VT Route 15 Bicycle/Pedestrian Improvements Study
Susie Wilson Road to West Street Extension
Essex Junction, Vermont

Scoping Report Update

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Prepared for: Chittenden County RPC, Village of Essex Junction, Vermont AGENCY OF TRANSPORTATION

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VT ROUTE 15 BICYCLE/PEDESTRIAN IMPROVEMENTS STUDY, SUSIE WILSON ROAD TO WEST STREET EXTENSION

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1.0 INTRODUCTION

The Chittenden County Regional Planning Commission (CCRPC), working with the Village of Essex Junction the Town of Essex, and Stantec Consulting Services Inc. updated a scoping study completed in 2013 for bicycle and pedestrian improvements to VT Route 15 from Exit 15 to West Street Extension. This update looks more closely at the section between Susie Wilson Road and West Street Extension. The scoping process involves quantifying existing bicycle and pedestrian, roadway and traffic conditions and then defining a purpose and need for the project. Alternative improvement strategies are then identified and evaluated leading to the selection of a preferred alternative.

The scoping process includes working closely with a project advisory committee made up of community leaders, Village/Town staff, CCRPC staff, and others. Advisory committee members for this project are listed below.

- Essex Junction Village Staff: Robin Pierce, Rick Jones
- Essex Town Staff: Dennis Lutz, Darren Schibler
- CCRPC: Christine Forde, Marshall Distel

The advisory committee is charged with recommending a preferred improvement alternative to the Village Trustees and Town Selectboard.

2.0 PROJECT BACKGROUND

The VT Route 15 corridor from Winooski to Essex Junction is recognized as a primary transportation corridor that lacks sufficient bicycle facilities. Much progress has been made in recent years to address this. In Essex Junction, from West Street Extension to the Champlain Valley Exposition (CVE), bicycle lanes have been added to VT Route 15 by converting the four-lane section to a three-lane section with a center left turn lane. East of CVE, bike lanes have been added to VT Route 15 to the five corners. For the VT Route 15 section, from Lime Kiln Road to Susie Wilson Road, a shared use path is currently being designed and needed acquisitions and easements are being pursued.

This study focuses on VT Route 15 section from Susie Wilson Road to West Street Extension. This section was included in a previous scoping study which resulted in recommending reducing the 4 lanes to 2 lanes and 2 bicycle lanes, with the median retained.

This scoping study builds upon the previous study to further evaluate alternatives for addressing the bicycle and pedestrian needs along this portion of the corridor.
Figure 1: Project Study Area
2.1 EXISTING PLAN AND STUDY REVIEW

Several studies and plans have been developed for this area that considered traffic and pedestrian concerns. The most recent studies were reviewed in the preparation of this scoping study and are listed below.

- Essex Junction Comprehensive Plan 2014
- Pearl Street (Route 15) Multimodal Transportation Plan, June 2010
- Vermont Route 15 Bicycle and Pedestrian Scoping Report, 2013
- Colchester/Essex Network Transportation Study (CENTS), 2014
- VTrans Susie Wilson Road Scoping Study, (ongoing)
- CCRPC Chittenden County Active Transportation Plan, 2015

2.1.1 Essex Junction Comprehensive Plan 2014

This plan includes the following objectives that pertain to this project.

1. Continue improving access to and safety of bicycle and pedestrian facilities, and public transit. Support the work of the Bike-Walk Advisory Committee.

2. Continue reducing local energy demand by providing further expansion of sidewalks, bike paths, park & rides, and public transportation.

3. Continue to increase the number of sidewalks and other facilities to support bike and pedestrian travel, making it easier for residents to visit downtown businesses.

4. Engage in climate mitigation strategies to reduce the region’s contribution of greenhouse gases. For example, continue to implement policies that promote investment in transportation options that reduce emissions - such as sidewalks and bike lanes.

5. Encourage alternative access to all educational facilities through the use of sidewalks, bike paths and mass transportation as appropriate.

6. Well-marked bike and pedestrian lanes will encourage safety by allowing residents to comfortably and securely navigate the community.

7. Promote and implement strategies to encourage the use of bicycles as alternate transportation modes.

The Transportation section of the Comprehensive Plan states the following:

1. The Bike-Walk Advisory Committee has adopted the following vision statement: “Essex Junction strives to be recognized as a friendly village of connected neighborhoods and destinations in which convenient and safe bicycle and pedestrian facilities are integrated into a seamless and accessible year-round transportation system. This system will promote the enjoyment and health of all citizens, a more vibrant local economy, and a cleaner environment.”
2. On major arterial roads such as Pearl Street the high number of curb cuts makes a shared use path less desirable and does not adequately address the need for local access if the path is not immediately adjacent to the street. On-street bicycle facilities should be considered in these areas and supported at the regional level.

2.1.2 Pearl Street (Route 15) Multimodal Transportation Plan

The Pearl Street (Route 15) Multimodal Transportation Plan was conducted in 2010 and included the area along Route 15 from Susie Wilson Road to the Five Corners. Below are the pertinent recommendations from the plan.

NEAR TERM RECOMMENDATIONS - PHASE 1 (Less than three years)

- **A1.** Position corridor for reduced bus travel times and reduced headways with incremental improvements to regular service.
- **A2.** Provide new bus shelters at Summit Street, Willey's Court, West Street Extension (South side), and new CVE Gate A entrance.
- **A4.** Work with New England Central Railroad (NECR) to seek corridor rail improvement funding for the Burlington Branch line to support future passenger rail service (commuter and/or expanded Amtrak service), leveraging NECR funds to support matching Federal funds.
- **A5.** Increase signal time for Pearl Street at the West Street Extension intersection to reduce the queuing condition.
- **A6.** Relocate the existing bus shelter at the jug handle to the current bus stop location to the west of the intersection.
- **A9.** Add vehicular and pedestrian gateway elements east of the West Street Extension intersection, including a welcome sign, plantings, and a road narrowing (by converting the painted bump out to one defined by a six-inch curb) within the Pearl Street right-of-way.
- **A10.** Add small or medium trees within the five-foot apron and, as possible, larger street trees in the setbacks of adjacent properties along Pearl Street.
- **A13.** Continue negotiations to secure a long-term easement agreement with NECR for a shared use path in the railroad ROW (rail-with-trail).
- **A20.** Check current speed conditions to determine if it may be possible to reduce posted speed limits west of CVE and lower the speed limit if appropriate.
- **A21.** Initiate discussions with the Town of Essex and VTrans on the medium term recommendation of implementing a road diet on Pearl Street (one lane each direction plus designated bike lanes) between the Susie Wilson and West Street Extension intersections.
- **A22.** Update Village Zoning regulations to allow greater residential density along Pearl Street in the Residential 2 district.
- **A24.** Set up regular maintenance procedures for Route 15 including:
  o Regular pavement marking schedule,
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- On-going signal updates,
- Street tree and green strip maintenance, and
- Detection loop service

NEAR TERM RECOMMENDATIONS - PHASE 2 (Less than five years)

- B7. Enhance pedestrian crossings (painted and/or textured crosswalks) at the West Street Extension, Post Office Square, Summit Street, and School Street intersections.
- B8. Adapt VT ROUTE 15 eastbound right turn lane and signal operations at West Street Extension to provide a transit queue jump.
- B10. Conduct a study to investigate the feasibility of implementing a road diet on Pearl Street between the Susie Wilson and West Street Extension intersections. B11. Calm the roadway traffic on Pearl Street, with reduced lane widths, vehicle activated signs, streetscape, and gateway treatments.

MID-TERM RECOMMENDATIONS (Less than ten years)

- C1. As ridership on existing buses increases, evaluate the suitability of a BRT application to the FTA Small Starts program with the aim of beginning a new limited-stop overlay BRT on the Pearl Street service.
- C2. Seek earmarks in Federal authorizations for BRT planning and development.
- C4. Based on the results of the feasibility study and negotiations with VTrans and Essex Town, proceed with the implementation of a road diet for the Pearl Street section west of the West Street Extension intersection—convert the existing two lanes in each direction to one lane with an adjacent bike lane and provide adequate bicycle routing through the intersection.
- C5. Add new pedestrian scale street lighting, some with banner poles.
- C7. Prepare design plans for a shared use path in the railroad right-of-way.
- C8. Investigate the need for a second West Street Extension lane for left turns.

LONG TERM RECOMMENDATIONS (More than ten years)

- D1. Develop BRT as a means of increasing transit ridership in the corridor; BRT should include the following elements:
  - Attractive stations,
  - Distinctive and easy-to-board vehicles,
  - Off vehicle fare collection,
  - Ten-minute headways during peak periods,
  - Automatic vehicle location systems,
  - Passenger information systems, and
  - Transit priority at signalized intersections.
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- **D2.** Work with Chittenden County Transportation Authority (CCTA) to establish a transit area sign system with distinctive graphics for the BRT services that may be developed for the region.
- **D3.** Following lease agreements with NECR, construct a shared use path in the railroad right-of-way.
- **D6.** Investigate the operation of the Pearl/West Street Extension Intersection—if needed, convert the existing eastbound right turn lane to a combined thru and right turn lane and create a short receiving lane on the east side to enable through traffic in two lanes that would taper to the existing three lane section east of the intersection.
- **D8.** Investigate the feasibility of a “complete street” plan for the Pearl Street corridor that includes planted median and roundabouts to enable U-turns and facilitate access to businesses; based on the results of the feasibility study, develop a “complete street” plan for the corridor.

*Source: Pearl Street Multimodal Corridor Plan, Broadreach, 2010.*

Following is a graphic from the plan that illustrates the “road diet” and addition of bicycles lanes in this section of VT Route 15.

*Figure 2 Pearl Street Multimodal Corridor Plan, Broadreach, 2010.*
2.1.3 Vermont Route 15 Bicycle and Pedestrian Scoping Report

The 2013 Vermont Route 15 Bicycle and Pedestrian Scoping Report, focused on the bicycle and pedestrian needs along VT Route 15 from I-89 Exit 15 in Winooski to West Street Extension in the Village of Essex Junction. For this report's subject area, the 2013 report include the following recommendation: Bicycle lanes on the north and south sides of Route 15 from Susie Wilson Road to West Street Extension. Below is a graphic from the report illustrating the bicycle lanes.

Figure 3 Typical Section Vermont Route 15 Bicycle and Pedestrian Scoping Report

2.1.4 Colchester/Essex Network Transportation Study (CENTS)

The CENTS project area was bounded by Roosevelt Highway (US 2/7) on the west, Main Street (VT 2A) on the north, Susie Wilson Road on the east, and Severance Road/Kellogg Road along the south. One of the primary goals of this study is to develop a better understanding of current and future travel demands along the VT2A, Susie Wilson Road, and Severance/Kellogg corridors and develop specific improvement recommendations in response to identified issues and stakeholder input. The study included a scoping level assessment of the VT Route 15 (Pearl Street) and Susie Wilson Road intersection.

The recommended selected preferred alternative for the VT Route 15 (Pearl Street) and Susie Wilson Road intersection was widening of the intersection to incorporate a second southbound left-turn lane (see Figure 4 below).
2.1.5 VTTrans Susie Wilson Road Scoping Study

The Vermont Agency of Transportation (VTTrans) is currently conducting a more detailed scoping of the Susie Wilson Road Corridor to determine the specific corridor improvements to seek funding for. This includes updating the 2013 analysis for the VT Route 15 and Susie Wilson Road intersection. The VT15/Susie Wilson Road scoping is underway, and the results are not yet available for this study. For this study’s purposes, it is assumed that a preferred alternative is likely to be determined before the intersection scoping is finished. Therefore, the proposed bicycle and pedestrian facility improvements recommended from this study will be considered in the intersection scoping. The improvements for this study need to consider the possibility of accommodating 2 receiving lanes on VT Route 15 eastbound for the Susie Wilson two left turn lanes shown above.
2.1.6 CCRPC Chittenden County Active Transportation Plan

This plan updated the previous Chittenden County Active Transportation Plan, which defines its goal as creating a safe, comfortable, and connected regional network of pedestrian and bicycle routes that appeal to all ages and abilities. The Active Transportation Plan (ATP) supports CCRPC’s regional plan ECOS and was developed in coordination with other concurrent local, regional, and state planning efforts. The result of this planning process was a series of proposed infrastructure and non-infrastructure recommendations organized around the five E’s—education, encouragement, enforcement, engineering, and evaluation. Infrastructure and engineering recommendations were developed using a prioritization method that involved feasibility, closing gaps in the network, addressing a high crash location, and serving a population in need.

Important items noted in the plan relative to this study area included:

1. This section of VT15 was shown as a high priority and high feasibility on the proposed active transportation network.

2. The project team developed an interactive online map (a wikimap) that was available for input between late September 2015 and early November 2015. This allowed the public to provide geographically specific information about informal connections, desirable routes, and roadways of concern. Users were asked to identify routes they already ride or walk, ones they would like to ride or walk, and barriers to bicycling or walking throughout Chittenden County. When the project team asked the public to show which routes they would like to walk or bike within Chittenden County, this section of VTRoute 15 was one of the most common.

3. The project team asked the public to show which locations they see as barriers to biking in Chittenden County and VTRoute 15 was identified as challenging due to sight lines and narrow shoulders.

4. Green Mountain Transit (GMT; formerly Chittenden County Transportation Authority (CCTA)) shared data on numbers of people and bikes getting off and on by stop for the year 2013. The Essex route had the second largest number of bike boardings among all the routes at 7278 bike boardings.

5. Network segments were established to connect bicycling and walking origins and destinations. Segments for which a low-stress alternative does not already exist (for example, a shared use path on a parallel alignment) were identified and it included the VTRoute 15 corridor.

6. Recommendations included: Focus on separated facilities (separated bike lanes, shared use paths) to attract the greatest number of potential users.
3.0 EXISTING CONDITIONS

3.1 ROADWAY CHARACTERISTICS

This section of VT Route 15 was reconstructed in 1964 with a full depth of new subbase and pavement, new drainage system, and water and sewer utilities. It was constructed as a curbed four lane roadway (two 12-foot lanes in each direction) that are separated by a landscaped median (16 feet wide). A 5-foot wide sidewalk and aerial utility poles were installed along the northern side. A typical section from the 1964 record plans is shown below. Bicyclists using this section either ride on the 5-foot wide sidewalk or assume a lane on the roadway.

Figure 5 Existing Typical Section

The roadway is bordered by residential and commercial development to the north and the New England Central Railroad to the south. The median extends the full length of the project area and restricts left turns to and from the northside development. Lefts turns are accommodated by U-turns at the jug handles at the Susie Wilson Road and West Street Extension intersections. A jug handle is a type of ramp, or slip road, which allows drivers to change directions without disruptive stops or direct left turns. The Susie Wilson Road jug handle's operation is problematic in that it is stop controlled within a signalized intersection and therefore U-turns are subject to signal controlled traffic yielding to them.

The current posted speed is 45 mph. It changes to 35 mph east of the West Street Extension intersection. Over the years land use on this section of VT Route 15 has evolved from a few single-family homes into commercial establishments and multi-family housing. This has generated greater friction along VT Route 15 with more driveway movements, more frequent bus stops and greater pedestrian and bicycle activity. This redevelopment is expected to continue.

East of the Susie Wilson Road intersection, VT Route 15 is a Class I Town Highway, owned and maintained by the Village of Essex Junction. VT Route 15 west of this intersection is owned and maintained by VTrans. VT Route 15 east of West Street Extension was improved with a VTrans Class I town highway resurfacing project. Improvements in this section should be coordinated with future VTrans’ resurfacing projects.
3.2 INTERSECTION CHARACTERISTICS

3.2.1 VT Route 15 / Ethan Allen Avenue

The VT Route 15/Ethan Allen Avenue intersection is a T-type signalized intersection. The westbound VT Route 15 approach includes two through lanes and a right turn lane. The eastbound VT Route 15 approach includes two through lanes and a left turn lane. The southbound Ethan Allen Avenue approach includes a single lane for right and left turns. The signal operates with three phases serving: westbound and eastbound movements; southbound movements; and, eastbound left-turn movements. Westbound right-turn movements have a green arrow during southbound movements. The only crosswalk provided at the intersection allows pedestrians to cross Ethan Allen Avenue. A push-button activated pedestrian signal phase is available.

3.2.2 VT Route 15 (Pearl Street) / Susie Wilson Road

The Pearl Street/Susie Wilson Road intersection is a state-controlled, T-type signalized intersection. The westbound Pearl Street approach includes two through lanes and a channelized right turn lane. The eastbound Pearl Street approach includes three lanes with two left turn lanes and a single through lane. The southbound Susie Wilson Road approach includes a left turn lane and two right turn lanes. The signal operates with three phases separately serving: westbound movements; southbound left-turn movements; and, eastbound left-turn movements. Southbound right turns and eastbound through movements each operate during two of the above three phases. Sidewalks are located on the north side of Pearl Street and both sides of Susie Wilson Road at this intersection. The only crosswalk provided at the intersection allows pedestrians to cross Susie Wilson Road. A push-button activated pedestrian signal phase is available.
3.2.3  VT Route 15 (Pearl Street) / West Street Extension

The Pearl Street/West Street Extension intersection is a four-way signalized intersection. The westbound Pearl Street approach includes a through lane and a combined through and right turn lane. Left turns from this approach must use the jug handle. The eastbound Pearl Street approach includes a left turn lane, a thru lane, and a right turn lane separated by a median. Northbound and southbound West Street Extension approaches each include a single lane. One crosswalk serves pedestrians crossing the westbound approach; a second crosswalk serves pedestrians crossing the southbound approach. The pedestrian phase operates concurrently with West Street Extension.

3.3  TRAFFIC VOLUMES

Traffic volume data including Annual Average Daily Traffic (AADT) values and Peak Hourly Volumes for the study area were collected from VTrans. 2016 AADT values for the study area road segments are displayed in Table 1. The segment of VT Route 15 between Ethan Allen Avenue and Susie Wilson Road has the highest volume, with the volume of VT Route 15 being one third less for the primary study segment between Susie Wilson Road and West Street Extension. The volume of VT Route 15 is further reduced east of West Street Extension.

<table>
<thead>
<tr>
<th>Location</th>
<th>AADT</th>
<th>Count Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT Route 15 – West of Susie Wilson Ave.</td>
<td>24400</td>
<td>2016</td>
</tr>
<tr>
<td>Susie Wilson Road</td>
<td>20500</td>
<td>2016</td>
</tr>
<tr>
<td>VT Route 15 – East of Susie Wilson Ave.</td>
<td>16300</td>
<td>2016</td>
</tr>
<tr>
<td>West Street Extension</td>
<td>5900</td>
<td>2016</td>
</tr>
<tr>
<td>VT Route 15 – East of West Street Ext.</td>
<td>11700</td>
<td>2016</td>
</tr>
</tbody>
</table>

Existing weekday commuter peak hour traffic conditions for the study area were determined using the latest available data. Traffic volume data are collected periodically by VTrans and by the Chittenden County Regional Planning Commission (CCRPC) at intersections in the region. Collected data used to establish existing conditions include:
A recent traffic impact study report was completed for a potential private development on the parcel adjacent to and northwest of the intersection of VT Route 15/Susie Wilson Road (3/8/2018). During that study, existing 2017 Design Hour Volumes (DHV’s) were developed by the project team, reviewed by, and vetted by the Town of Essex. The existing 2017 DHV turning movements at the intersection of VT Route 15/Susie Wilson Road from that study were used in this scoping study and combined with the counts listed above to balance DHV’s among the three study intersections. Where conflicting volumes were noted between adjacent intersections, the existing 2017 DHV turning movements, vetted and approved by the Town of Essex, were used to balance the volumes to create a baseline condition.

VTrans typically requires that traffic studies be prepared using Design Hour Volumes (DHV’s). Design Hour Volumes are calculated based on historical traffic counts to represent the 30th highest volume hour of the year and therefore represent a very conservative design condition. DHV’s for roadways such as those in the study area are typically experienced during the commuter peak hours in the summer months. DHV calculations for this location are based on data from the VTrans Continuous Traffic Counting station D530 on VT 289 in Essex.

Figures 9 through 14 display existing AM and PM design hour volume (DHV) turning movement counts for the three study area intersections. The data show a large portion of eastbound traffic volume along VT Route 15 diverting to Susie Wilson Road.
Figure 9 Existing 2017 AM Design Hour Volumes

VT Route 15 & Ethan Allen Avenue
2017 Existing AM DHV

VT Route 15

Ethan Allen Avenue

13
72
10
755

93
1580

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Figure 10 Existing 2017 AM Design Hour Volumes
Figure 11 Existing 2017 AM Design Hour Volumes

VT Route 15 & West Street Extension
2017 Existing AM DHV
Figure 12 2017 Existing PM Design Hour Volumes

VT ROUTE 15 & Ethan Allen Avenue
2017 Existing PM DHV

VT Route 15

Ethan Allen Avenue

1759

24

B6

799

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Figure 13 Existing 2017 PM Design Hour Volumes
Figure 14 Existing 2017 PM Design Hour Volumes

VT Route 15 & West Street Extension
2017 Existing PM DHV

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3.4 INTERSECTION OPERATIONS

Intersection and roadway operating levels of service (LOS) have been calculated for the study area intersections based on the traffic volume, geometry and traffic control type previously mentioned. The results of these calculations, which are intended to quantify intersection operations, are presented below.

3.4.1 Level of Service Criteria

Level of service (LOS) is a term used to describe the quality of the traffic flow on a roadway facility at a particular point in time. It is an aggregate measure of travel delay, travel speed, congestion, driver discomfort, convenience, and safety based on a comparison of roadway system capacity to roadway system travel demand. Operating levels of service are reported on a scale of A to F, with A representing the best operating conditions with little or no delay to motorists, and F representing the worst operating conditions with long delays and traffic demands sometimes exceeding roadway capacity.

Intersection operating levels of service are calculated in accord with procedures defined in the Highway Capacity Manual, published by the Transportation Research Board. For unsignalized and signalized intersections, the operating level of service is based on travel delays. Delays can be measured in the field but generally are calculated as a function of the following: traffic volume; peaking characteristic of traffic flow; percentage of heavy vehicles in the traffic stream; type of traffic control; number of travel lanes and lane use; intersection approach grades; and pedestrian activity. Through this analysis, volume-to-capacity ratios can be calculated for individual movements or for the intersection as a whole. A volume-to-capacity ratio of 1.0 indicates that a movement or intersection is operating at its theoretical capacity. The specific delay criteria applied per the 2010 Highway Capacity Manual to determine operating levels of service are summarized in Table 2.

Table 2: Intersection Level of Service Criteria

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Delay per Vehicle (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signalized Intersections</td>
</tr>
<tr>
<td>A</td>
<td>≤10.0</td>
</tr>
<tr>
<td>B</td>
<td>10.1 to 20.0</td>
</tr>
<tr>
<td>C</td>
<td>20.1 to 35.0</td>
</tr>
<tr>
<td>D</td>
<td>35.1 to 55.0</td>
</tr>
<tr>
<td>E</td>
<td>55.1 to 80.0</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80.0</td>
</tr>
</tbody>
</table>

*Level of Service F is also assigned if the volume-to-capacity ratio exceeds 1.0 for a specific movement or lane group. For approach-based and intersection assessments, LOS is defined solely by delay. (Source: HCM 2010 Highway Capacity Manual, Transportation Research Board, National Academy of Sciences, Washington, DC, 2010.)*
3.4.2  Calculated Operating Levels of Service

The intersection PM peak hour operating levels of service were calculated following procedures described in the 2010 Highway Capacity Manual and as applied by the Synchro software package. Analysis results for existing conditions are reported in Table 3. Results are presented for estimated 2017 Design Hour Volumes. The VT Route 15/Susie Wilson Road intersection is the controlling intersection in the area. It operates with higher volume-to-capacity ratios than the other two intersections. Capacity analysis worksheets for existing and future analysis conditions are presented in Appendix D.

<table>
<thead>
<tr>
<th></th>
<th>2017 Existing PM DHV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Hour</td>
</tr>
<tr>
<td>Signalized Intersection</td>
<td></td>
</tr>
<tr>
<td>VT Route 15 / Ethan Allen Ave</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>B</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
</tr>
<tr>
<td>VT Route 15 / Susie Wilson Rd</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>C</td>
</tr>
<tr>
<td>PM</td>
<td>D</td>
</tr>
<tr>
<td>VT Route 15 / West Street Ext</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>A</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
</tr>
</tbody>
</table>

¹ LOS = Level of Service  
² Delay = Average delay expressed in seconds per vehicle  
³ V/C = Volume-to-capacity ratio for critical movements

3.5  PEDESTRIAN AND BICYCLE FACILITIES

A network of sidewalks and a shared use path are provided or planned within and adjacent to the project area. There is an existing 5-foot wide asphalt sidewalk along the northside of VT Route 15 in the project area. This connects to sidewalks along VT Route 15 east and west of the project area and to sidewalks on Susie Wilson Road and West Street Extension. Marked crosswalks exist at the signalized intersections and include a protected signal phase crosswalk on VT Route 15 at West Street Extension. As the southside of VT Route 15 is bordered by the railroad and is not developed, pedestrian crossings are not needed.

There are no dedicated bike facilities along VT Route 15 in the project area. Bicycles currently use the existing 5-foot wide sidewalk or share a lane with traffic on VT Route 15. The existing lanes are 12 feet wide with no shoulder. There is a regional direct bicycle network planned and being developed along VT Route 15. Buffered bike lanes exist east of the project area and connect to the Five Corners. A shared use path west of the project area and connecting to Lime Kiln Road is in the design phase.
The Essex Bicycle Plan, dated January 15, 2015, identified this section of VT Route 15 as an important gap in the planned direct bicycle network and listed it as an implementation project.

### 3.6 Transit Service

Green Mountain Transit (GMT) has a local bus route, Route #2: Essex Junction, through the project area. This route loops from the Downtown Transit Center in Burlington to the Essex Junction Amtrak Station using VT Route 15.

There are six designated bus stops in the project area. One stop services the eastbound bus and five service the westbound bus. There is no eastbound stop between Ethan Allen Avenue and West Street Extension.

Table 4 summarizes bus route schedule and fare information.

**Table 4: GMT Bus Schedule**

<table>
<thead>
<tr>
<th>Route</th>
<th>Start Location</th>
<th>End Location</th>
<th>Cost*</th>
<th>Schedule</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2: Essex Junction</td>
<td>Downtown Burlington</td>
<td>Essex Junction</td>
<td>$1.25</td>
<td>M-F: 5:45AM-9:30PM 6:10AM-7:15PM</td>
<td>M-F: 15 min (on peak); 30min (off-peak); SAT: 30 min (on peak), 1hr (off peak)</td>
</tr>
</tbody>
</table>

*Fare for one-way ride

### 3.7 Crash History

The crash history for the study area was investigated using the VTrans crash database. VTrans keeps records of reported crashes by milepost along State and Federal Aid highways in Vermont. General Yearly Summaries can be requested from VTrans for given roadway segments. The summaries note the location (mile marker), date, time of day, weather conditions, contributing circumstances and severity for reported crashes. Crash data for 2012 through 2016 were reviewed for VT Route 15 between mile marker 0.3 and mile marker 1.10 including the Susie Wilson Road intersection at 0.60 and the West Street Extension intersection at 1.00. Crash data for 2012 through 2016 were also reviewed for Susie Wilson Road between mile marker 0.0 and mile marker 0.2. The Town of Essex / Village of Essex municipal boundary is at Susie Wilson Road and VT Route 15, approximately mile marker 0.6.

Table 5 provides a summary of the crash data. VT Route 15 experienced the greatest number of crashes with 141 reported over a five-year period (2012-2016). The most prominent crash types at both intersections were rear-end collisions. Crashes were most often observed during the midday and afternoon commuter peak hours. Thirteen crashes involved injuries, and none involved a fatality.
Table 5 Crash Summary (2012-2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>Susie Wilson Road</th>
<th>VT Route 15</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>15</td>
<td>21</td>
<td>36</td>
</tr>
<tr>
<td>2013</td>
<td>13</td>
<td>28</td>
<td>41</td>
</tr>
<tr>
<td>2014</td>
<td>25</td>
<td>37</td>
<td>62</td>
</tr>
<tr>
<td>2015</td>
<td>26</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>2016</td>
<td>13</td>
<td>26</td>
<td>39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>141</strong></td>
<td><strong>233</strong></td>
</tr>
</tbody>
</table>

**Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Susie Wilson Road</th>
<th>VT Route 15</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle</td>
<td>11</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>Rear-end</td>
<td>42</td>
<td>69</td>
<td>111</td>
</tr>
<tr>
<td>Head-on</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Single Vehicle</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Sideswipe</td>
<td>30</td>
<td>38</td>
<td>68</td>
</tr>
<tr>
<td>Unknown-other</td>
<td>9</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>141</strong></td>
<td><strong>233</strong></td>
</tr>
</tbody>
</table>

**Severity**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Susie Wilson Road</th>
<th>VT Route 15</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Damage</td>
<td>83</td>
<td>126</td>
<td>209</td>
</tr>
<tr>
<td>Personal Injury</td>
<td>8</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Fatality</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>141</strong></td>
<td><strong>233</strong></td>
</tr>
</tbody>
</table>

**Weather**

<table>
<thead>
<tr>
<th>Weather</th>
<th>Susie Wilson Road</th>
<th>VT Route 15</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear</td>
<td>58</td>
<td>68</td>
<td>126</td>
</tr>
<tr>
<td>Cloudy</td>
<td>22</td>
<td>44</td>
<td>66</td>
</tr>
<tr>
<td>Rain</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Snow/Ice</td>
<td>6</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Fog</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>141</strong></td>
<td><strong>233</strong></td>
</tr>
</tbody>
</table>

**Time of Day**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Susie Wilson Road</th>
<th>VT Route 15</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00AM to 9:00AM</td>
<td>5</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>9:00AM to 4:00PM</td>
<td>57</td>
<td>60</td>
<td>117</td>
</tr>
<tr>
<td>4:00PM to 6:00PM</td>
<td>18</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>6:00PM to 7:00AM</td>
<td>12</td>
<td>32</td>
<td>44</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>141</strong></td>
<td><strong>233</strong></td>
</tr>
</tbody>
</table>
3.7.1 High Crash Locations

VTrans maintains a listing of High Crash Locations (HCL) within the state. A 0.3 mile highway segment or intersection must have at least 5 crashes over a 5-year period and the actual crash rate (number of crashes per million vehicles) must exceed a critical crash rate to be classified as an HCL. The critical crash rate is based on the average crash rate for similar highways. The VTrans High Crash Report: Sections and Intersections 2012-2016 lists two intersections and one roadway section as HCLs within the project study area. These are summarized in Table 6.

Table 6 High Crash Locations

<table>
<thead>
<tr>
<th>Name</th>
<th>Mile Marker</th>
<th>AADT</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>Actual/Critical Ratio</th>
<th>Severity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersections</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VT Route 15 / Susie Wilson Rd</td>
<td>9</td>
<td>0.510 - 0.660</td>
<td>26,772</td>
<td>84</td>
<td>0</td>
<td>8</td>
<td>2.225</td>
</tr>
<tr>
<td>VT Route 15 / West St Ext</td>
<td>19</td>
<td>0.960 - 1.080</td>
<td>15,566</td>
<td>43</td>
<td>0</td>
<td>8</td>
<td>1.785</td>
</tr>
<tr>
<td>Segment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susie Wilson Rd</td>
<td>210</td>
<td>0.000 - 0.300</td>
<td>19,933</td>
<td>80</td>
<td>0</td>
<td>14</td>
<td>1.738</td>
</tr>
</tbody>
</table>

3.8 Natural Resources

Stantec Consulting Services Inc. (Stantec) conducted a preliminary review of the natural resources present within the project area. Specifically, as part of this investigation, Stantec identified and characterized wetlands, streams, rare, threatened, or endangered (RTE) species, wildlife habitat, agricultural land, 4(f) and 6(f) public lands, and hazardous waste sites. Following is a summary of the findings.

Natural Resource Review Summary – Review of Existing Materials

Stantec used the Vermont Agency of Natural Resources (ANR) Natural Resources Atlas mapping Program to evaluate known natural resources within the Project Area.

Wetlands and Streams. According to the ANR program, there are Vermont Significant Wetland Inventory (VSWI) wetlands mapped along Sunderland Brook to the north of the project area (see attached ANR Wetlands/Streams figure 15). These are Class II wetlands with a regulated 50-foot buffer.
Sunderland Brook flows from east to west to the north of the project area. This is a perennial stream with an ANR 50-foot river corridor (see ANR Wetlands/Streams figure 15 below). Sunderland Brook is stormwater-impaired.

Additional wetlands are floodplain areas are mapped along the Winooski River to the south (and outside) of the project area.
RTE Review. Several state-Threatened and rare plant species and rare habitat types are mapped by ANR within the project area (see ANR RTE figure below). These plants and habitat types are all located along the south side of VT Route 15.

Figure 16 VT Route 15 West - RTE
Agricultural Soils. According to the Natural Resources Atlas, the soils within the project area include Statewide agricultural soils (see attached ANR Prime Ag Figure). The Farmland Policy Protection Act does not apply to projects within existing road ROWs. If any work is proposed outside of existing ROW, authorization from the NRCS via form AD-1006, the Farmland Conversion Impact Rating form, may be required.

Figure 17 VT Route 15 West - ANR Prime Ag
Public Lands. The project area does not include public recreation lands (a Section 4(f) resource) or public lands developed with Land and Water Conservation Funds (a Section 6(f) resource) (see attached ANR Conserved Lands figure). Note, however, that the Dalton Drive Parade Grounds at Fort Ethan Allen and the State Tree Nursery along West Street are in the project vicinity.

Figure 18 West - ANR Conserved Lands
Hazardous Waste Sites. The ANR mapping program was reviewed for information on Hazardous Waste Sites in the project vicinity. No active Hazardous Waste Sites or Hazardous Waste Generators are located within the project area (see attached ANR Hazardous Waste figure).

Figure 19 VT Route 15 West - Hazardous Waste

Natural Resource Review Summary - Site Investigation
Stantec conducted a site visit on October 18, 2017 to evaluate natural resources present within the project area.

Wetlands/Streams. The wetlands associated with Sunderland Brook were verified during the site investigation. These wetlands are located to the north of and outside of the project corridor. One additional wetland area was identified during the site visit. This wetland is located at the northeast corner of the VT Route 15 and Susie Wilson Road intersection. The wetland is associated Sunderland Brook. This palustrine emergent and scrub/shrub wetland is likely a Vermont Class II wetland with a regulated 50-foot buffer.

RTE Species. Stantec did not verify the presence of RTE species during the October 18, 2017 site visit since it was late in the growing season. Much of the corridor has been disturbed to some
degree by mowing, clearing, or adjacent development. Further RTE surveys should be conducted during the growing season to verify the presence of any RTE species within the corridor.

**Wildlife Habitat.** The project area provides habitat for various wildlife species common to Vermont’s suburban areas such as black-capped chickadee (Poecile atricapillus), blue jay (Cyanocitta cristata), raccoon (Procyon lotor), skunk (Mephitis mephitis), and gray squirrel (Sciurus carolinensis), as well as other species that may travel through the area. The proximity to VT Route 15 limits the value of the wildlife habitat.

**Federal and State Wetland/Stream Regulations.** The US Army Corps of Engineers (Corps) regulates wetlands and streams under the provisions of Section 404 of the Clean Water Act. The Corps has issued a Programmatic General Permit for the State of Vermont. Typically, wetland and stream impacts of less than one acre may be covered by a Programmatic General Permit (GP), with impacts of less than 3,000 s.f. often eligible for approval via a one-page Self-Verification Form. Note that the current GP will expire in December 2017, and the new GP may have different conditions and requirements.

The Vermont ANR regulates Class I and II wetlands and their buffers. The wetland area associated with Sunderland Brook is likely a Class II wetland. Therefore, any impacts to this wetland or its 50-foot buffer would likely require authorization under the Vermont Wetland Permit or Vermont General Permit. The classification of this wetland must be verified by ANR. Stormwater designs must address the impaired status of Sunderland Brook.

### 4.0 PURPOSE AND NEED STATEMENT

The following statement was developed based on the existing conditions assessment, public input, and project advisory committee discussions.

**Purpose:** The purpose of this project is to provide a safe, visible, comfortable, convenient, and direct bicycle facility connecting existing and/or planned facilities on VT Route 15 between (Ethan Allen Avenue) Susie Wilson Road and West Street extension, for bicyclists of various ages and abilities, while maintaining safe and efficient vehicular and pedestrian conditions on VT Route 15.

**Need:**

1. **Complete a missing bicycle facility link in the town, village, and regional bicycle network.** VT Route 15 is an important regional transportation corridor that was reconstructed in the 1960’s as a median divided highway with four (4) 12-foot lanes. It has long been recognized that this area of VT Route 15 lacks bicycle facilities and while some improvements have been constructed, gaps remain. East of the study area bicycle lanes exist along VT Route 15 from West Street Extension to the Five Corners intersection and beyond. West of the study area a shared use path from Lime Kiln Road to Susie Wilson Road has been designed and construction is expected in 2022. This leaves a missing link in the bicycle network from Susie Wilson Road to West Street extension.
2. Provide an inviting travel corridor for a growing number of residents and bicycle commuters that reinforces the Town’s, Village’s and Region’s goals for pedestrian and bicycle mobility. Land use and zoning changes in the project area have introduced a greater need to connect corridor residents to surrounding destinations. The 2016 Essex Town Plan states the following specific transportation policy: “Multiple modes of transportation that connect residents to schools, work places, shopping centers and recreational areas shall be supported.” The 2014 Village Comprehensive Plan objectives include: continuing to increase the number of sidewalks and other facilities to support bike and pedestrian travel, making it easier for residents to visit downtown businesses; provide well-marked bike and pedestrian lanes, to encourage safety by allowing residents to comfortably and securely navigate the community; and promote and implement strategies to encourage the use of bicycles as alternate transportation modes.

3. Facilitate use by all age groups, experience levels, and trip purposes. The current facility - VT Route 15 roadway and existing sidewalk - is challenging for all bicycle users, including the most experienced and confident cyclists. The existing roadway is posted at 45 mph and has 4 lanes, 12-feet wide, and no shoulders for much of the corridor. This discourages would-be commuters and recreational cyclists needing to travel along VT Route 15. This connection would provide access to schools, shopping centers, and work places and therefore it is expected to be used by a wide range of ages and abilities.

5.0 FUTURE CONDITIONS

5.1 FUTURE TRAFFIC VOLUMES

Roadway and traffic conditions in the study area were projected to a future design year of 2030. Existing Design Hour traffic volumes were increased by 8 percent. This growth rate was obtained from the 2015 VTrans Red Book which compiles and analyzes traffic volume data collected by VTrans. The VTrans recommended growth factor to increase 2017 volumes to 2030 is 1.08. Intersection operations were then analyzed for the future travel demands. The resulting 2030 AM and PM peak hour traffic flow networks are shown in Figure 20 through Figure 25.
Figure 20 2030 AM Design Hour Volumes
Figure 21 2030 AM Design Hour Volumes
Figure 22 2030 AM Design Hour Volumes
Figure 23 2030 PM Design Hour Volumes

VT Route 15 & Ethan Allen Avenue
2030 PM DHV

Source: VT Rural Roads Texture & Elevation, AECOM
Scale: 1:3000
Figure 24 2030 PM Design Hour Volumes
Figure 25 2030 PM Design Hour Volumes
5.2 FUTURE TRAFFIC OPERATIONS

The traffic operations analysis conducted for existing traffic conditions were repeated for the future conditions based on the traffic growth assumptions described above. The analysis again examined the three intersections. As shown in Table 7 below, new traffic growth will increase utilization (V/C) during both the AM and PM peak hours for each of the intersections, with the most significant increase occurring at the controlling intersection of VT Route 15/Susie Wilson Road. However, LOS will remain unchanged at this intersection, and will stay at LOS C or above for the other two intersections.

Table 7 Existing Intersection Capacity Analysis Results

<table>
<thead>
<tr>
<th></th>
<th>Existing DHV</th>
<th>Future DHV (2030)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Hour</td>
<td>LOŚ Delay² V/C³</td>
</tr>
<tr>
<td><strong>Signalized Intersection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VT Route 15 / Ethan Allen Ave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>B</td>
<td>17.5</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
<td>20.0</td>
</tr>
<tr>
<td>VT Route 15 / Susie Wilson Rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>C</td>
<td>27</td>
</tr>
<tr>
<td>PM</td>
<td>D</td>
<td>44</td>
</tr>
<tr>
<td>VT Route 15 / West Street Ext</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>A</td>
<td>9.6</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
<td>14.9</td>
</tr>
</tbody>
</table>

1 LOS= Level of Service
2 Delay = Average delay expressed in seconds per vehicle
3 V/C = Volume-to-capacity ratio for critical movements

6.0 ALTERNATIVES

The project advisory committee (PAC) considered a wide range of improvements to address the project’s purpose and need. Replacing the existing 5-foot wide sidewalk along the north side from Susie Wilson Road to West Street extension with a 10-foot wide shared use path was considered. This improvement was discarded as it creates a conflict and safety concern with all bicyclists, including higher speed users, when crossing the numerous driveways and there were viable alternatives to accommodate higher speed on-road cyclists.

The PAC also discussed the need to consider potential future improvements at the VT Route 15/Susie Wilson Road intersection which could include two left-turn lanes from Susie Wilson Road to VT Route 15 eastbound. If two left-turn lanes are constructed on Susie Wilson Road, two receiving lanes on VT Route 15 eastbound will be needed at the intersection. The preferred alternative selected should not preclude accommodation of two receiving lanes.
The resulting alternatives developed and evaluated include the following:

- Alternative 1: No Action
- Alternative 2: Two Lanes with Median
- Alternative 3: Three Lanes No Median

### 6.1 ALTERNATIVE 1: NO ACTION

For the No Action alternative, the existing transportation facilities in the project area remain as they exist today. The roadway would remain a four-lane facility with a median and no shoulders or bicycle facilities beyond the existing 5-foot sidewalk. Bicyclists traveling along VT Route 15 would continue to leave a shared use path to the west or bike lane from the east, and either assume a lane or use the existing 5-foot sidewalk. There would be no additional bicycle facilities or improvements. This alternative would have no construction costs and there would be no impacts to right-of-way, resources, or traffic. The No Action Alternative would not address the project’s purpose and need and a missing link in the regional bike network would remain.

Figure 26 Alternative 1 Typical Section
6.2 ALTERNATIVE 2: TWO LANES WITH MEDIAN

This alternative retains most of the existing median and converts the existing 2 travel lanes in each direction into a single travel lane with a buffered bike lane in each direction. One goal of this alternative was to develop a design that would have minimal impacts and costs, as well as being readily implemented. Most of the improvements with this alternative are accomplished with pavement markings and signage. A typical section and plan of this alternative is shown in Figures 27 and 28.

Figure 27 Alternative 2 Typical Section
As shown on the plan this alternative includes the following features:

- Eastbound and Westbound buffered bike lanes on VT Route 15 and single travel lanes.
- Connection to the planned shared use path to the west of the Susie Wilson Road intersection via crosswalk.
- A bicycle signal and bicycle crosswalk on the VT Route 15 westbound approach at the Susie Wilson Road intersection, to access an eastbound buffered bike lane. This provides for the potential of a future eastbound bus stop.
- Two (2) VT Route 15 eastbound receiving lanes at the Susie Wilson road intersection if needed for the Susie Wilson road improvements. This requires removing the existing median for approximately 300 feet. The median removal could be deferred until the Susie Wilson Road improvements require them. Bike lane separation using vertical elements, such as flexible posts, should be considered in the vehicle merge areas.
- Westbound buffered bike lane exits to a shared use path approximately 400 feet prior to Susie Wilson Road.
- Median is retained, restricting left turns, and requiring continued use of jug handles for U-turns at the Susie Wilson Road and West Street Extension intersections.
- Provisions for westbound bus stops are included via pavement markings and signs.
- VT Route 15 eastbound buffered bike lane connects to buffered bike lane east of the West Street Extension intersection.
- VT Route 15 westbound buffered bike lane extends approximately 200 feet east of the West Street extension intersection and connects to the existing buffered bike lane. This reduces the VT Route 15 westbound approach lanes from two to one lane.
- VT Route 15 eastbound right turn lane crosses eastbound buffered bike lane on west approach to the West Street extension intersection.
- VT Route 15 continues to provide for temporary 4 lane operation during the CVE, by using traffic cones, but will restrict bicycle traffic in the buffered bike lanes.
- The existing northside 5-foot asphalt sidewalk is widened to 8 feet.
- Estimated construction cost is $800,000

These improvements do not impact drainage, right-of-way or utilities, or require permits, allowing this alternative to be readily implemented, subject to available funding. Many of the
improvements could be eligible for a VTrans Class One town highway resurfacing project and therefore minimizing the local cost.

Based on the VTrans’ 1964 plans, the existing highway right-of-way is approximately 8 feet north of the northern edge of the existing 5-foot sidewalk. This allows for the existing sidewalk to be widened by 3 feet in the northerly direction, to a width of 8 feet. This puts the north edge of sidewalk 3 feet closer to development and would require some construction and/or grading easements.

**Operational Impacts**

Analyses were performed to assess the potential traffic impacts of reducing the number of travel lanes on VT Route 15, from four lanes to two lanes, between Susie Wilson Road and West Street Extension. These analyses are documented in a memo in Appendix D. The assessment includes the two endpoint intersections at Susie Wilson Road and at West Street Extension. The analyses indicate that capacity along the roadway segment from Susie Wilson Road to West Street Extension is sufficient with the lane reduction. The analyses also indicate the need to maintain two lanes on the westbound approach to the intersection with Susie Wilson Road. At the West Street intersection there is adequate capacity to permit elimination of one of the two westbound through lanes.

CCRPC staff used the regional travel demand model to estimate the increase in vehicle travel delay and resulting decrease in traffic volume due to a lane reduction in each direction along this segment. The model predicts that the lane loss/capacity reduction would cause some motorists to divert to an alternate route, Susie Wilson Road and VT Route 289. The model only considered reducing from 4 to 2 lanes in the roadway segment without assuming changes to the intersections. It was based on the 2015 PM peak hour traffic volumes. Results are displayed below. Given the posted speed limit of 45 MPH, with a roadway segment length of approximately 2,250 FT, a baseline travel time was determined to be 34 seconds. A lane reduction increases travel time 41% to 48 seconds for westbound travel and increases travel time 32% to 45 seconds for eastbound travel along this segment.

<table>
<thead>
<tr>
<th></th>
<th>Delay Increase Per Vehicle (Seconds)</th>
<th>PM Peak Hour Volume Changes (Vehicles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound</td>
<td>14</td>
<td>-73</td>
</tr>
<tr>
<td>Eastbound</td>
<td>11</td>
<td>-27</td>
</tr>
</tbody>
</table>

The carrying capacity of the VTRoute 15 roadway segment between the two intersections was first considered. The 2010 Highway Capacity Manual provides a baseline capacity for a multilane highway segment with a speed limit of 45 MPH of 1,900 pc/h/ln (passenger cars per hour per lane). With two lanes in each direction along this segment, 3,800 vehicles per hour is assumed to be the directional capacity. The table below displays volume-to-capacity (V/C) ratios calculated for the baseline and reduced lane conditions, using 2017 directional PM peak hour volumes.
obtained from VTrans. As shown, volume-to-capacity ratios will increase with the lane reduction, however the resulting operating ratios remain well below capacity.

Table 9 Roadway Segment Operations Analysis

<table>
<thead>
<tr>
<th>Direction</th>
<th>Existing</th>
<th></th>
<th></th>
<th></th>
<th>Lane Reduction</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Capacity</td>
<td>V/C Ratio</td>
<td>Volume</td>
<td>Capacity</td>
<td>V/C Ratio</td>
<td>Volume</td>
<td>Capacity</td>
</tr>
<tr>
<td>Westbound</td>
<td>555</td>
<td>3800</td>
<td>0.15</td>
<td>482</td>
<td>1900</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastbound</td>
<td>749</td>
<td>3800</td>
<td>0.20</td>
<td>722</td>
<td>1900</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intersection operations analyses were conducted to determine if the road diet treatment could be carried through both intersections. Conditions with and without the lane reduction were compared. For the “with lane reduction” conditions, the estimated changes in volume reported in Table 8 were assumed. From a geometric perspective, the “with lane reduction” conditions eliminated a VT Route 15 westbound through travel lane at both intersections. (The eastbound VT Route 15 approaches would be unaffected by the lane reduction as they each provide only a single through lane under existing conditions.) Results, displayed below, indicate no change to the overall LOS B for the West Street Extension intersection, with intersection delay remaining the same, and the Volume-to-Capacity ratio essentially remaining the same. Results of analyzing having only one through lane on the VT Route 15 westbound approach at Susie Wilson Road indicate the need to maintain two lanes for at least 300 feet, tapered to one westbound lane upstream. This is based on the queue calculations and signal green phase duration for this approach. That analysis is documented in the memo in Appendix D. Results below show that Alternative 2 has no significant impact to traffic operations compared with Alternative 1, the No Action alternative.

Table 10 Intersection Capacity Analysis Results

<table>
<thead>
<tr>
<th></th>
<th>Future DHV (2030)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Alternative 1 (No Action)</td>
<td>Alternative 2</td>
</tr>
<tr>
<td></td>
<td>Peak Hour</td>
<td>LOS1</td>
<td>Delay2</td>
</tr>
<tr>
<td>Signalized Intersection</td>
<td>AM</td>
<td>C</td>
<td>27.2</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>D</td>
<td>48.2</td>
</tr>
<tr>
<td>VT Route 15 / West Street Ext</td>
<td>AM</td>
<td>B</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>B</td>
<td>17.4</td>
</tr>
</tbody>
</table>

1 V/C = Volume-to-capacity ratio for critical movements  
2 Delay = Average delay expressed in seconds per vehicle  
3 LOS= Level of Service
6.3 ALTERNATIVE 3: THREE LANES NO MEDIAN

This alternative removes the existing median and converts the existing 2 travel lanes in each direction into a single travel lane, with a left turn lane for eastbound traffic, and a buffered bike lane in each direction. A typical section of this alternative is shown below, and an alternative plan is on the following page.

Figure 29 Alternative 3 Typical Section
As shown on the plan this alternative includes the following features:

- Eastbound and westbound buffered bike lanes on VTRoute 15, single travel through lanes, and a left turn lane for eastbound traffic, to access north side driveways.

- Connection to the planned shared use path at the west of the Susie Wilson Road via a crosswalk.

- A bicycle signal and bicycle crosswalk on the VTRoute 15 east approach to access eastbound buffered bike lane. This does provide for the potential of a future eastbound bus stop.

- Two (2) VTRoute 15 eastbound receiving lanes at the Susie Wilson road intersection. This requires reducing the existing median from 16 feet wide to 4 feet for approximately 300 feet. The median removal could be deferred until the Susie Wilson Road improvements required them. Vertical bike lane separation vertical elements, such as flexible posts or armadillos, should be considered in the vehicle merge area.

- Westbound buffered bike lane transitions to shared use path approximately 400 feet prior to Susie Wilson Road.

- Median is removed, allowing left turns into and out of north side driveways.

- Provisions for westbound bus stops are included via pavement markings and signs.

- VTRoute 15 eastbound buffered bike lane connects to buffered bike lane on the east side of West Street Extension intersection.

- VTRoute 15 westbound buffered bike lane extends approximately 200 feet east of the West Street extension intersection and connects to the existing buffered bike lane. This reduces the VTRoute 15 westbound approach lanes here from two to one lane.

- VTRoute 15 eastbound right turn lane crosses eastbound buffered bike lane on west approach to the West Street extension intersection.

- VTRoute 15 continues to provide for temporary 4-lane operation during the CVE, by using traffic cones, but will restrict bicycle traffic in the buffered bike lanes.

- The estimated construction cost is $1,800,000.

This alternative results in over one acre of new and expanded impervious surface which surpasses the threshold and will require an operational stormwater permit. Because some of the existing impervious will be replaced by the new grass buffer areas, however, the total new and expanded impervious can be offset. The net total requiring treatment is roughly 1/3 of an acre.
This can be treated within the proposed green buffers, in a relatively low-maintenance manner, with bioretention, box filters or a combination of the two.

These improvements impact curbs and drainage, require some road reconstruction and a stormwater operational permit and have a greater construction cost. Many of the improvements could be eligible for a VTrans Class One town highway resurfacing project and therefore reducing the project and/or local cost.

**Operational Impacts**

The same traffic operations analyses performed for Alternative 2 were also applied to Alternative 3. Results below also show that Alternative 3 has no significant negative impact to traffic operations compared with Alternative 1, the No Action alternative.

Table 11 Intersection Capacity Analysis Results

<table>
<thead>
<tr>
<th>Signalized Intersection</th>
<th>Future DHV (2030)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Alternative 1 (No Action)</td>
<td>Alternative 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peak Hour</td>
<td>LOS1</td>
<td>Delay2</td>
<td>V/C3</td>
<td>LOS1</td>
<td>Delay2</td>
</tr>
<tr>
<td>VT Route 15 / Susie Wilson Rd</td>
<td>AM</td>
<td>C</td>
<td>27.2</td>
<td>0.94</td>
<td>C</td>
<td>27.2</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>D</td>
<td>48.2</td>
<td>0.99</td>
<td>D</td>
<td>48.2</td>
</tr>
<tr>
<td>VT Route 15 / West Street Ext</td>
<td>AM</td>
<td>B</td>
<td>10.1</td>
<td>0.52</td>
<td>B</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>B</td>
<td>17.4</td>
<td>0.85</td>
<td>B</td>
<td>18.2</td>
</tr>
</tbody>
</table>

1. V/C = Volume-to-capacity ratio for critical movements
2. Delay = Average delay expressed in seconds per vehicle
3. LOS = Level of Service

**6.4 OPTION A: ETHAN ALLEN TO SUSIE WILSON BIKE LANE**

During PAC discussions, it was pointed out that bicyclists traveling eastbound on the future shared use path, who intend to continue eastbound on VT Route 15, would have to cross Susie Wilson Road and then VT Route 15, likely requiring two signal phases. To address this and provide an additional and more direct connection for eastbound bicyclists, an option, that could be added to either of the previously described alternatives, was developed. Option A provides a 5-foot bike lane and 2-foot buffer for eastbound bicyclists between Ethan Allen Avenue and Susie Wilson Road along VT Route 15. This is accomplished by removing the existing median, which varies from 4 to 16 feet wide, from Ethan Allen Avenue to Susie Wilson Road, and reducing the eastbound travel lanes from 12 feet to 11 feet. The existing westbound lanes would remain 12 feet wide and the planned 10-foot shared use path on the northside would remain.
This option includes a connection from the planned shared use path on the north side of VT Route 15 to a short on-road bike lane segment on Ethan Allen Avenue. Eastbound bicyclists enter the southbound Ethan Allen Avenue bike lane, use the existing traffic signal phase to turn left across VT Route 15 and enter the eastbound bike lane. This bike lane connects to the proposed eastbound bike lane east of the Susie Wilson Road intersection, where users are controlled by the signal. This option is compatible with Alternatives 2 and 3 and retains the crossings at the Susie Wilson Road Intersection as proposed in these alternatives. This option has no right-of-way or utility impacts and requires no permits. As this portion of VT Route 15 is a state highway, owned and maintained by VTrans, it requires their concurrence and can be part of a future state highway resurfacing project. A plan of this alternative follows.

A westbound bike lane was discussed but is not recommended. Westbound bicyclists, whether on the shared use path or on a bike lane, still need to cross with a signal phase at Susie Wilson Road. It was concluded it would be safer to encourage westbound bicyclists onto the shared use path east of Susie Wilson Road.

6.5 COMPARISON OF ALTERNATIVES

6.5.1 Alternative Impacts

Traffic Operations

The most significant variance in traffic operations between Alternatives 2 and 3 is the effects on the existing westbound VT Route 15 U-turn operation at Susie Wilson Road. This U-turn operation is problematic in that it does not have a dedicated signal phase but operates concurrently with the Susie Wilson Road left turn signal phase. This requires motorists using the U-turn to make use of gaps in Susie Wilson Road left turning traffic during their green phase. Alternative 2 does not address this condition and the current operation remains, pending the Susie Wilson Road improvements currently being developed by VTrans.

Alternative 3 removes the VT Route 15 median between Susie Wilson Road and West Street Extension which allows left turns to and from the VT Route 15 driveways and removes the U-turn operation. Alternative 3 also removes the channelized right turn on the westbound VT Route 15 approach to the intersection with Susie Wilson Road, which has little impact on the intersection performance.

Alternatives 2 and 3 maintain the existing lane configuration at the Susie Wilson Road intersection, including the 2 westbound and eastbound approach lanes on VT Route 15. Although a VT Route 15 bike crossing phase is added to the signal phasing, this phase is concurrent with the VT Route 15 left turn phase and does affect the intersection's capacity.

VT Route 15 eastbound currently has two lanes east of the Susie Wilson Road intersection. The right lane becomes an exclusive right turn only lane approaching the West Street Extension intersection. Alternatives 2 and 3 address this by providing a VT Route 15 eastbound merge after
the Susie Wilson Road Intersection and then right turns diverge into an eastbound right turn lane on the approach to West Street Extension. This right turn lane is approximately 150 feet long. The future year traffic analysis indicates the eastbound through traffic lane at the West Street Extension intersection, will have 95% queues greater than 400 feet. In peak periods there will be queues and delay greater than the analysis since right turning vehicles will not be able to access the right turn lane due to the queued through vehicles. This condition on this eastbound approach is unchanged by the alternatives and suggests further traffic improvements may be needed at this intersection in the future regardless of implementing the alternatives or not.

The westbound approach on the VT Route 15/West Street Extension intersection is reduced from two lanes to one lane in both alternatives. This has little impact on the intersection performance and reduces the number of lanes pedestrians must cross.

The table below indicates no significant difference in traffic operations among Alternative 1 (No Action), Alternative 2, and Alternative 3. Alternative 2 and Alternative 3 are both acceptable in terms of traffic operations.

Table 12 Comparison of Intersection Capacity Analysis Results Among Alternatives

<table>
<thead>
<tr>
<th></th>
<th>Future DHV (2030)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alternative 1 (No Action)</td>
</tr>
<tr>
<td>Signalized Intersection</td>
<td>LOS¹</td>
</tr>
<tr>
<td>VT Route 15 / Ethan Allen Ave</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>C</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
</tr>
<tr>
<td>VT Route 15 / Susie Wilson Rd</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>C</td>
</tr>
<tr>
<td>PM</td>
<td>D</td>
</tr>
<tr>
<td>VT Route 15 / West Street Ext</td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>B</td>
</tr>
<tr>
<td>PM</td>
<td>B</td>
</tr>
</tbody>
</table>

¹ V/C = Volume-to-capacity ratio for movements
² Delay = Average delay expressed in seconds per vehicle
³ LOS = Level of Service

Safety Impacts

Safety for pedestrians and bicyclists is improved in Alternatives 2 and 3. Bicyclists have the choice of a buffered bike lane or an 8-foot path along VT Route 15. Alternative 3 removes the westbound right turn slip ramp and corresponding non-signalized crosswalk at Susie Wilson Road. Since U-turns need to be provided, Alternative 2 retains the westbound right turn slip ramp crosswalk at the Susie Wilson Road intersection. This is a yield control condition and the slip ramp radius encourages higher turning speeds. The slip ramp crossing in Alternative 2 is improved by realigning the crossing and providing a yield condition.
Right-of-Way (ROW) Impacts

Based on the 1964 record plans, the Right-of-Way width varies but generally is 90 feet wide, is 8 feet north of the northside sidewalk, and is 10 feet south of the southside curb. Alternatives 2, 3 and Option A do not require permanent acquisitions but may require easements for construction.

Environmental Resource Impacts

Based on the desktop research and site visit there are no known impacts to natural resources, such as wetlands, streams, wildlife, or rare and endangered species, for any alternatives.

Cultural Resource Impacts

A preliminary cultural resources assessment was done as part of the 2013 VT Route 15 Bicycle and Pedestrian Study. The assessment area was limited to west of Susie Wilson Road, and therefore does not include the project area east of Susie Wilson Road. Due to this being a scoping report update, a cultural resource assessment was not conducted. Given the disturbance of the 1964 construction and the limited nature of the alternative’s construction, impacts to cultural resources are not anticipated. This will need to be confirmed if a National Environmental Policy Act (NEPA) process is required.

Utility Impacts

Existing utilities in the project area include aerial electric distribution and communication lines, underground sewer, water, gas, electric and communications. The limited construction of the alternatives does not impact utilities and does not require their wholesale relocation. Alternative 3, which relocates the northside curb, does require new curbside drainage inlets and may require isolated waterline and hydrant relocations.

Stormwater Impacts

Alternatives 1 and 2 add less than the 1 acre threshold of new impervious and therefore stormwater treatment and a stormwater permit is not required. Alternative 3 does exceed the threshold and stormwater treatment and a stormwater permit is required.

3.4.4 Project Costs

The following table is a summary of the project costs for alternatives. The costs include a full overlay of the roadway and much of the cost could be eligible for a VTrans Class 1 Town Highway paving project. A Right-of-way cost has been included when construction easements are anticipated.
Table 13 Summary of Project Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Alternative 1: No Action</th>
<th>Alternative 2 (2 lanes with Median)</th>
<th>Alternative 3 (3 Lanes No Median)</th>
<th>Option A (EAA to SWR Bike Lane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Costs</td>
<td>$0</td>
<td>$800,000</td>
<td>$1,800,000</td>
<td>$240,000</td>
</tr>
<tr>
<td>Right-of-Way Costs</td>
<td>$0</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$0</td>
</tr>
<tr>
<td>Design Engineering</td>
<td>$0</td>
<td>$120,000</td>
<td>$270,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>$0</td>
<td>$80,000</td>
<td>$180,000</td>
<td>$30,000</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COSTS</strong></td>
<td><strong>$0</strong></td>
<td><strong>$1,010,000</strong></td>
<td><strong>$2,260,000</strong></td>
<td><strong>$310,000</strong></td>
</tr>
</tbody>
</table>

6.5.2 Evaluation Matrix

The following table provides an evaluation matrix summarizing the above information pertaining to traffic operations, safety, right-of-way, environmental, cultural resources, utilities, and project costs. The major difference is traffic operations and project costs. Alternative 3 eliminates the problematic U-Turn at Susie Wilson Road and reduces the U-Turn’s user costs by providing a more direct route. Alternative 3 does remove the median and its vegetation but replaces it by providing a greater buffer and separation between the northside development and the travel lanes. This buffer allows for vegetation and an enhanced separation. Alternative 3 does come at an additional cost but not substantially greater impacts.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Alternative 1: No Action</th>
<th>Alternative 2: Two Lanes with Median</th>
<th>Alternative 3: Three Lanes No Median</th>
<th>Option A: EEA to SWR Bike Lane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Costs</strong></td>
<td>$0</td>
<td>$1,010,000</td>
<td>$2,260,000</td>
<td>$310,000</td>
</tr>
<tr>
<td><strong>PURPOSE AND NEED</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete a missing bicycle link</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support goals for active mobility</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Facilitate use by all ages and experience</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>IMPACTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Operations</td>
<td>Does not address U-turn at SWR</td>
<td>Does not address U-turn at SWR</td>
<td>Addresses U-turn at SWR</td>
<td>None</td>
</tr>
<tr>
<td>Safety</td>
<td>No Improvement</td>
<td>Improved</td>
<td>Improved</td>
<td>Improved</td>
</tr>
<tr>
<td>Right-of-way</td>
<td>None</td>
<td>Minor</td>
<td>Minor</td>
<td>None</td>
</tr>
<tr>
<td>Environmental</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
### CRITERIA

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Alternative 1: No Action</th>
<th>Alternative 2: Two Lanes with Median</th>
<th>Alternative 3: Three Lanes No Median</th>
<th>Option A: EEA to SWR Bike Lane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities/ Drainage</td>
<td>None</td>
<td>None</td>
<td>Minor Light Pole Relocation and Drainage Modifications</td>
<td>None</td>
</tr>
<tr>
<td>Stormwater</td>
<td>No Change</td>
<td>Minor Change/ No Permit</td>
<td>Change w/ Treatment Opportunity</td>
<td>Minor Change/ No Permit</td>
</tr>
</tbody>
</table>

Table 14 Evaluation Matrix

#### 7.0 STAKEHOLDER INPUT AND RECOMMENDATIONS

An alternatives presentation meeting was noticed and then conducted on June 27, 2018 at the Essex Town Offices. Some attendees expressed a concern on the traffic impacts of a reduction from four to three lanes. It was pointed out that VT Route 15 westbound traffic often queues back from the Susie Wilson Road intersection eastward to West Street Extension. Discussions concluded that queuing is due to VT Route 15 traffic turning traffic onto Susie Wilson block the westbound traffic and create the queue. The proposed alternatives do not address the Susie Wilson Road intersection operational issues as this is part of the VTrans Scoping project and the proposed alternatives do not impact the capacity of the intersection.

All attendees who voiced a preference supported Alternative 3 as it is likely to meet the needs of more users compared to Alternative 2 and it addresses the Susie Wilson Road intersection U-turn operation.

#### 8.0 MUNICIPAL PREFERRED ALTERNATIVE

With input received at the public meetings considered, Village and Town Engineering and Planning Staffs worked cooperatively to produce a series of recommendations relative to the project. The Staff recommendations are:

1. The Preferred Alternative is Alternative 3, with Option A: Three Lanes, no median, on-road bike lanes and a multi-use path on the north side to replace the current sidewalk and

2. The VTrans Susie Wilson Road Corridor Project should be split into three separate projects as per the following:
   a. VTrans would continue to design the Susie Wilson Road/VT15 intersection but track that project both for timing and funding with the Route 15 Bicycle/Pedestrian Improvements project, using Alternative 3
   b. The bike lane portion of the Susie Wilson Road Corridor work should be turned over to the Town to run as a VTRANS local project and
VT ROUTE 15 BICYCLE/PEDESTRIAN IMPROVEMENTS STUDY, SUSIE WILSON ROAD TO WEST STREET EXTENSION

c. VTrans would continue to design the Kellogg Road/ Susie Wilson Road intersection and

3. Funding for the Route 15 Bicycle/Pedestrian Improvements project would utilize the unused Class 1 paving funds to help defray the project costs (promised Class 1 paving was delayed until this scoping study was completed) and

4. Consideration be given by VTrans to include Option A: Ethan Allen to Susie Wilson Road Bike Lane in the project to be constructed as presented in the scoping study.

A memo outlining the Village and Town recommendations can be found in Appendix A. These recommendations will be provided to the Village Trustees and Town Selectboard for discussion and to seek their endorsement.