roadway for the point classes (or adjacent to a road), and for line types, they must have included a segment of state roadway. The following pages include a table for each class that presents the feature rank, the unique feature ID, a brief summary of the comments collected for that point, and a locator map for each feature. After the table for each feature, an overview map of the state is included that shows the geographic distribution of the top 10 features per type.

After reviewing the Top 10 features of each class, some overarching themes of the input gathered became apparent. Foremost, Vermont residents enjoy bicycling in the state of Vermont and are passionate about improving bicycling conditions. Many of the comments called for infrastructure enhancements to make bicycling state-wide more comfortable, including wider shoulders, shoulders cleared of debris, longer/clearer sight lines on curvy roads, improved pavement conditions, and the construction of shared-use paths adjacent to the roadways. For the point classes, many of the comments suggested that more people would access the destinations by bicycle if conditions were improved. The comments indicated that there is latent demand for bicycling in the state: if bicycling conditions along the state roads were better more people would bicycle for all types of trips, both recreational and transportation driven. Specific comments are included in the Top 10 Summary table for each feature type.






Play Destination I would/do bicycle to				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
1	92869	3	This section of VT-15 is not comfortable to ride upon. Improvements should be concentrated along this section to improve access to the play destinations along this route.	
	93263	3	This location along US-7 is a trailhead to the Missisquoi Valley Rail Trail. Crossing Sheldon Rd on bike can be difficult. Improvements to this crossing should be made. A rectangular rapid flash beacon installed at the crossing to the trail head could make it safer.	
	93319	3	The Pool and Recreation fields adjacent to VT-12 are a destination people would like to bike to.	
	96833	3	Sand Bar State Park along US-2 is a popular destination that people would like to bike to	
5	92923	2	Collins Perley Recreation Center is the major recreational center for our community, but VT-104 is not a comfortable route for bicyclists and walkers to access the center. Multi-use paths next to the road would make a more comfortable connection.	

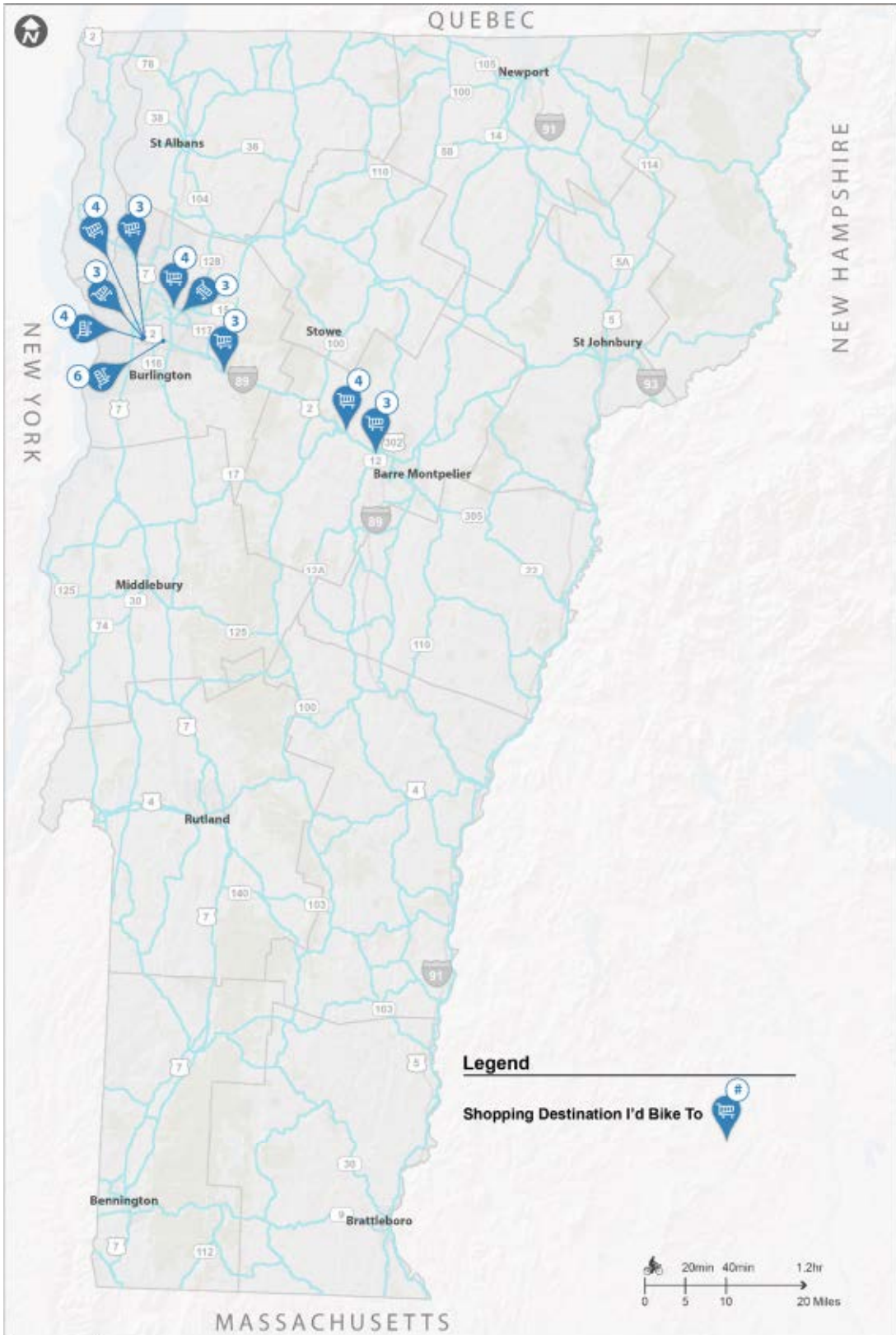
Play Destination I would/do bicycle to				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
2	93003	2	Dana Thompson Recreational Park is a popular destination that bicyclists would like to access. VT-30, which is used to access the park, is not comfortable to bike upon. A shared use path leading to the park that provided an alternative route than riding along VT-30 would be desirable.	
	93110	2	People would like to bike to Willow Park, just off of VT-279	
	93132	2	The field near the Champlain Cable Corporation just off Roosevelt Hwy/US 2 is an attractive bicycling area	
	93214	2	People would like to bike to Maple Street Park along VT-117	
	93269	2	Aldis Hill and Hard'ack Recreation Facilities are popular destination to bicycle to. A multi-use path between the Hard'ack recreation area and Collins Perley Sports Center is desirable	













Shopping Destination that I would/do Bicycle To				
Rank	Unique ID	Likes	Summary of Public Opinion*	Summary of Public Opinion*
1	92888	6	Earl's Cyclery by the intersection of Williston Rd. and Valley Rd. is a potentially popular cycle destination, but commenters don't feel safe biking there from UVM along Route 2. Industrial avenue is uncomfortable to ride upon due to a lack of road markings that would define a space for cyclists.	
2	92849	4	Red Hen Bakery at the intersection of US Rt. 2 and Gallagher Rd. in Middlesex is a shopping destination people would bicycle to. Commenters noted that short sight lines on Rt. 2 make them feel uncomfortable.	
	92892	4	Trader Joe's is a potentially popular bicyclist destination.	
	93147	4	Commenters noted the difficulty to arrive to this destination by bike from UVM's campus. The volume and speed of traffic were the primary concerns.	
	93290	4	Firebird Café on Pearl St. / VT 15 is a retail destination that bicyclists would like to bike to.	

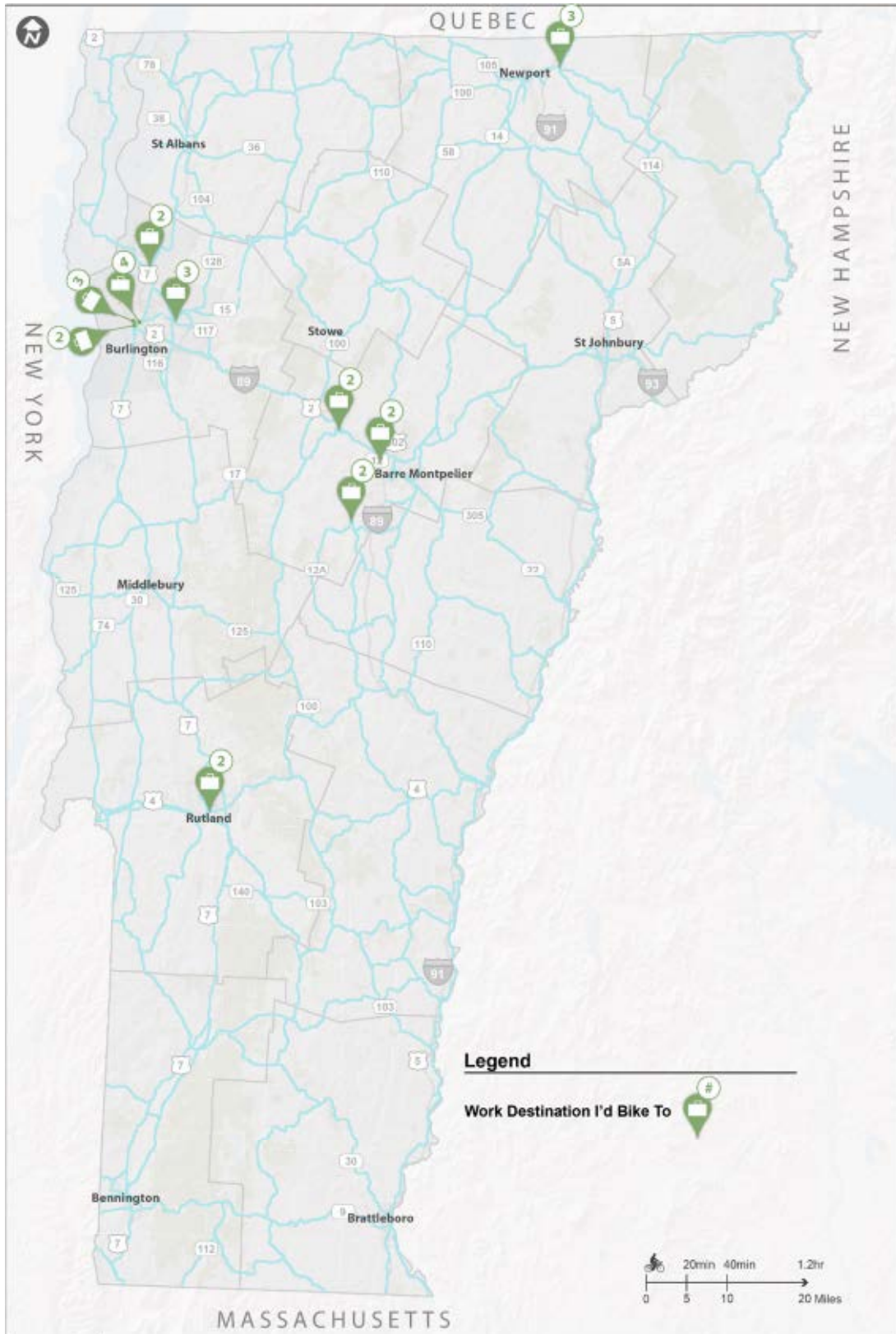







Shopping Destination that I would/do Bicycle To, continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Summary of Public Opinion*
6	92985	3	There are lots of services in Richmond that cyclists could ride to, especially the Richmond Market. However, bicycling Brown's Trace and Rt. 2 are uncomfortable and pose a barrier to accessing this destination by bicycle.	
	92993	3	Riders find it difficult and inconvenient to bike to the University Mall and surrounding area from Burlington's South End.	
	93012	3	Getting in and out of City Market on the corner of S. Winooski Ave. and Bank St. by bicycle can be very challenging.	
	93215	3	Essex outlets and grocery stores are popular shopping destinations that bicyclists would ride to.	
	93332	3	The shopping plaza at the corner of State St. and Elm St. would be a potentially popular shopping destination for bicyclists to ride to.	








Employment Destination I would/do bicycle to				
Rank	Unique ID	Likes	Summary of Public Opinion*	Point Location
1	92907	4	Many commenters agreed that they would bike to the University of Vermont Medical Center	
2	92858	3	Creation of bike paths off of Rt. 115 would increase safety and ridership.	
	94417	3	Riders who commute to IBM utilize various off-road cycle path connections. The short portion of 117 that these commuters ride on is agreed upon as the least safe portion of the ride.	
	96949	3	Intersection improvements for bikes and pedestrians on the bridge over I-91 between Newport and Derby would raise rider comfort level. This would connect two important corridors.	
3	92843	2	Commenters would bike to the Davis Building in the National Life Complex on National Life Drive in Montpelier.	

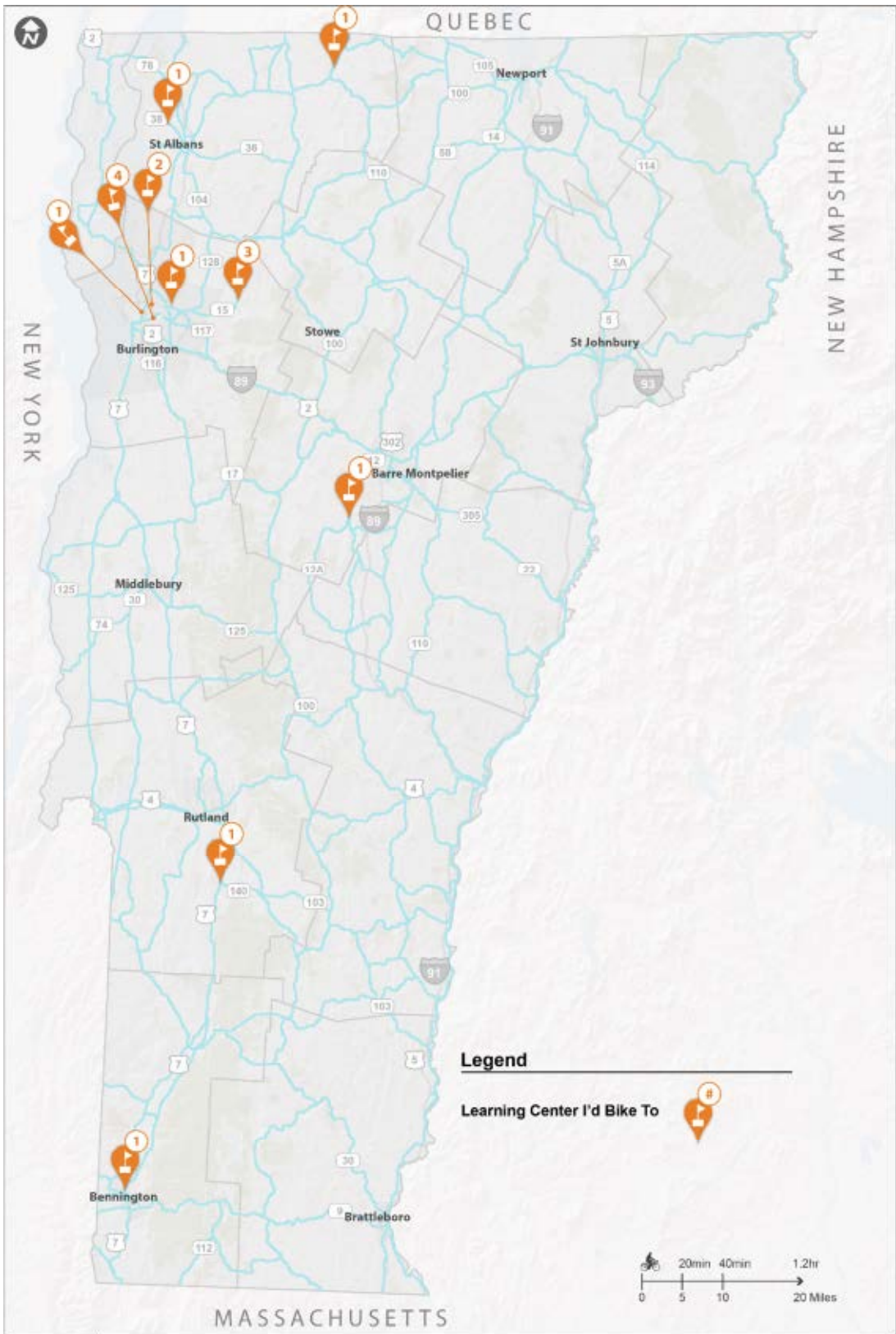
Employment Destination I would/do bicycle to, Continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Point Location
	93087	2	Water Tower Hill off of Roosevelt Highway in Winooski would be a popular work bicycling destination, but it is difficult to bicycle to due to motor vehicle traffic exiting exit 16.	
	93144	2	The University of Vermont entrance on S. Prospect St. is a popular work destination that cyclists would bike to.	
	93352	2	Norwich University in Northfield Center is a work destination that bicyclists would like to be able to ride to.	
	94687	2	The intersection of Merchants Row and West Street in Rutland is a work destination highlighted by commenters. Bicyclists face difficulty and feel unsafe crossing from Rutland Regional Medical Center to Rt. 4 in Center Rutland.	
	94902	2	The intersection of Rt. 2 and Gallagher Rd. in Middlesex is a work destination that people would like to bicycle to.	













Learning Destination I would/do bicycle to				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
1	92989	4	The UVM Medical Center and surrounding campus is a desirable biking location, just north of US 2	
2	93126	3	Children cannot safely bike to the schools just off River Road/VT-15 because there is no sidepath, and the road is too busy for children to bike upon. If a dedicated bicycle facility was provided, children would feel more comfortable biking to school.	
3	92990	2	The Fletcher Free Library east of S Winooski Ave in Burlington is a desirable biking location	
	93111	2	MAU Middle School is a learning destination that people would like to bike to. A bikepath connection from the school to downtown would be desirable.	
4	93057	1	Gilbert Hall Library is a destination that people would like to bike to. Currently, parents that bike with their children to the library either ride on the sidewalk, or ride on the road and are very careful to watch for passing cars.	








Learning Destination I would/do bicycle to, Continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
4	93099	1	Aikido School is a desirable learning destination to bicycle to.	
	93266	1	St. Albans City School is a desirable learning destination to bicycle to.	
	93289	1	The field near the Champlain Cable Corporation just off Roosevelt Hwy/US 2 is an attractive bicycling area	
	93320	1	St Mary's Church is a desirable learning destination to bicycle to via S Main St/VT 12	
	96937	1	Northfield Middle and High School is a desirable destination to bicycle to via N Main St/VT 12	

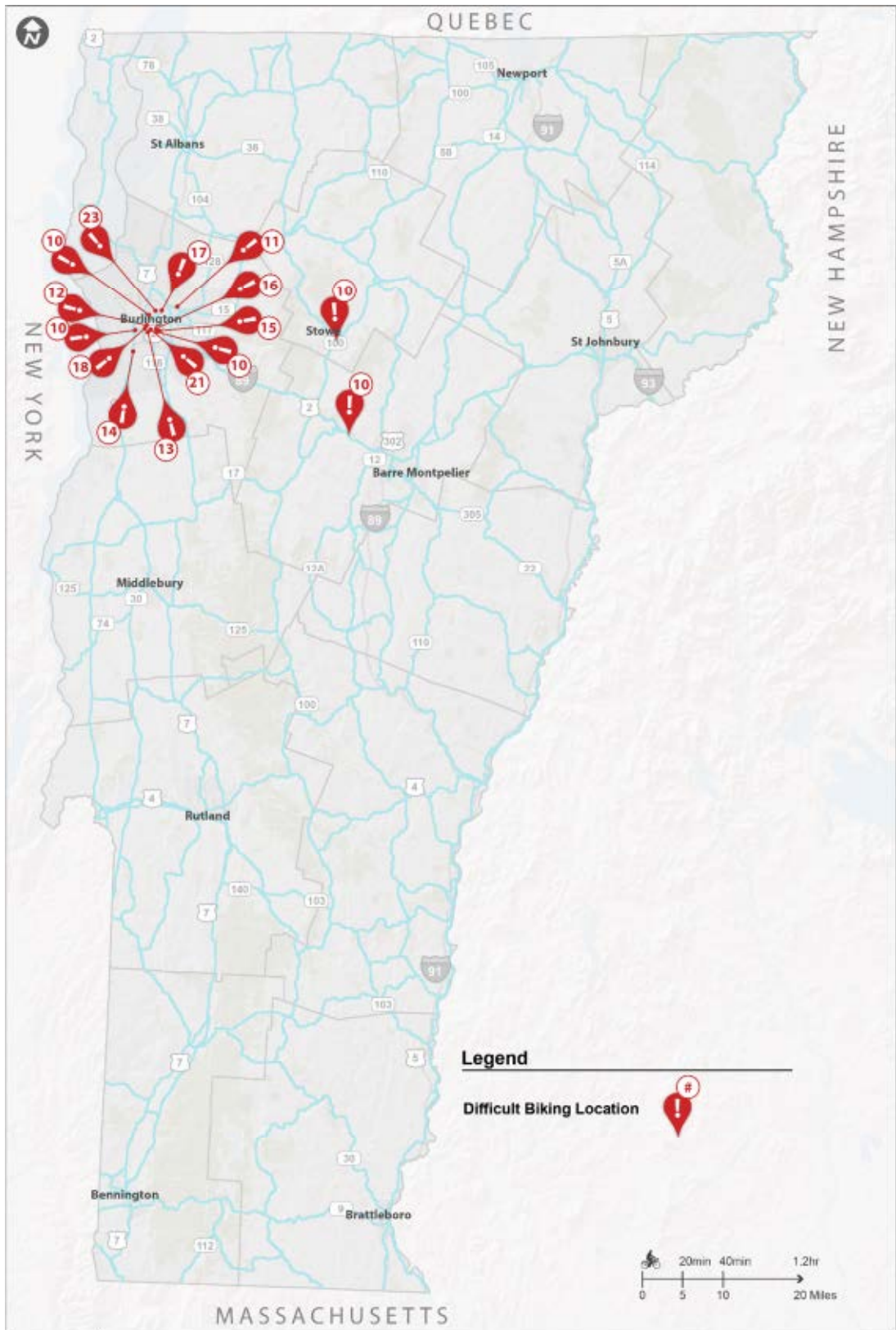


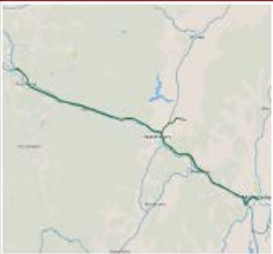




Difficult Bicycling Location, 1 of 3				
Rank	Unique ID	Likes	Summary of Public Opinion	Image of Location
1	92859	23	This section of College Parkway/VT-15 is stressful to bike upon. The roadway is constrained by the presence of curbs, and frequently when passing bicyclists, cars get pushed against the curb, creating a stressful situation for riders. Drivers are not being aggressive, but there simply isn't enough room for opposing cars to pass each other when bicyclists are on the road. A wider road cross-section would ameliorate this issue. This difficult biking location causes there to be no convenient way to bike from Essex to Burlington.	
2	92942	21	Bicycling across this bridge along Williston Rd/US 2 is very difficult. Cars accessing the bridge via the I-89 off-ramps travel very fast, and further compromise the prospect of bicycling across the bridge. Bicycle lanes are an improvement, but there are too many conflicts between the bike lanes and on/off ramps. Improvements to the bridge are needed to make the crossing more comfortable for bicyclists.	
3	93070	18	The section of Rte 2 between Burlington and Williston is too dangerous to bike. Simply stated - biking along this section of road is only for the 1% of riders that are strong and fearless. The other 99% will not bike upon this route, which means that people who would use this section of road to access Burlington do not. Improvements to the roads would likely increase the number of riders coming to and from Burlington via bicycle.	
4	92860	17	VT-15/College Parkway would be an appealing route to access Burlington if it was made more comfortable for biking.	
5	92861	17	This section of VT Rt 15 needs to become more bicycle friendly. It is a heavy traveled roadway, and represents a direct and convenient route for bicyclists. Improving this section of road would make traveling from Essex to Burlington via bicycle much more viable.	






Difficult Bicycling Location, 2 of 3				
Rank	Unique ID	Likes	Summary of Public Opinion	Image of Location
6	92862	17	Vt-15/E Allen St represents a desirable bicycle route that people do not use because it is not perceived as safe or comfortable to ride.	
7	93239	16	This road needs a protected lane in order to provide an all-ages-and-abilities route to access the University, mall and shops. Currently, accessing these destinations from this location by bicycle is not comfortable.	
8	93140	15	Riding here is intimidating for adults, let alone children. The public does not feel comfortable bicycling with children along this stretch of road. A bike/walking path along this stretch of road is desirable. Improvements need to be made to make a stronger bicycle connection between Burlington and S. Burlington.	
8	93152	15	Along this stretch of RT 7, the bike lane ends at Imperial Drive. North of Imperial Drive, the road narrows and there is little to no shoulder available. In heavy traffic this stretch of road can be intimidating for bicyclists. North of I-189, there are alternative options to Rt. 7, but south of the interstate, there are few convenient options besides zigzagging through the shopping mall parking lots or riding on the sidewalk.	
10	92950	14	Some stretches of RT 7 have bike lanes, some do not. This road represents a desirable bicycle route, but with no or intermittent bicycle facilities, it is a challenging and stressful road to ride upon. A protected facility or parallel path would greatly improve bicycle comfort levels and provide access for bicyclists to adjacent destinations.	

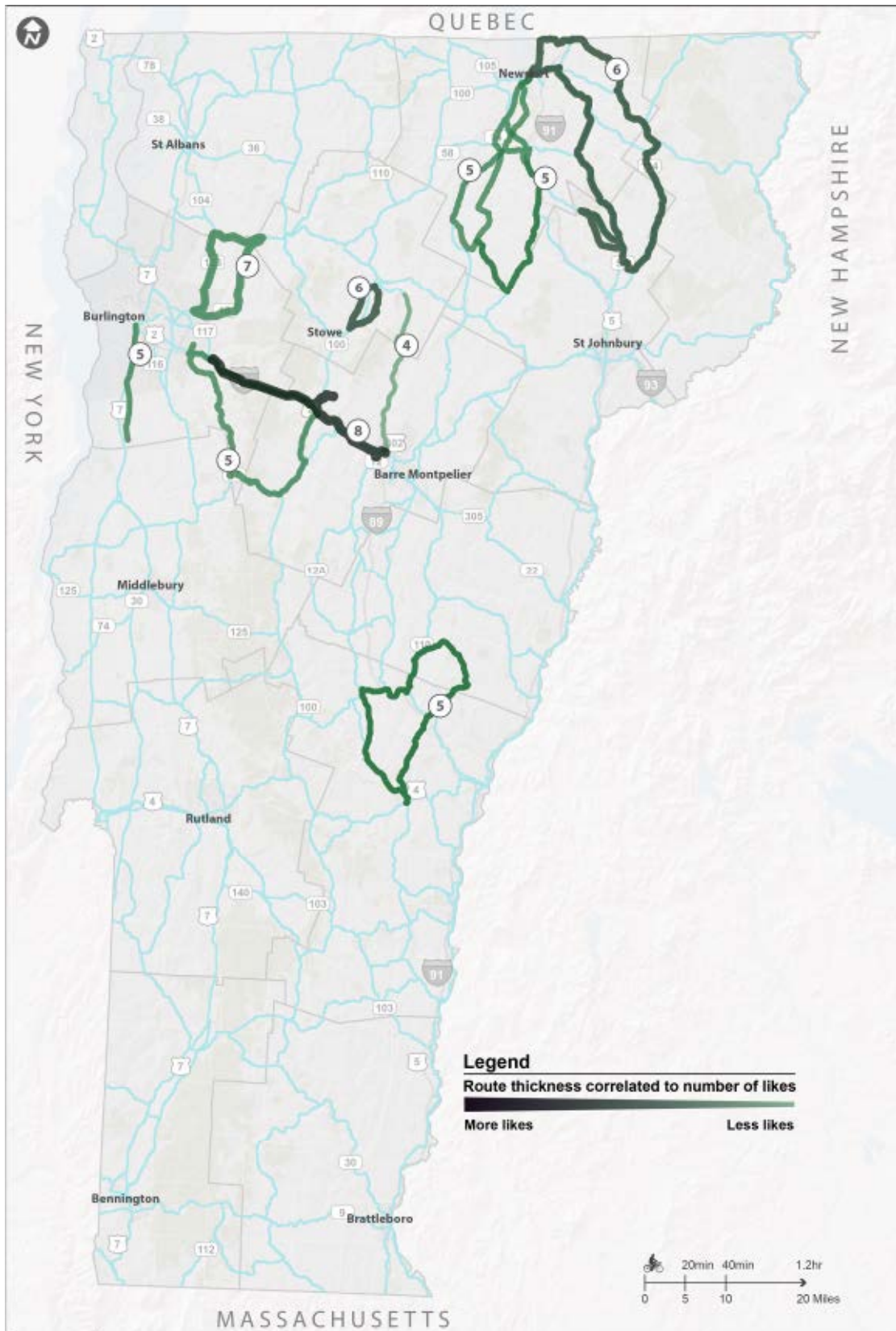
Difficult Bicycling Location, 3 of 3				
Rank	Unique ID	Likes	Summary of Public Opinion	Image of Location
11	93143	13	The traffic circle and circulation pattern where Allen St and Main St in Winooski intersect can be challenging to bicycle through.	
12	93149	12	At this point along Williston Rd/US 2, cars speed up to access the I-89 SB on-ramp as bicyclists are crossing the on-ramp. This create a dangerous conflict point.	
13	93124	11	Where VT 15 crosses over VT-289, cars coming onto and exiting VT 15 make bicycling along this stretch of road challenging and stressful.	
15	92971	10	The shoulder along this stretch of US 2 is in need of immediate repair. It could also be made wider to provide more space for bicyclist.	
	93010	10	The intersection of Shelburne Rd, Locust St, Willard St and Ledge St is stressful to navigate for bicyclists. Space should be delineated for bicyclists.	






Crowdsourced interactive maps can generate more data in areas with higher population densities. While the top 15 most commonly Difficult Bicycling Locations were in and around Burlington and Montpelier, clusters of Difficult Bicycling Locations were identified in Middlebury, Montpelier, VT 100 between VT 66 and Montpelier, VT 100 between I-89 and VT 16, Bennington and Brattleboro.



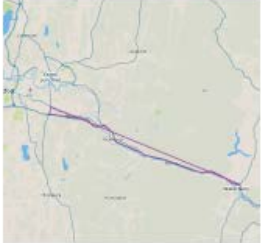
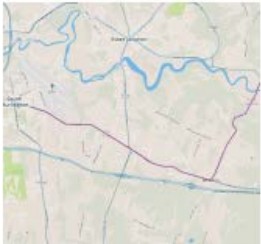
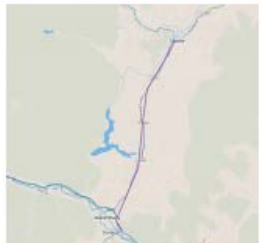


State Roadway I Like to Bike				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
1	813038	8	Safety and aesthetics could be improved along Rt. 2. The addition of two feet of pavement to the shoulder would be a welcomed improvement. Reducing blind corners would also help to increase ridership along this desirable route.	
2	813150	7	Shoulder width should be wider and more consistent. Short sight distances cause issues when coming around corners, and high motor vehicle speeds can make riding along the road stressful.	
3	813167	6	Although some of this route runs along Rt. 100, much of it is along Stagecoach Rd and Randolph Rd because Rt 100 can be uncomfortable to ride upon. These alternatives are hilly and lengthy, but have wide shoulders. Commentors questioned the use of the "ride single file" signs on Randolph Road.	
	817703	6	Lake Willoughby is an attractive stretch to ride due to recent resurfacing on 5A. Commentors recommend extending road surface improvements to West Burke.	
4	813145	5	Rt. 7 feels unsafe in places. Commentors mentioned that riding to Philo on this stretch would be convenient for shopping and errands. Small shoulders and short sight lines in southern Charlotte make riders feel uncomfortable when cars pass or approach.	

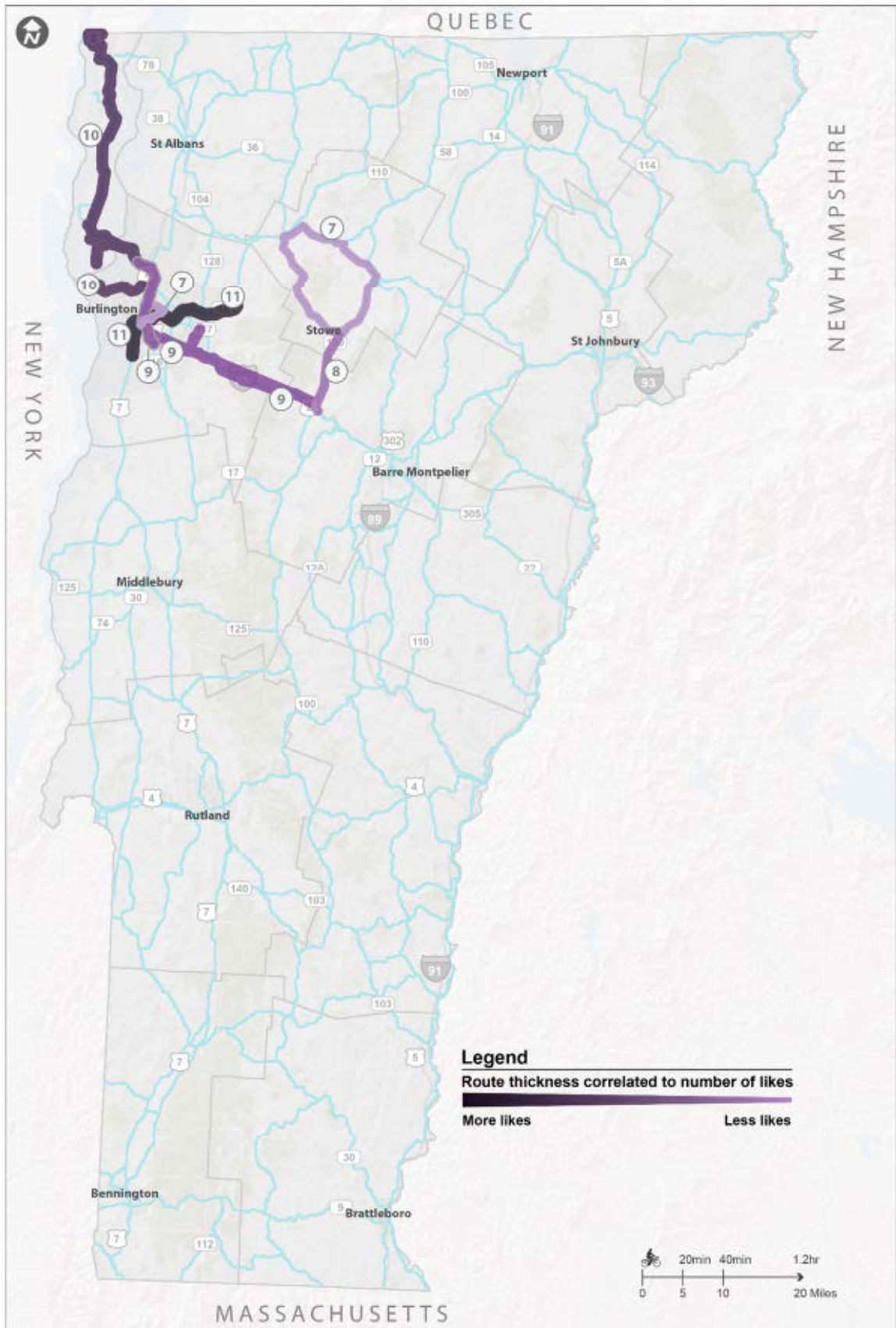
State Roadway I Like to Bike, Continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
4	813273	5	The Orleans Central Route / Tour de Kingdom would benefit from resurfacing due to heavy truck traffic between Coventry and Newport.	
	817543	5	Certain locations along this stretch would benefit from repaving.	
	817698	5	The Orleans Country Loop is a comfortable ride.	
	818576	5	US 2 paralleling the interstate is a great bike route since it's grade is gradual and has relatively low motor vehicle traffic. The majority of cars travel upon I-89. Route 100 to Waitsfield and Irasville, then VT 17 to Huntington and Richmond is a spectacular loop, with world class climbing and descents on the gap. Portions of 2 that have been repaved are excellent. Commentors would like to see rest of Rt. 2 repaved.	
10	813140	4	This portion of road has high tourism value. The frost heaves make bicycling difficult. Road conditions are good here and degrade as you get into Montpelier. Improvements to the pavement condition of the road would make bicycling this segment more enjoyable.	

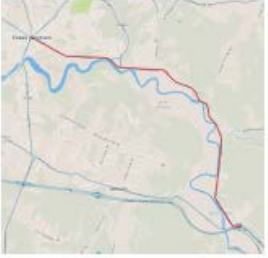


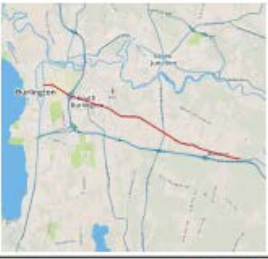








State Roadway Bike, But could be Improved				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
1	813127	11	Most of this route is intimidating, with unclear bike lanes and signals. The road can be increasingly stressful in winter when it's dark and icy. There should be designated and separate bike lanes or at the very least, a wider shoulder for bikes on Shelburne Rd and RT 15 through Colchester and Winooski.	
	813170	11	This route would benefit from wider shoulders or a dedicated bike lane to make it more comfortable for commuters. There simply isn't enough space for motorists and cyclists to share the road comfortably. Specific safety improvements should be made at the crosswalk on the hill. The St. Mike's and Fort stretch are particularly stressful and in need of improvements.	
3	813081	10	Rt. 2 from Sand Bar State Park to Quebec/NY/VT border is a popular tourist-cyclist destination. The shoulder width varies and often is obscured with gravel and debris. This stretch of busy road could be more bike friendly in areas, which may be a good return on investment by attracting more cyclists to the area.	
	813164	10	This loop represents a route that bicyclists desire to ride, and which incorporates the bike ferry, but Route 2 needs improvements, such as better signage and a wider shoulder. The traffic along this segment of road travels at high speeds, and additional shoulder width would improve comfort levels for bicyclists. Additionally, the crumbling shoulders should be repaired so that bicyclists can ride within them.	
5	813153	9	The traffic conditions along Rt 7 pose challenges to bicyclists from Chimney corners into Winooski. Merging traffic and narrow shoulders create uncomfortable conditions. Connections from Colchester bike path to the Islands are comfortable except for these two miles.	

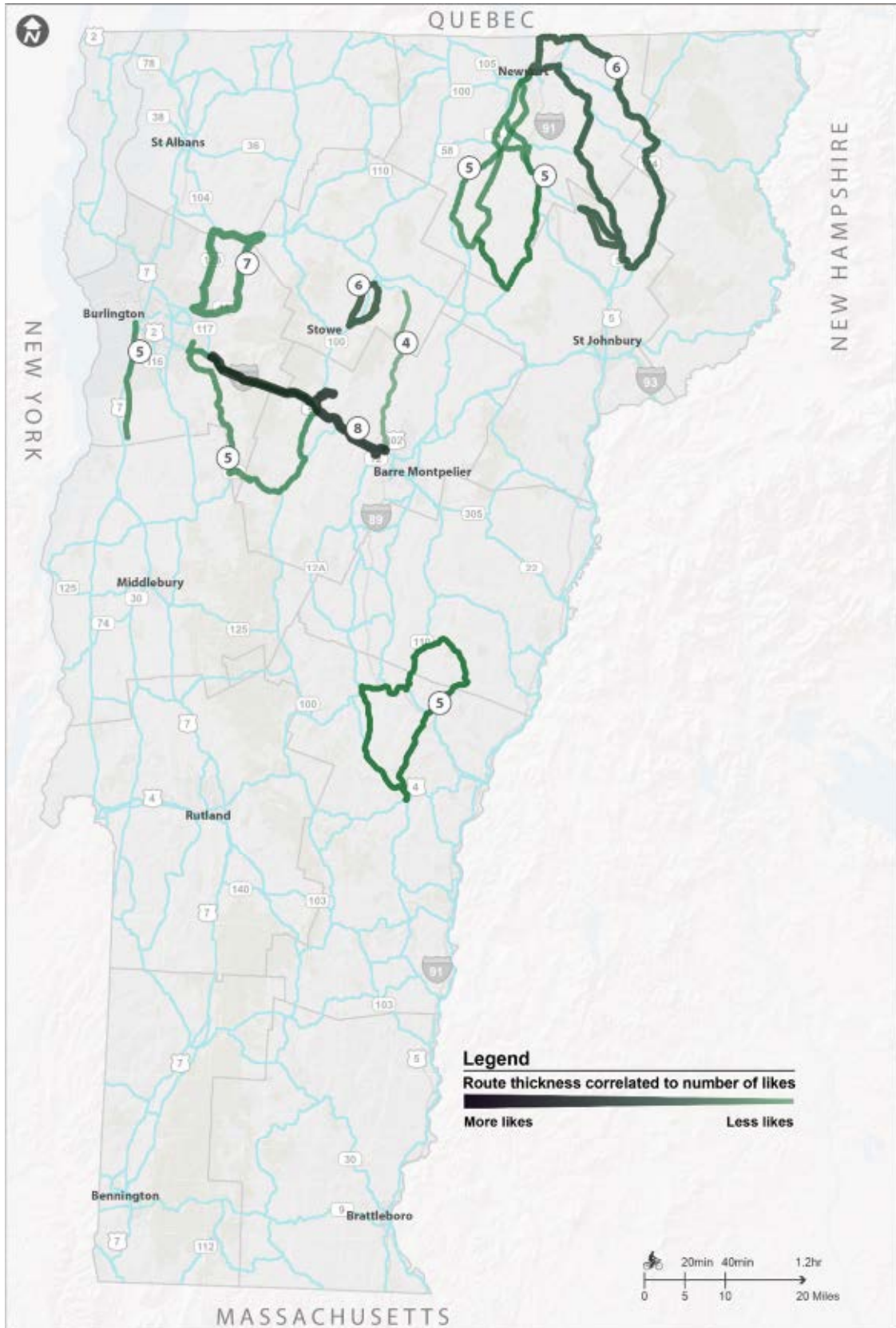


State Roadway Bike, But could be Improved, Continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
5	817360	9	This stretch has shoulders that are in fair condition, but traffic is fast moving and there is a high frequency of large trucks. Shoulders are sometimes unusable due to accumulation of sand/gravel. In some areas, lack of shoulders require cyclists to mix with traffic. The recent road improvement greatly reduced the width of the shoulder. In many areas, this route is not suitable for cycling.	
	820961	9	North Williston Road is a critical missing link for many cyclists. The high-volume vehicle traffic often exceeds posted speed limits. High perceived speeds make riding and walking along this street stressful. A dedicated bike lane or widened shoulder would be a welcome improvement.	
8	817648	8	Riding on Rt. 100 is a necessary evil for those who live and cycle in central Vermont. Heavy tourist traffic and narrow shoulders create unsafe conditions. Widening the shoulders, creating dedicated bike lanes, or separate cycle paths would be a huge improvement that would benefit the many shops between town centers.	
9	813155	7	Rt. 100 is very busy and could use a better surface, wider shoulder, sharrows, and reduced motorist speeds. Rt. 15 has a better surface, but would benefit from the same improvements. Rt. 108 needs a surface upgrade. Additional signs and warnings at crosswalks would improve safety.	
	813168	7	Rt. 15 is uncomfortable at Hood's Crossing in Winooski, between St. Mike's and Camp Johnson, and on Suzy Wilson Rd. There are drainage issues that result in bicyclists riding through deep puddles following moderate rain storms. Storm water issues should be mitigated to improve bicycling conditions along this stretch of road.	



State Roadway I'd like to use, but Needs Improvement				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
1	813116	14	There are very few shoulders on this road. Short sight distances, high motor vehicle speeds, and many potholes add to cyclist discomfort. Commenters recommended bike lanes and a buffered barrier to increase comfort levels.	
2	812974	11	This stretch of roadway is very busy and has little to no shoulder. Riding Rt. 4 east of Woodstock feels unsafe. Commenters recommended a bike route all the way around the green area.	
3	812656	10	The area from North Winooski through downtown Burlington is unsafe yet has a high demand for cyclists. Commenters recommended a protected bicycle facility and/or a road diet, reducing the traffic to three lanes.	
	813128	10	Commenters feel uncomfortable riding on this stretch by Williston Road. This is a major thoroughfare for those traveling to South Burlington. The complete street portion of the road should be extended.	
4	813154	9	Commenters feel that shoulder widening and surface improvements, in addition to share the road signs and sharrows, would increase bicycling comfort levels for those riding from Waterbury and Stowe.	

State Roadway I'd like to use, but Needs Improvement, Continued				
Rank	Unique ID	Likes	Summary of Public Opinion*	Route Location
	813184	9	Rts. 115 and 117 would benefit from a wider, dedicated shoulder, VT 289 would benefit from a marked lane or separation from fast traffic. Many commenters noted a new gas pipeline right-of-way would make an ideal alignment for a new shared use path.	
	817534	9	This stretch of US 5 has numerous potholes, making it hard to ride without taking the whole lane at times. Commenters noted inconsistent shoulders, and that there was potential for increased ridership along this route if bicycling improvements were implemented.	
5	812943	7	This route needs improvement to use. It has potential to be a great connector for long rides. Commenters note surface, shoulder, and pothole improvements would make the route attractive to bicycle tourists, and could boost local tourism revenue.	
	812975	7	This stretch of VT-12 completes an important and scenic loop often used by many bicyclists in the area. Commenters recommended that shoulders along the road be widened, signage installed at narrow points, and line of sight improvements. These enhancements would improve bicyclist comfort levels along this route.	
	813048	7	This stretch has little to no shoulder and heavy truck traffic. Route 30 from RT 4-A in Castleton to Wells Village has no effective shoulders. There are many cyclists who live in the area, including students from Castleton State College and Green Mountain College. Bicycle riding is very popular in and around Poultney as a basic form of transportation, for commuting to work and school (Green Mountain College), and for pleasure riding.	



APPENDIX C. RESPONSIVENESS DOCUMENT

As noted above, this project involved extensive public outreach, and resulted in large amounts of feedback from the public and other interested parties. To ensure all input was incorporated, documents were created which included the response to all feedback. The following tables summarize those responses.

Comments	Response	Responsiveness to comment
Confusion with Wikimap and Data for Wikimap		
Comments about not being able to access map	The interactive crowdsourcing map (aka WikiMap) was open from November 17, 2015 to February 14, 2015.	We were unable to open the interactive crowdsourcing map (aka WikiMap) after it closed on February 14, 2015.
General comments about the need and desire for bike lanes in Burke and Lyndonville - improve Route 5	On November 17, 2015 we sent email correspondence to all public libraries, regional planning commissions, the project's steering committee and local motion to contact their members.	Users were requested to view and react to the draft Desirability map presented at the Statewide Meeting held on September 30, 2015.
bike path from richmond to williston that could follow route 2	As part of the email correspondence announcing the WikiMap and the On Road Bicycle Facility Plan we attached a flyer to be hung in public spaces.	Note: The Vermont Bicycle Corridor Priority Map was formerly named the Draft Desirability Map.
Route 74 is used by bike tours going to the Shoreham Inn. Rte 74 from Rte 30 to 22A has been partially repaved but not the piece Route 30 to North Bingham Road	We held a Statewide meeting introducing the public to the interactive crowdsourcing map (aka WikiMap) for input on January 9, 2015. This meeting was originally scheduled for December 9, 2014 but was postponed due to winter storm conditions.	
Route 22A also could use a consistent shoulder.	Although the WikiMap is no longer accepting input, it can be viewed at http://vtransplanning.vermont.gov/bikeplan .	
I will not ride on Route 100 or Route 7 at all because of nonexistent shoulders	All input to in WikiMap has been archived and will inform future phases of this work.	
Routes 105,242, 118, 100 (basically around Jay Peak) – Roads are narrow and rough, great area for tourism		
Route 15 Johnson to Morrisville – Very unsafe in places – no shoulder. Important corridor.		
Morrisville to St. Johnsbury (rt. 15) – Important East West Corridor		
Route 2 from Montpelier to St. Johnsbury – Important corridor – no shoulder in some places.		
Route 5 Thetford to Barnet – Route 5 could be a huge boon to cycle-tourism. It is an important corridor which needs wider shoulders in many sections.		
Route 7 in Highgate - Plan bike access to link w/Quebec bike plans. Re: Extended under(?) route 35		
Rt. 2/7 split in Milton – Needs safer left turn heading Northbound		
Montpelier – Please attend to Barre-Montpelier road. This is a vital corridor		
There are safety concerns for students to get from Lyndon State College into town.		
VT 122/RT 5/VT114 (Path Around Lyndon) –wider shoulders to allow pedestrians and cyclist to complete the PAL loop, Center St along Steven loop bridge on US. At the intersection of all these roads there is a very unsafe right turn (per conversation with Doug).		
VT 30 north of Sudbury – good candidate for separated path		
VT30 and VT74- dangerous intersection		
Route 2, 314 in Grand Isle – Stay away from state highway except where It cannot be avoided.		
Tour De Farms - Route 116 from Hinesburg to Bristol and Route 17 from Bristol to New Haven		

Comments	Response	Responsiveness to comment
Confusion About Desirability		
money should be spent on the blue roads to make them desirable. Just don't call them desirable yet, because at this point they are not.	The term 'desirability' was intended to describe the current and potential bicycle use on state roads: where people ride and where they would ride if conditions were improved.	To clarify the purpose of the map. VTrans will now use the term 'use' rather than 'desirability' to indicate current and potential bicycle use. Also for clarity, the map was renamed Vermont Bicycle Corridor Priority Map (formerly Draft Desirability Map).
I think the color labels were confusing. I know that my group at the meeting interpreted the map in different ways and no one was very sure what it meant.	VTrans used an interactive crowdsourcing map as a tool (aka WikiMap) to gather information from the public about current and potential bicycle use. This was captured by asking users to select a line type when "mapping" a ride. The line types included:	The Vermont Bicycle Corridor Priority Map is the culmination of Phase 1 of this project. The high-, moderate- and low-use categories on the map represent bicycle use on state roads based on an analysis of current and potential use by bicyclists. The 'use' categories will help prioritize corridors for bicycle improvements. High-use bicycle corridors have the highest priority.
Did the colors represent what people currently think of the roads, or do the colors represent where the DOT would most focus its efforts? We hope the DOT uses the latter interpretation.	<ul style="list-style-type: none"> • State Road I like to Bike (representing current use) • State Road I bike but could be improved (representing current use) • State road I'd like to use, but needs improvement (representing potential use) 	
The terms "least, moderately and most desirable" were very confusing. Most people in Middlebury interpreted these terms differently.		
I would suggest have a complete definition attached to each statement to minimize confusion		
Your labeling of roads as "most desirable" to "least desirable" is very misleading.		
Many sections marked "least desirable" that are, in fact, very desirable places to ride - if they were safer.		The map will be used to inform future phases of the project. As part of the next phase, corridors will be analyzed to identify critical gaps in their condition.
It is unclear how this map (desirability) will be interpreted or used. It does not make sense to me.		In response to public comment and confusion, we developed a FAQ document.
It is confusing what demand means. Demand levels = the ideal or the most needed/currently used?		
map does not represent "desirable" routes. The majority of the most desirable routes shown (blue) are around the most populated areas. These routes would be better classified as routes that need the most work to make them biker friendly.		See the project report for more information on project background defining the score system used to determine the 'use' corridors.
Color code is confusing about what action VTrans will take based upon desirability.		

Comments	Response	Responsiveness to comment
General Questions/Concerns		
Why doesn't VT 127 in Burlington/Colchester show as desirable? Is it the availability of a path along the road or is it because it's a limited access highway?	Some state-managed roads that are limited access were included such as VT- 289 and the St. Albans State Highway because a suitable adjacent alternative bicycle facility does not exist in those locations.	No change necessary
Why does VT 289 shown as desirable even though it's a limited access highway? Susie Wilson Road and Bypass – In reading the criteria it says to include sections of Town Highways functioning as State Highways. We think Susie Wilson meets this criterion but we are not sure about the desirability of this route.	Susie Wilson Rd and Bypass were identified as an important route by a number of people who contributed to the Wikimap. Given this comment the most appropriate designation in context of the Wikimap would have been "State road I'd like to use, but needs improvement"	No change necessary
Unclear how "least, moderate, most desirable" relates to original wiki tags of "route I like to bike/ route I bike could be improved/routes needs improvement to use"	<p>The interactive crowdsourcing map (aka WikiMap) was used as a tool (aka WikiMap) to gather information from the public about current and potential bicycle use. This was captured by asking users to select a line type when "mapping" a ride. The line types included:</p> <ul style="list-style-type: none"> • State Road I like to Bike (representing current use) • State Road I bike but could be improved (representing current use) • State road I'd like to use, but needs improvement (representing potential use) <p>The line types do not correspond directly to the 'use' categories (formerly desirability tiers), the WikiMap line type were one source of data used to calculate 'use' levels.</p>	<p>In response to public comment and confusion, we developed a FAQ document.</p> <p>See the project report for more information on project background defining the score system used to determine the 'use' corridors.</p>
Is there a State road with no use and no desire?	No	No change necessary

Comments	Response	Responsiveness to comment
Methodology Questions/Concerns		
I do know you use Strava but once again most of our roads do not have internet service.	Strava relies on GPS technology and NOT cellular technology. In the event the data cannot be downloaded due to lack of adequate satellite coverage the data is stored and downloaded when the device is within range. Therefore data is compiled from throughout the state regardless of the availability of cellular coverage.	We have confirmed with Strava the ability to gather data throughout the state and will continue to rely on this data source. Coincidentally, Strava reports some of the highest use locations in VT occur in the NEK in relationship to Kingdom Trails network.
My concerns focus on the spotty nature of the desirability categories on state roads in the Northeast Kingdom and really anywhere outside the greater Burlington Area. Is this spotty nature due to the data being not Vermont in nature or by the fact that Strava by its nature will not be capturing complete trip info due to the lack of a cohesive cell network (certainly in the NEK)		
Spotty data and/or methodology seems to make short "desirability" corridors.		
Entire corridors should maintain at least "Moderately Desirable" classification, including designated scenic roads	Changes in 'use' (formerly desirability) could be due to local road use (high counts of cyclist drop off), the final score of a segment is at threshold score (limit between cutoff of each 'use' category) or because of land use changes (density decreasing along a corridor).	VTrans has developed a methodology for smoothing the scores and to introduce consistency along a corridor where appropriate. The "smoothing" used a combination of professional judgement, experience with managing state roads and the following guidelines.
Also that there should be some attempt to smooth out the results so that a coherent network of state highway infrastructure focused on cyclists will result.		
Other areas – I'll be interested to see how things are smoothed out. For my region I think the smoothing should be done on a macroscale – more about 5-10 miles per	Entire segments of corridors will be treated consistently.	Bicycle Corridor Priority Map Smoothing Guidelines:
What are you proposing to do with relatively short sections of roadway that differ in desirability from their surrounding sections? They look like little islands on the map it doesn't make sense to have the "least desirable" between sections of "most".		
Safety should have been weighted much more heavily as a factor in the equation - VTrans sidestepped the issue of safety	The goal of Phase 1 is to categorize the state highway system into high-use, moderate-use and low-use corridors based upon existing and potential use as illustrated in the Vermont Bicycle Corridor Priority Map (formerly called the Draft Desirability Map). Safety is very important to VTrans, and the overarching goal of this project is to ensure safer roads for all users. We implicitly received safety information in Phase 1 using the interactive map by asking users to draw lines on state roads they "would like to use but need improvement."	Future phases will include an analysis of reported bicycle crashes and examine the safety data entered in the Phase 1 interactive crowdsourcing map.

Comments	Response	Responsiveness to comment
Methodology Questions/Concerns		
All the roads in yellow in Addison County are very desirable to ride on IF they were safe. (but they are not!) We think methodology did not reflect our thoughts.	<p>VTrans used this crowdsourcing tool to gather information from the public about current and potential bicycle use. This was captured by asking users to select a line type when mapping a ride. The line types included:</p> <ul style="list-style-type: none"> • State Road I like to Bike • State Road I bike but could be improved • State road I'd like to use, but needs improvement <p>Rides designated as "State road I'd like to use, but needs improvement " addresses your concern. This designation was used in the methodology to categorize the state roads when creating the Vermont Bicycle Corridor Priority Map (formerly called the Draft Desirability Map).</p>	No change necessary.
Was Lake Champlain Bikeways map used?	We reviewed a large range of data sets for this project and decided the data used ((No Suggestions) data, land use data, Strava data, and interviewing bicycle touring companies) were the best to achieve the goal of Phase 1 (categorize the state highway system into high-use, moderate-use and low-use corridors based upon existing and potential use).	Yes, the Lake Champlain Bikeways (LCB) map was considered during the "smoothing" exercise and actual use of the LCB route appears in both the Strava data and on the interactive crowdsourcing map (aka Wikimap).
Was SRTS info included in your methodology (such as the travel plans)?		
The state needs to know what local roads are best for biking and then see which state roads are essential connections to these local roads. These state road linkages should be the priority for real improvements.	The Vermont Bicycle Corridor Priority Map (formerly called the Draft Desirability Map) is the culmination of Phase 1 and will be used to help prioritize improvements and maintenance activities by VTrans on state roads. The high-, moderate- and low-use bicycle corridors on the map represent state roads based on an analysis of current and potential use by transportation and recreation bicyclists. Therefore, the 'use' categories reflect higher-, moderate- and lower-priority corridors for bicycle improvements. The map will also be used to inform future phases of the project.	We have created FAQs. The FAQ "How will the Vermont Bicycle Corridor Priority Map be used?" address this confusion. See response.
Need a map that clearly shows what roads will be improved		
What weight do these findings have in prioritization?		
Overall, I noticed there is a noticeable slant toward uses which are for utility in my region, rather than recreational. Recreational riding is far stronger here – and it is strong. Not sure how to address that, although maybe one or more of my later comments might help re-balance things.	<p>The methodology considers two different types of riding: land use based "transportation" and recreation based.</p> <p>Land use based is more likely near village centers; recreation riding is more likely on rural roads. Both are important and both have been included. The presented methodology did rely a bit more heavily on the Land Use-based score component. In response to this feedback, we have adjusted the methodology to give equal weight to recreational and utilitarian uses.</p>	<p>In response to feedback, we have adjusted the methodology in two ways.</p> <ul style="list-style-type: none"> • The interactive crowdsourcing map (aka WikiMap) line type "Roads I would like to ride but need improvements" was incorporated into the recreation score as potential use. This change to the methodology was added so that potential use was a component of the recreation score. • We added a weight to the Recreation Score to ensure that the maximum number of points a segment could receive from Land Use-based riding and from Recreation riding are the same. In other
I think that the land use analysis that you mentioned in the presentation last week might be falsely elevating status of certain areas. Around here to go 1-2 miles to work is incredibly rare. But an easy 5 mile bicycle ride to work is possible on our roads. Could the analysis be tweak to reflect land use character – so very urban areas apply the 1-2 mile model while the more rural areas apply the 5 mile model? On that note, have you explored the LEHD data? I think it could be really helpful for understanding true commuter patterns. See attached for more info about LEHD and other travel pattern data.		
I think it is also concerning that the desirability map statewide but very much in the NEK is showing low or no "desire" for connectivity between population centers (likely because of the methodology that looks at employment and residential locations...which are dispersed in VT as a whole but even more so in the NEK)	The purpose of the Vermont Bicycle Corridor Priority Map (formerly called the Draft Desirability Map) is to identify the roads on which people want to ride their bicycles so VTrans can work to ensure maintenance and improvement projects are focused most efficiently.	<p>In response to feedback, we have adjusted the methodology in two ways.</p> <ul style="list-style-type: none"> • The interactive crowdsourcing map (aka WikiMap) line type "Roads I would like to ride but need

Comments	Response	Responsiveness to comment
Methodology Questions/Concerns		
I do understand that VTrans has to use the best available data, however I want to express my concern that the inherent weaknesses (at least my perception of it) in the data used in the methodology in determining desirability (though it may be the best available) will necessarily show less desire in the more rural regions of the state.	This map will be one component in a decision-making process, which will also include local input, RPC information, Safe Routes to Schools information, and presence of suitable alternative bicycle routes.	improvements" was incorporated into the recreation score as potential use. • The recreation score and transportation score are weighted equally, where previously the transportation score was scaled.
Rural areas seem to get overlooked and the limited state funds will be directed towards more desirable routes and these are all concentrated in urban areas	Because VTrans methodology relied on land use patterns, population inherently affects the potential use of state roads for bicycles.	See the project report for more information on project background defining the score system.
Rural areas have fewer destinations, an inherent problem with the methodology. In many cases, rural area also have fewer options for travel routes, forcing folks to ride on state routes .		
I would hope that there is a discussion in the final report detailing the limitations of the data used for this methodology.	Yes	Please see project report
Lastly, it appears our old Urban Functional Classification Area is being used on the map (see dark gray shaded municipalities). I think our newly established areas (statewide) should be used. Sarah Kepchar can provide these.	Correction Noted	Change made
How do we get data to RPCs?	We will be making the data available to RPCs, municipalities, etc. upon request. The data needs to be better understood by VTrans before providing a date and mechanism for data delivery.	No change necessary

Comments	Response	Responsiveness to comment
Specific Map Comments		
Addison County should generally be more favorable		
VT 125 from Addison to Middlebury – make blue		
Vt. 125 in Middlebury, Bridport and Addison between Lake St. and the Lake Champlain Bridge		
T 74 between Shoreham and West Cornwall and Rt 125 from 22a to Middlebur		
RT 74 between Shoreham and West Cornwall		
Vt. 74 from Vt. 30 to Vt. 22A;		
Vt. 53 around Lake Dunmore		
Vt. 17 in Addison, Bristol, New Haven		
Rte 78 between Alburgh and Swanton.		
VT-131 is one of the most desirable locations in our region. Currently it is all shown as least or moderately. I think it should all be either moderately or most. Regularly used by local riders and visiting riders.		
Ferry Road/F-5 in Charlotte.		
Route 100 through Granville/Warren – Major Importance! Should be at least to Hancock & Rochester		
Rte 100 between Waitsfield and Morrisville.		
Rte 15 between Johnson and St. Johnsbury.		
Rte 5 between St. Johnsbury and Hartford.		
Rt. 5 Lyndon to St. Jay – this stretch may score blue if road conditions were better. Shoulders need cleaning and widening.		
Short yellow section of Route 5 between Hartland and White River Junction be changed from yellow to green, so that the green roads to the south and to the north would be connected		
5A should be at least moderately desirable		
Route 14 between Calais and Barre		
Rt. 14 in Williamstown/Brookfield – Williamstown gulf – lowest elevation for cross Vermont access. Needs better attention than this process provides(?)		
Vt. 116 east of Bristol;		
VT 116 from Bristol to Hinesburg – make blue (focus on 116 not RT7)	Thank you for your feedback.	
VT116 from Bristol to Middlebury – entire section should be blue		
116 and 17 South of Hinesburg - important 'bridge' segment to most desirable routes. Also, both are included in or provide access to popular recreation routes	The Vermont Bicycle Corridor Priority Map (formerly called the Draft Desirability Map) is the culmination of Phase 1 of this project. The high-use, moderate-use and low-use bicycle corridors on the map represent bicycle use on state roads based on an analysis of current and potential use by bicyclists.	Although, high-use bicycle corridors have the highest priority, this map will be one component in a decision-making process.
Rte. 105 From Derby-Brighton		
Addison County generally should be more favorable		
Rte 30 in Addison Co.		
Rt 30, Bomoseen	Use was quantified on a statewide basis rather than individual corridors. The analysis included land use patterns, bicycle access to state roads, proximity to destinations, data collected on recreational bicycling, and 2,100+ users providing public input through the project's interactive crowdsourcing map (aka WikiMap).	VTrans will continue to enhance road accommodations for cyclist when the opportunity arises however high-use corridors will be given priority.
Route 12 near Northfield Falls		
Include parts of Adventure Cycling's Northern Tier route and Green Mountain Loop. (Sojourn says "No!")		
Rt 314 heading northwest from Rt 2 to the Ferry should be labeled desirable.		
I live in Rutland Town has too much yellow, not enough green and blue.		
Parts of Rte 7		
The route 7 corridor between Middlebury and Burlington is a major work commute roadway; can you imagine what it would be like to majorly improve safety (eg an off road bike path) and reduce this road's driving pressure? It seems to be low priority here because so many feel major highways (like rt 7) are inherently unsafe. Please prove this idea wrong!		
Middlebury (VT 125) and Lincoln (VT 73) gaps between US 7 and VT 100		
VT 73 Orwell to Brandon- make green		

Comments	Response	Responsiveness to comment
Specific Map Comments		
All portions and segments of the state-designated Scenic Byways		
Bikeway routes designated by Lake Champlain Bikeways and the Lake Champlain National Heritage Area.		
Route 111 through Morgan – Desirable but dangerous (narrow)		
St. Johnsbury – I think this (the yellow near the ST. Johnsbury label on the desire map) indicates road conditions .		
VT 114 East Burke and Lydonville- this should be one stretch (all blue) right now goes from blue to green. This is high desire route but low use because it is unsafe. People would like to safely bike from Lyndon to the Kingdom Trails (per conversation with Doug).		
Fairhaven Area (cluster on map with RT. 4, VT 4A and Vt 22A was circled with comment) – growing up in this area, I know there is not a cycling culture but this does not mean there should not be positive change here. This is a major equity issue in these “findings”. There is a college there with major potential for users.		
VT-103 in Ludlow – This is one of the most desirable – so should fill in the gap with “most”		
VT-44 and VT-44A in Windsor and West Windsor – should be “most”. Regularly used by 2 different bike shop weekly rides, as many other local riders. There are also a good number of bike enthusiasts who come to the area – either for local road riding, the mountain biking trails on the western side of Ascutney or to be mad enough to cycle up the 2300ft of Ascutney Mountain Road.		
VT 133 in the Rutland Region is a popular route and not considered highly desirable It should be.		

Comments	Response	Responsiveness to comment
General Feedback: Public Input Process		
<p>Phase 1-A is needed and that it should incorporate public input and make adjustments before going on to Phase 2.</p>	<p>We are adjusting the methodology based on public comment. These changes will be completed as part of Phase 1 of this project.</p> <p>Public input has and will continue to significantly influence the outcome of this project. Public involvement was a primary component of this phase of the project.</p> <p>Public input for the current phase of this project (Phase 1) included:</p> <ul style="list-style-type: none"> • Collection of Strava data for 10,459 users • Crowdsourced interactive map (aka the (No Suggestions)) input from 2,123 users • Two Statewide Public Meetings using VIT technology and broadcast to the web with attendance of 66 participants at meeting #1 and 51 participants at meeting #2. • A stakeholder committee that included representatives from Regional Planning Commissions, Tourism & Marketing, Agency of Commerce & Community Development, Vermont Bike & Pedestrian Coalition / Local Motion, VBT Bicycling & Walking Vacations, Green Mountain Bicycle Club, American Council of Engineering Consultants • A dedicated email address (Vermontbike@gmail.com) for project comments that received 144 email correspondences • The VTrans On Road Bicycle Plan project website that included: <ul style="list-style-type: none"> o Archived videos of both statewide public meetings o Key project information • Project materials were provided to state libraries throughout Vermont to post statewide public meeting information on their bulletin boards and social media pages. <p>If you have a comment that hasn't yet been shared, we encourage you to email us at vermontbike@gmail.com.</p>	<p>In response to feedback, we have adjusted the methodology in two ways.</p> <ul style="list-style-type: none"> • The interactive map (the WikiMap) category "Roads I would like to ride but be need improvements" was incorporated into the recreation score as potential use. • The recreation score and transportation are equally important, where previously the transportation score was scaled. <p>See the project report for more information on project background defining the score system.</p> <p>Public involvement will be sought throughout all phases of the project.</p>
Concerned that public input was not understood		
Very innovative and engaging input process (interactive map, meetings)		
Why was hardly anybody from the public not at this meeting? Does this count as public input?	<p>If you have a comment that hasn't yet been shared, we encourage you to email us at vermontbike@gmail.com.</p>	
General Feedback: Support		
Thanks for getting back to me so quickly. Looks like my road has been well noticed. Good luck with the project.	No response needed	No change necessary
I also wanted to say that the methodology for acquiring data to inform and guide the department's work was overall very sound.		
Rt 2 from Jonesville to Waterbury – Thank you for the fresh Pavement!		
Finally I want to express my appreciation for the effort that went into this study. VTrans faces a real challenge in addressing the lack of suitable bicycle friendly State Highways. In rural parts of the state it is not as easy as just adding a shoulder. Many areas will need significant investment to achieve the goal of a safer and more desirable bicycle friendly state highway system. I do think this effort will be beneficial in the difficult task of prioritizing routes for investment and I look forward to participating in future stages of this process.		

Comments	Response	Responsiveness to comment
General Feedback: Questions		
How will VTrans deal with Class 1 roads/municipal decisions?	The data collected for this project includes Class 1 Town Highways (those road segments of town highways functioning as an extension of State roads) as part of Phase 1 methodology. This information is available to municipalities for their use and will be consulted during Class Town 1 Highways projects.	No change necessary
How is out of state (Canadians in Addison County) input getting compiled?	We are using Strava data as input to our methodology. According to the Strava data set 12 % of the users are located in Canada (1308 users out of 10459 total). In addition, nothing would prevent a Canadian visitor from having participated in the interactive Wikimap.	No change necessary
Some areas are underrepresented for recreation. Bethany used an example of her region and tourist from Canada.		No change necessary
General Feedback: Ideas		
I would love to see a program where the state works with towns to identify key biking roads and then provides technical and financial assistance to make those roads better where they need to be.	VTrans currently provides technical assistance to towns via the Bicycle and Pedestrian, the Transportation Alternatives and the Safe Routes to School Programs by provide funding to assist towns with planning, designing and constructing bicycle improvements. In addition, VTrans Bicycle & Pedestrian Program staff are available to provide technical assistance directly to towns.	No change necessary
General Feedback: Economy		
I do think communities such as Hardwick, Orleans, Lyndonville, Newport and St Johnsbury ect. are also in need of transportation redevelopment. Its the underserved post-industrial towns that could benefit the most from multiple transportation options. Every economy around the globe has seen growth and development with infrastructure redevelopment. Vermont is a wonderful state as you must know and the addition of protected bicycle ways in smaller cities might be just the right step to improving the lifestyles of so many in need. Thank you for allowing me to comment.	We agree that providing quality roads for bicycling makes economic sense among other reasons. See the 2012 study Economic Impact of Bicycling and Walking in Vermont: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/BikePedFinal%20Report%20Econ%20Impact%20Walking%20and%20Biking2012.pdf	No change necessary
There have been multiple research studies done in other countries and states that indicate that bicycle tourists are one of the largest per diem spenders. The last study I read stated that the average income of bicycle tourists is close to \$100,000. Vermont needs to ensure that our roads/bike paths are safe to encourage for both Vermont residents and tourists.	Also view: https://www.youtube.com/watch?t=10&v=BoO_eS0eg-A	
A US brand manager for a cycling simulator company... Sometimes I think we should add a disclaimer to video routes we post from this area so that tourists don't come here to ride and find unsafe, cracked pavement and too narrow or non-existent shoulders.		
Please help keep all of the cyclists alive (they keep the economy alive...).		
Bikes take up too much space and cost too much		
The State has spent a lot of effort on the Byway Program so making these routes as bike-friendly as possible- highly desirable-is preferable, to attract all modes to use these roads which we promote.	Designated scenic byways were analyzed the same as the rest of the State roads in the initial analysis however they were taken into consideration during the "smoothing" exercise.	No change necessary

Comments	Response	Responsiveness to comment
General Feedback: Safety		
Vermont needs to pass a law that cars must stay three feet away from bicyclists. It is unfortunate that in this state there is no law regulating the distance a car needs to give bikes.	<p>We have a safe passing law but it does not specify a distance.</p> <p>Motor vehicle "shall exercise due care, which includes increasing clearance" - 23 V.S.A. §1033(b)</p>	No change necessary
Signage is important. Bike routes should be signed (e.g., as Lake Champlain Bikeways is signed). Numbering bike routes with signs, as other states have done, would be great.	<p>Signs may not always be the appropriate. Our bicycle sign placement guidance is available here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/PedestrianandBicycleFacilityDesignManual.pdf</p> <p>See Chapter 8 for VTrans guidance on Signs, Pavement Markings and signals.</p> <p>Note a disadvantage of "Bike Route" signs are some drivers of motor vehicles, may infer that bicyclists have no rights traveling on roads not formally marked as a "bicycle route".</p>	No change necessary
Safety should have been weighted much more heavily as a factor in the equation - VTrans sidestepped the issue of safety	<p>Safety is very important and the underlying goal of this project is to ensure a safe environment for all users.</p> <p>Safety will be included based on information entered in the project's interactive map (WikiMap) and analysis of reported bicycle crashes.</p> <p>We implicitly received safety information by asking WikiMap users to draw lines on state roads they would like to use but need improvement.</p>	No change necessary
Also, the more signs about bicycling there are, the more motorists might realize that bikes belong too - legitimizes bicycling	<p>Signs may not always be the appropriate. Our bicycle sign placement guidance is available here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/PedestrianandBicycleFacilityDesignManual.pdf</p> <p>See Chapter 8 for VTrans guidance on Signs, Pavement Markings and signals.</p> <p>See page 8-13 for information on where SHARE THE ROAD sign may be appropriate include.</p> <p>Note, SHARE THE ROAD are ambiguous and can actually contribute to conflict and confusion. Interestingly the Delaware has done away with their use.</p>	No change necessary
Overall, Vermont is a great place to cycle but we need more separated bike paths and wider shoulders on the roads.	<p>We agree. We are addressing the need for wider shoulders by conducting the On Road Bicycle Facility Plan. We will use the information from the Plan to increase shoulder widths during pavement activities. We have also funded (either in development or in use) over 100 of miles of shared use paths in the State including the rail trails.</p>	No change necessary

Comments	Response	Responsiveness to comment
General Feedback: Safety		
<p>No shoulder creates hazards with cars passing bikes. When I am driving my car in one direction and a bicyclist is riding in the other direction, cars behind them will drive into my lane to pass instead of waiting the five or ten seconds for me to go by. have almost been hit by cars doing this several times.</p>	<p>We understand the importance of driver and bicyclist education. We have an educational brochure here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/BikePedShareTheRoad05032011.pdf</p> <p>VTrans has also contracted w/Local Motion for next 2-yrs. to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas:</p> <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training 	<p>No change necessary</p>

Comments	Response	Responsiveness to comment
General Feedback: Connectivity		
My first comment is about bike/pedestrian paths: while there are several great paths in the state, locally they are very segmented into a mile here, a few miles there. The paths should be contiguous and follow road routes so you don't have to go so far out of the way to get anywhere.	<p>We agree, this why VTtrans has a Bicycle and Pedestrian Program. The program is to improve access and safety for bicyclists and/or pedestrians through the planning, design and construction of infrastructure projects.</p> <p>Example of eligible projects for scoping or design/construction are bicycle lanes, widening road shoulders and shared-use paths (designed for use by both bicyclists and pedestrians).</p>	No change necessary
Considering the number of cyclists that travel to Vermont to ride and enjoy the trails or the roads, I cant believe that bike lanes would even be something to debate.	<p>Note: General guidance is for bicycle lanes (where appropriate) in urban areas and villages, while paved shoulders are typically used in rural areas.</p>	No change necessary
What also needs to happen is give towns money to widen roads/put in bike lanes in downtown areas so that people can commute more safely to work.	<p>VTtrans has allocated 8-10M/yr. towards improving bike/ped infrastructure, this includes connections.</p> <p>Also, the Regional Planning Commissions coordinate with towns in their regions to improve non-motorized connections.</p> <p>For more information go to: http://vtransengineering.vermont.gov/bureaus/mab/local-projects/bike-ped</p>	No change necessary
The strategy of making state highways safer in and around town centers makes the most sense.	We agree the areas around towns/villages are important and have incorporated a land use component in our analysis of priority bicycle corridors.	No change necessary
Corridors should maintain the same level of desirability	Segments of roads will maintain the same level of desirability however some corridors may not. Parallel routes or intersecting roads may change the desirability throughout a corridor.	No change necessary
I think there is a desire of residents to be able to bike on State Highways between villages and towns but that there is also a reticence to do so because of fear based on lack of adequate shoulders.	We agree and this is the reason we are developing the On Road Bicycle Plan. We also recognize we have limited resources and need to direct those resources to the highest priority bicycle corridors.	No change necessary

Comments	Response	Responsiveness to comment
General Feedback: Culture		
<p>I have found over the last ten years drivers are increasingly disrespectful of bicyclists, some downright and intentionally confrontational. they have NO understanding that WE have rights to the road, too. I've been driven off the roads, cut off, brakes slammed in my face, and told I have no right to the road as a cyclist.</p>	<p>It is important that all road users model proper behavior. We have an educational brochure here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/BikePedShareTheRoad05032011.pdf</p> <p>VTrans has also contracted w/Local Motion for next 2-yrs. to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas:</p> <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training 	<p>No change necessary</p>
<p>he state needs to lay the ground rules, when I grew up there were public information announcements, and law enforcement needs to politely speak with cyclists, pedestrian and drivers about shades responsibilities.</p>	<p>We agree, that is why we have undertaken this project. VTrans has also contracted w/Local Motion for next 2-yrs. to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas:</p> <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training 	<p>No change necessary</p>
<p>Our state is one of the best places to ride bikes in the country, and I know because I have ridden in other "meccas" - Colorado (my childhood home), California, Utah, Nevada and Minnesota - none compares to the beauty, variety and (generally) the politeness of drivers. This resource needs to be built up and marketed - but first the roads need work.</p>	<p>We agree, that is why we have undertaken this project.</p>	<p>No change necessary</p>
General Feedback: Facility Design		
<p>What standards will be used for "improvements"? A 3ft shoulder is not enough and is UNSAFE.</p>	<p>The Vermont State Standards</p>	<p>No change necessary</p>
<p>Will this be used for / applied to complete streets?</p>	<p>This effort compliments complete streets and will be applied in combination with the complete streets law.</p>	<p>No change necessary</p>
<p>Scott Bascom asked how this is related to the Vermont Pedestrian and Bicycle Policy Plan document.</p>	<p>The On Road Bicycle Plan will compliment this document.</p>	<p>No change necessary</p>
General Feedback: VTrans Policy		
<p>How does this project fit in with Asset Management? Comments to this question from Scott Bascom: as part of the project definition, Asset Management is deteriorating based.</p>	<p>This project will be incorporated into the prioritization process to help manage our assets for all roadway users.</p>	<p>No change necessary</p>

Comments	Response	Responsiveness to Comment
Specific map segment comments		
I think the top priority should be to widen Rt 30 as it comes from downtown to and past Middlebury College.	This section is designated as high use/priority. This will be addressed in the future Phases. The anticipated scope of Phase III is to identify improvement strategies along high-use bicycle corridors.	No change needed
There just isn't a safe way to bike from the town to the college (Middlebury)	This is a Class 1 Town Highway (Class 1 TH). Class 1 TH are the towns' jurisdiction not VTrans.	No change needed
Rutland still has a bicycle ban on 35 mph 4 lane sections of routes 4 and 7 where many businesses and attractions are located		
Multiple comments on non-state roads	The On-Road Bicycle Plan focuses on state highways only.	No change needed
Is there a reason why VT-103 is shown as high priority in Chester area and then again around Proctorsville, but not in between?	Yes, the change is due to land use density/patterns in villages and proximity of intersecting roads identified as popular bicycling routes in the Strava data and the crowdsourced interactive map (aka WikiMap).	No change needed
Specific suggestions for improvements to Rt. 117 from the IBM entrance out to Richmond.	This section is designated as high use/priority. This will be addressed in a future phase. The anticipated scope of Phase III is to identify improvement strategies along high-use bicycle corridors.	No change needed
Concerns about the road survey planned in Phase 2 be done by bicyclists on bikes.	Given the geographical extent of data collection needed in Phase II, using bicyclists to collect data is not economically feasible.	No change needed
Montpelier - timing of repaving and including Phase 3 improvements for Rte 12.	So noted. Improvement needs will be addressed in a future phase. The anticipated scope of Phase III is to identify improvement strategies along high-use bicycle corridors.	No change needed
Rte 17 from New Haven to Waitsfield needs help! The Appalachian Gap		Note: Although, high-use bicycle corridors have the highest priority, this map will be one component in a decision-making process.
Rte. 116 from Bristol to Starksboro needs safer shoulders and improved pavement.		VTrans will continue to enhance road accommodations for bicycling when the opportunity arises. However, high-use corridors will be given priority.
In summary: I -- and many others, including former District Administrators, feel strongly that you need to re-think accessing North Danville via US2 and the North Danville road, and changing signage appropriately. It would tremendously enhance the opportunity for circular trips involving Peacham, Danville, the LVRT, and North Danville.	VTrans has evaluated this and determined due to safety concerns at I-89 on/off ramps, there is no easy/quick fix to address this concern. So it will need to be addressed as a part of a larger improvement project.	No change needed

Comments	Response	Responsiveness to Comment
Specific map segment comments and Segment should be higher priority		
Please consider making Route 78 from Swanton to the East Alburgh bridge, a high priority for improvement in regard to bicycling		
Please add the remainder of VT-131 from Cavendish village to VT-106 as high priority		No Change needed
Much of Rt 30 from Brattleboro to Townshend is great with nice wide shoulders. But there is an area between Newfane and Townshend that is very scary. No shoulders at all and very curvy. If the whole of Rt 30 can't be a high priority, I would like to see that section get priority attention.	Thank you for the feedback. Bicycle Use has been quantified on a statewide basis rather than individual corridors. VTrans has reviewed public input and taken it into consideration when appropriate during the developing the final map.	Note: Although, high-use bicycle corridors have the highest priority, this map will be one component in a decision-making process.
I am proposing an upgrade for the entirety of Route 4 (esp. Route 4A) as it crosses the mid-portion of the State.		VTrans will continue to enhance road accommodations for bicycling when the opportunity arises. However, high-use corridors will be given priority.
Rt 5 are more important in the river valley terrain on the east side of the state, where we most often do not have the option of using alternate roads that was mentioned during the Dec 1 Public Meeting by several towns on the west side		
Given that most of our other downtown/ village centers are shown as high priority, we think that downtown Springfield should be "high priority"	Springfield is a designated downtown (and urban compact). In comparison to other comparable communities, Springfield has the highest population, the greatest land use densities and the most expansive area of dense land uses, and the highest concentration of residences, businesses and employers. In addition, they have existing bicycle facilities e.g. designated bike lanes on a portion of Rte. 11 and the Toonerville Trail (former railroad that parallels Rte. 106 from bridge to NH to downtown) which channel bicycles into the downtown. Given all these factors changing the designation along this approximate 1.6 mile segment of Class I TH (Rte. 11) in Springfield is warranted. Note this is only a portion of the 2.6 miles of Class I TH in Springfield. Also note, Southern Windsor County Regional Planning Commission was consulted and concurred that this segment would be the most logical addition.	The final VTrans Priority Bicycle Corridors Map reflects a change in the use category from moderate use/priority to high use/priority within Class I TH limits between Bridge St. and Fairgrounds Rd.
I also suggested that Rt 5 south of Brattleboro at least to Algiers be a high priority.	This route is high use/priority.	No change needed
Rt 142 to Vernon is a popular recreational route and would also be the road bike commuters from Vernon use.	This route is high use/priority to Carroll Concrete.	No change needed

Comments	Response	Responsiveness to Comment
Specific map segment comments and Segment should be higher priority		
Rt 9 out of Brattleboro to Sunset Lake Rd in West Brattleboro.	We agree with this change within the Class I TH limits from Downtown Brattleboro to West Brattleboro. The dense land use patterns and juxtaposition of residential, commercial and employment warrant consideration as a "high use" corridor. However, the lower density land use patterns west of West Brattleboro do not support a change from high to moderate use/priority. The western segment will remain in the moderate use/priority category.	The final VTrans Priority Bicycle Corridors Map reflects a change in the use category from moderate use/priority to high use/priority within Class I TH limits on Rt 9.
Included Business Route 2 (State St from Bailey to Main) and Montpelier State Highway (Memorial Drive from Bailey to Dog River) is owned by the state but doesn't have a route number	This route is high use/priority.	No change needed

Comments	Response	Responsiveness to Comment
Transportation > recreation		
I have a transportation bias.	The previous comment period (following Statewide Meeting #2) indicated a need to reassess the bicycle use scoring system because dense areas were being favored in the methodology. To better represent bicycle use in rural areas, the transportation and recreation components of the scoring system were given equal importance. For more information on how bicycle use is calculated see the project report located at: http://vtransplanning.vermont.gov/bikeplan/documents	No change needed
Unfortunately transportation is a pretty big concern for all of us. Making improvements for cyclists and pedestrians can only help to reduce our overall fossil fuel consumption and make our people healthier	Agreed. The VTrans strategic plan Vision statement is "A safe, reliable and multimodal transportation system that promotes Vermont's quality of life and economic wellbeing". The strategic plan Goal 3 is to Provide Vermonters energy-efficient travel options.	No change needed
This year I have been commuting to work via rte 15 and am flabbergasted at the lack of knowledge car drivers have for cyclists.	We understand the importance of driver and bicyclist education. We have an educational brochure here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/Itf/BikePedShareTheRoad05032011.pdf There is information provided in the Vermont Driver's Manual. VTrans has also contracted with Local Motion for the next 2 years to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas: <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training 	No change needed

Comments	Response	Responsiveness to Comment
General importance of biking in VT		
Is there a bike option comparable to the Long Trail hiking path: with lodging and/or camping in Vermont?	The most comparable bicycling option is the Cross Vermont Trail. More information is located here: http://www.crossvermont.org/	No change needed
There is a large hidden desire in the Upper Valley area to use bicycles more, but average riders do not feel safe.	<p>We understand the importance of driver and bicyclist education. We have an educational brochure here: http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/ltf/BikePedShareTheRoad05032011.pdf</p> <p>VTrans has also contracted with Local Motion for the next 2 years to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas:</p> <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training 	No change needed
I am pleased that Vermont will be taking the Cycling community more seriously.	<p>The VTrans Strategic Plan's Mission focuses on safety and the vision addresses all modes.</p> <p><u>Mission:</u> Provide for the safe and efficient movement of people and goods.</p> <p><u>Vision:</u> A safe, reliable and multimodal transportation system that promotes Vermont's quality of life and economic wellbeing.</p> <p>We are proud to have had a Bicycle and Pedestrian Program for over 20 years and counting, recognizing the importance of these modes.</p>	No change needed
All new paving projects and bridge replacements should include adequate shoulders for cyclists and pedestrians.	We look for opportunities in all projects and increase shoulder width when possible. The reason we are conducting the On-Road Bicycle Plan is to better understand priorities.	No change needed
"Bikes may use full lane" has been a major movement around the country and in places I grew up in Ohio; this needs to be added to VTRANS plans in places where proper infrastructure cannot be built	VTrans is using this sign where appropriate as one of the tools in our toolbox. The Bicycle and Pedestrian Program Manager is presently recommending this sign over the Share the Road.	No change needed

Comments	Response	Responsiveness to Comment
General importance of biking in VT		
<p>Nearly every bicycle lane I have seen in Vermont, particularly in Burlington area are substandard and too narrow for safe use, and encourage unsafe passing. They also encourage right;hooks and don't take in account for intersection conflicts</p>	<p>VTrans follows national standards for bicycle lanes on state roads and continually looks for ways to make the road safer for all users. Note: VTrans does not control bicycle lane application/design on roads outside our jurisdiction.</p>	<p>No change needed</p>
<p>I wish there was more enforcement of the safe passing rule</p>	<p>VTrans has contracted with Local Motion for the next 2 years to provide assistance in Bicycle and Pedestrian safety education and outreach in three areas:</p> <ul style="list-style-type: none"> • Community Level Support • Law Enforcement Training • Driver Education Training <p>The safety education to law enforcement as part of the above mentioned contract is intended to provide education for improved enforcement including safe passing.</p>	<p>No change needed</p>