Chittenden County Regional Planning Commission
Town of Richmond

Vermont Route 2 Bicycle and Pedestrian Scoping Report

Final Report

Submitted by:
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In conjunction with
Broadreach Planning & Design
Heritage Landscapes LLC

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I. INTRODUCTION

A. OVERVIEW

The Town of Richmond has long contemplated a better bicycle and pedestrian link between Richmond Village and the Richmond Park & Ride on Route 2 close to Interstate 89 Exit 11, a distance of approximately 1.5 miles. The Chittenden County Regional Planning Commission (CCRPC) has been able to assist with funding to study the feasibility of creating such a connection. The CCRPC staff is providing project management on behalf of the Town of Richmond.

With the assistance of the Town of Richmond (the Town), the CCRPC organized a Steering Committee of local officials and citizens to provide direction for the study. The CCRPC selected a consultant from their list of on-call consultants to help them with the feasibility study; the team is led by Stantec Consulting Service and supported by Broadreach Planning & Design and Heritage Landscapes LLC (the Stantec Team).

The Study Area for this project extends westerly from the center of Richmond Village and Bridge Street to the Route 2 Checkered House Bridge over the Winooski River, and from the southern edge of the Interstate 89 right-of-way on the north to the Winooski River on the south. Figure 1 shows the location of the project and the general extent of the Study Area.

This summary report is the product of the work of the Steering Committee and the Stantec Team. After this introduction, it describes the recommendations of the study. This is followed by background information and implementation suggestions. The report is formatted for double-sided printing; blank pages are intentional.

B. PURPOSE AND NEED

The purpose of the Route 2 bicyclist and walker project is to create improved walking and bicycling conditions between Richmond Village and the Richmond Park & Ride, especially for commuters, and to consider better bicycling and walking access and connections to the other destinations within or adjacent to the Study Area, including the Richmond Elementary School and Camels Hump Middle School.

Needs for the improvements include:

- The paved shoulders of six inches or less and poor pavement conditions on Route 2 in the Study Area;
- Average annual daily traffic (AADT) volumes of 8,500 vehicles on Route 2 traveling 40 to 50 miles per hour (mph) when obeying the speed limits;
The resulting poor conditions for existing bicycle commuters who make the trip between the Village and the Park & Ride to reach the transit service there; and

The lack of comfortable, convenient walking facilities along Route 2 outside of the Village towards the Park & Ride.

C. PROJECT DEVELOPMENT PROCESS

After an initial meeting with the Steering Committee, the Stantec Team began work on Task B of their scope of work: to analyze the existing conditions in the Study Area. At the end of the work on this Task, the Stantec Team produced an *Existing Conditions* summary describing in detail the existing conditions in the Study Area. **Appendix A** is a copy of the final *Existing Conditions*; the main body of this final report incorporates portions of the summary.

After the completion of the work on Task B, the Stantec Team, with assistance from the Steering Committee during a team work session, developed a set of alternatives for upgrading bicycle and pedestrian circulation along Route 2 within the Study Area. They considered as many different options of making the improvements as possible during their work session. As part of the subsequent analysis after the work session, the Stantec Team reviewed the potential impacts, benefits and likelihood of gaining approvals for the various alternatives. They summarized the numerous alternatives that they considered and analyzed in the *Alternatives*. **Appendix B** is a copy of the final *Alternatives*; the main body of this final report incorporates portions of the *Alternatives*.

Part of that analysis included meeting with representatives of the New England Central Railroad (NECR) because several of the alternatives involved the use of the railroad right-of-way. The NECR representatives indicated that tunneling under the railroad could potentially work but that they did not think that using a portion of their right-of-way for a shared use path would be possible but they would check with others in NECR administration.

The analysis also included meetings with the three adjacent landowners over whose properties the shared use path would run after it left the railroad right-of-way. They have each indicated that they are open to discussing the future granting of an easement for the proposed shared use path on their land and thought that it might be possible to have a shared use path co-exist next to their farming operations. They did not, however, give an unconditional approval of the alignment. Each wants to see more detailed information on the alignment and the impacts on their property before agreeing to grant an easement.

After further reviewing and refining the alternatives with the Steering Committee, the Stantec Team assisted with an “Alternatives” public work session hosted by the Town to review the alternatives and begin the selection of a preferred alternative. The consensus of the meeting was an alternative that included both tunneling under the railroad and placing a shared use path within the railroad right-of-way where the right-of-way was directly adjacent to Route 2. Knowing that the NECR might ultimately deny the use of their right-of-way,
the Stantec Team also worked with the meeting attendees to identify a second choice that did not include the use of the railroad right-of-way.

The Stantec Team and the Steering Committee supported the preferred alternative that emerged from the alternatives public work session. The Stantec Team completed work on a final report summarizing the existing conditions, the alternatives and the recommended improvements to the corridor. The final report included full copies of the Existing Conditions and Alternatives summaries as part of the appendix. The Stantec Team assisted CCRPC and the Town staff members in discussing the recommendations with appropriate Vermont Agency of Transportation (VTrans) and NECR representatives to include their thoughts and suggestions in the final report.

During these discussions, the NECR decided that it would not allow the addition of a shared use path in its right-of-way, at least not right now, eliminating the preferred alignment from any consideration of being constructed in the near future. Before settling for the second choice that emerged from the public work session, five-foot bicycle lanes on either side of Route 2, the Steering Committee wanted to re-examine the original alternatives as well as see if there were any other alternatives that would be better than the second choice. The Steering Committee did not think that the bicycle lanes on Route 2 fully addressed the purpose and need of the project of providing better bicycling and walking conditions for users of all ages and abilities. The Revised Alternatives summary describes the second look. The revised alternatives included updates on the shared use path alternative on the east/north side of Route 2 and refinements to other alternatives that went through the town cemeteries in the Study Area.

The Stantec Team conducted a second Alternatives work session at which there was little support for any of the alternatives and much opposition to any use of the cemetery land for a shared use path. The Richmond Cemetery Commission also submitted a letter opposing the use of Riverview Cemetery. After the second Alternatives public work session, the Steering Committee and Stantec Team updated the final report to reflect the additional analysis and conclusions. This final report includes excerpts from Revised Alternatives and Appendix C includes a full copy along with a copy of the letter from the Cemetery Commission.

The Steering Committee completed the Updated Final Report and held one more work session to provide the community with one last chance to review the recommendations before they finalized them.

D. PROJECTED USERS

The Town would like to improve bicycling and walking conditions for people of all ages and abilities. This means that as much as possible, the improvements should be usable by school children, elderly citizens and those with disabilities, as well as experienced bicyclists and walkers. They should also enhance conditions for skilled bicyclists. The Existing Conditions summary in Appendix A includes more information on the projected users of the path.
E. COMPLETE STREETS

The CCRPC, in collaboration with its member municipalities, state and local partners, has historically taken a multimodal approach to transportation planning. The Vermont Legislature sought to further encourage these best practices with the passing of Complete Streets Legislation (Act 34) which became effective on July 1, 2011. Its purpose is to ensure that the needs of all transportation users, regardless of their age, ability or preferred mode of transportation, be considered in all transportation projects. By developing a range of alternatives that would improve conditions for walkers and bicyclists, this project is in compliance with the Complete Streets Legislation. Appendix E contains a copy of the Complete Streets reporting form for this project.

II. EXISTING CONDITIONS

A. INTRODUCTION

Figures 2a and 2b show the general location of existing conditions in the Study Area described in the rest of this section.

B. TRANSPORTATION FACILITIES

The Study Area is focused on US Route 2 (Route 2) between the Richmond Village and the intersection with VT Route 117. Route 2 in Richmond is functionally classified by the VTrans as a Major Collector on a State Highway. The posted speed is 30 mph through the Village, rises to 40 mph and then 50 mph along the rural portion of the corridor and drops back to 40 mph at the western end of the Study Area close to the Interstate interchanges and Richmond Park & Ride.

Throughout the corridor, Route 2 generally consists of two 12-foot travel lanes with varying shoulder widths from zero to six feet. In the Village, the roadway is curbed and has five-foot-wide sidewalks on both sides of the road. A five-foot-wide grass strip separates the sidewalk and the roadway on the southwest side of the road in this area. On the northeast side there is about 150 feet of on-street parking just prior to the intersection with Jericho Road and Bridge Street. Illustration 1 shows a typical portion of Route 2 outside of the Village. Illustration 2 shows a typical view within the Village area.

The roadway surface is in poor condition throughout the project area. VTrans intends to reclaim the roadway in 2017 with the Richmond-Bolton STP 2924(1) project. Current plans for the reclaiming include widening the shoulders to at least three feet wide and up to four feet wide where possible.
The right-of-way (ROW) limits on Route 2 are typically 33 feet from the centerline for a 66-foot-wide ROW.

Illustration 1: Route 2 Looking East Midway between the Park & Ride & the Village.

Illustration 2: Route 2 Looking East from the Baker Street Intersection
The Route 2/Jericho Road/Bridge Street intersection is signalized, including pedestrian signals. There is considerable pedestrian activity at the intersection, especially in the morning and afternoon as school children are walking to the schools north of the intersection on Jericho Road. Numerous individuals commented at the public work sessions about the dangers to pedestrians trying to cross Route 2 due to turning vehicles from the cross streets and urged that the intersection be re-examined to make it easier for pedestrians to cross the street.

The Park & Ride was heavily used and over capacity as evidenced by vehicles parking in undesignated parking spaces or on lawn areas adjacent to Route 2. In 2014, VTrans completed an expansion of the Park & Ride, which included the installation of a new traffic signal at the intersection of Route 2 and the southbound off ramp/Park & Ride drive.

The New England Central Railroad rail line runs through the Study Area to the south of Route 2. For a short section just west of the Village, Route 2 and the railroad lie close to each other. **Illustration 3** shows a portion of the railroad where it lies close to Route 2. In this area, the railroad right-of-way takes precedence over the Route 2 right-of-way; the railroad right-of-way extends over and sometimes beyond Route 2 to the north.

**Illustration 3: Looking West Where the Railroad Is Close to Route 2**

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C. UTILITIES

Utility poles owned by Green Mountain Power run along the southwest side of the roadway in the Village, switch several times between the southwest and northeast sides of Route 2 to Riverview Cemetery, and line the northeast side of the roadway for most the rest of the project area, switching back to the south side of Route 2 just east of the southbound Interstate on ramp. Fairpoint Communications owns an underground fiber optic cable that runs along the south side of the road. Several other utility companies’ lines run in a duct bank along the north side of the road. Vermont Gas recently installed a natural gas line along the northern side of the roadway for the length of the project. The gas line runs on both sides of the street through the Village.

Water and sewer begin at 222 W. Main Street and head east to the intersection with Bridge Street and Jericho Road. The water line runs on both sides of Route 2 east from Baker Street.

D. NATURAL RESOURCES

The Winooski River floodplain covers a large portion of the Study Area, including the Richmond Park & Ride site. The topography in the Study Area is generally level but the Village center is approximately 25 feet higher than the lower floodplain areas along the Winooski River. Route 2 itself, as it leaves the Village area, descends towards the floodplain but remains several feet above the adjacent land, either by hugging the slow rise at the edge of the floodplain or by means of an elevated causeway made to keep the road above flood levels. Illustration 4 shows the portion of Route 2 as it leaves the Village area and descends closer to the level of the floodplain with the railroad adjacent to the road.

Illustration 4: Looking East Where the Railroad Is Close to the Route 2
Mapped wetlands in the Study Area are located along the edges of the Winooski River. There are also smaller isolated mapped Class 3 wetlands along the edges of the agricultural fields southwest of and close to Route 2.

III. RECOMMENDATIONS

A. OVERVIEW

The following description of the preferred alternative begins in Richmond Village. For clarity in discussing the preferred alignment, this report will treat Route 2 as if it runs in an east/west direction. The preferred alternative is a shared use path, which is an ADA accessible path at least eight feet wide but more typically ten feet wide with two-foot gravel shoulders on either side. Illustration 5 provides a typical cross section of a shared use path. Illustration 5 shows an asphalt surface because it is typically the most cost-effective surfacing in the long run and is the recommendation for this project. Figure 3 shows the general alignment of the preferred alternative. Appendix D contains a conceptual layout showing possible cut and fill requirements for the path, along with the potential locations of boardwalks and cross sections of critical areas.

Illustration 5: Typical Shared Use Path Cross Section

B. PREFERRED ALTERNATIVE - LONG TERM RECOMMENDATION

1. PRIMARY ROUTE

Starting in the Village, the preferred alternative would consist of shared use of the existing road by bicyclists and use of the existing sidewalks by walkers. To create better bicycling conditions on Route 2 in the Village area where there is no paved shoulder and the travel lanes are 11 feet wide and adjacent to the on-street parking on the northeast side, the Town can work with VTrans to install sharrows and SHARE THE ROAD or other appropriate
signs. The sharrows and the signs would notify both motorists and bicyclists that they can be expected to be riding in the travel lane within the village area. Illustration 6 shows as typical sharrow application. The sharrows would be between the Bridge Street and Baker Street intersections.

**Illustration 6: Typical Sharrow**

![Typical Sharrow Illustration](image)

West of Baker Street, the sidewalk on the south side of Route 2 would be widened as possible up to ten feet wide to accommodate both bicyclists and walkers. A new crosswalk on Route 2 on the west side of the intersection with Baker Street would allow walkers on the north side of the street and bicyclists heading west out of the Village to cross to the south side and get on the widened sidewalk on the south side of the road. VTrans staff has indicated that the addition of a second crosswalk on Route 2 in this location could be possible. Signage would notify both walkers and bicyclists of the continuation of the route west on the south side of the road; a crosswalk would provide a crossing location for pedestrians heading west to traverse to the south side of the road. Signs would also encourage bicyclists heading west to dismount their bicycles if they intend to use the crosswalk to cross Route 2. A new shared use path would begin at the end of the existing sidewalk and descend down the hill on the south side of Route 2.

At the bottom of the hill, the shared use path would lie below the elevation of the road, cut into the side slope of Route 2 above the wetland. The cut would be limited by a small retaining wall where needed to minimize impacts on the roadway, shoulders and utilities. As the grade rises again as the railroad comes close to the road, the shared use path would also come closer to the edge of the road to maximize the distance between the railroad and the
Illustration 7 shows a cross section through this area. The path would lie within the railroad ROW in this area.

Illustration 7: Shared Use Path Adjacent to the Road

As the path moves out of the railroad ROW, it would stay at the lower edge of the Route 2 fill slope running along the edge of the farm fields. As the path continues west, it would convert to a boardwalk several times to avoid filling wetland areas. The path would stay as close to the bottom of the slope as possible just above the outer edge of the Winooski River floodplain. This location would also avoid negative impacts to the adjacent farm fields. Throughout this area, the path would lie generally outside of the Route 2 right-of-way on the edge of the farm properties.

Illustration 8 shows a typical cross section of this path where it would lie at the bottom of the slope close to the road.

Illustration 8: Shared Use Path at the Bottom of the Slope

As the grade rises over an area that is higher than the floodplain near the two buildings on the south side of Route 2, the path would also rise at a five percent slope across the steep side slope of Route 2. At the top of the slope, the path would continue either on the adjacent property or at the outer edges of the right-of-way across the higher ground. It might be necessary to remove several small elm trees growing outside of the right-of-way and trim up the limbs of two spruce trees at the driveway entrance to the business located at
1151 West Main Street. At the western edge of the 1151 parcel, the grade drops back down to the floodplain. A wetland lies at the base of the slope, so the path would again convert to a boardwalk which would initially slope down towards the toe of the slope and then be level when it reaches the lower grade. At the end of the wetland, the path would return to the typical shared use path cross section (See Illustrations 1 & 4), staying just above the floodplain.

At the intersection with the southbound Interstate 89 off-ramp, the path would connect with a new crosswalk that would take path users across Route 2 to gain access to the Park & Ride via the signal at the intersection. The path would continue west along the toe of the slope of the off-ramp, heading towards the interstate railroad overpass. The path would cross under the interstate overpass and then turn north and west to move upgrade to the intersection of Route 2 and VT Route 117. A new crosswalk at the intersection would allow path users to head west on the proper side of either VT 117 or Route 2.

2. VOLUNTEER GREEN LINK

The shared use path of the initial preferred alternative would link Route 2 to Volunteers Green. Starting at Volunteers Green the path would head north towards Esplanade and Church Street via the existing Town right-of-way. The path would wrap around the eastern edges of the farm field and forests west of Railroad Street until it intersects the railroad. The path would tunnel under the railroad and link with the primary path along the south side of Route 2. Since the potential to create the tunnel is not clear, the Steering Committee decided to make this an additional feature of the preferred alternative but not part of the primary route. The NECR has not provided a response to the Stantec Team's request for an indication of the viability of the tunnel but at the initial discussions with NECR representatives, they said that it could potentially be possible.

3. SCHOOL LINK

The Richmond Land Trust is negotiating to purchase a portion of the Willis Farm west of the Village on the north side of Route 2. A second link to the primary path could be created on this land if it is purchased by the Richmond Land Trust as planned for use as open space and park land. The path would allow easier non-motorized access to the schools for students that live north and west along Route 2. The alignment of the path would need to be coordinated with Richmond Land Trust's plans for the property.

4. ADDITIONAL PROVISIONS

Either as part of the development of this project or as a separate action, the Town should work with VTrans to review the signal timing and crosswalk markings at the Route 2/Jericho Road/Bridge Street intersection. The efforts should focus on creating more protected crossing conditions for pedestrian than what the current signal provides. The main concern for pedestrians is a lack of protection from right or left turning vehicles during the concurrent pedestrian phase of the traffic signal. A leading pedestrian interval could be explored to address this issue.
The Town should also request VTrans to study the potential reduction of the 50 miles per hour (mph) section on Route 2 in the Study Area to 40 mph. The reduction of the speed limit would create a safer situation for bicyclists and pedestrians using the shoulders of the roadway.

If a portion of the Willis Farm property is purchased by the Richmond Land Trust, the Town should also explore the potential for the addition of a crosswalk or some other warnings at the new access drive to be created on the land. This crossing point could serve as an access to the recommended linking path between Route 2 to the schools. The crossing could also serve as part of a new gateway into the Richmond Village, which could extending the 30 mph village speed limit to this location, as well as welcome signage, landscaping and other visual clues on the Land Trust property that signal motorists they are entering a village area.

The recommended alignment includes one crossing of a commercial driveway at 1151 West Main Street when traveling east from the Park & Ride. The driveway is approximately 160 feet east of the end of the boardwalk/ramp. The path would include warning signs for this driveway for path users traveling in both directions. Signs would also be added to the roadway warning motorist turning into the commercial drive about the presence of the path and bicyclists on it.

Similar warning signs would be added to the path at the four agricultural access points. Large farm vehicles use these access points at various times. The large vehicle size combined with the small size of the access points requires the vehicles to move into the oncoming traffic lane in order to turn into or out of the drive. The farm vehicle drivers need to move quickly to take advantage of gaps in the Route 2 traffic. Since this situation could result in them not always watching for bicyclists and pedestrians on the path, the warning signs would be different from a typical stop sign. Additionally, the construction of the project should include a widening of the access points to make turns easier for the farm vehicles. This would allow them to make slower turns onto or from Route 2 and consequently be able to pay more attention to path users as they enter or exit the site. Because the general public does not use the farm access points, there would be no signs on Route 2 warning about the path near these access points.

C. PREFERRED ALTERNATIVE - SHORT-TERM RECOMMENDATION

Because it may take many years for the NECR to agree to the use of its right-of-way for a shared use path, the Town should work with VTrans to maximize as much as possible the width of the paved shoulders to be added to Route 2 as part of the upcoming repaving project (the No Action Alternative). With encouragement from the Town, VTrans might be able to create continuous four-foot-wide shoulders from the Park & Ride to the Village.
D. RECOMMENDATION BACKGROUND

In discussing the various suggested alternatives at the first Alternatives public work session, the participants noted that the three- or four-foot-wide paved shoulders to be added to Route 2 between the Village and the Park & Ride would primarily meet only the needs of experienced bicyclists. They pushed for an alternative that would address the bicycling and walking needs of casual and beginning bicyclists and walkers. They thought that the proposed shared use path at the bottom of the slope would separate the walkers and bicyclists from the motor vehicles on Route 2 both physically and visually. Such a shared use path would be more appealing to casual bicyclists and walkers, while still being direct enough to also invite use by experienced bicyclists. The meeting participants acknowledged that it may be some time before the facility could be constructed and again noted that the wide shoulders of the No Action Alternative would still be there for those that wanted to use them.

During the second Alternatives public work session, there was no consensus on what might be the best alternative to pursue. Participants had strong opinions that those alternatives that involved the use of either of the cemeteries were unacceptable. There was relatively strong support for reviving one of the original alternatives that used Jericho Road and the sidewalks heading north from the center of the Village to the schools. From there, a shared use path would move around the east side of the school campuses and then head northwest back to Route 2 across the planned future Richmond Land Trust property.

The Stantec Team looked more closely at this alternative but concluded that Jericho Road was currently not wide enough to provide comfortable bicycling conditions for many of the potential users and there was little potential to widen the road by at least ten feet to create adequate bicycle lanes on either side of the road. There was also no room to add a shared use path on either side of the road. They recommended and the Steering Committee agreed that the Jericho Road option was not a realistic option. They did think that bringing a path from Route 2 across the planned future Richmond Land Trust property to the schools would be a good idea and added it as another potential future link.

After considering the numerous alternatives and the valuable public input from the work session, the Steering Committee decided that the original preferred alignment was still the best, even if it might take many years for the Town to realize the completion of the path due to the NECR's reluctance to allow the use of its right-of-way for a shared use path.

IV. IMPACTS & ISSUES

A. OVERVIEW

The preferred alignment would have numerous issues associated with its implementation that the Town would need to address as part of its implementation. Table 1 in Section V provides an overview of the preferred alignment, including a list of identified issues and
benefits. Figure 4 shows the locations of various issues associated with the preferred alignment.

B. PURPOSE & NEED

The preferred alignment is considered to meet the purpose and need for this project. It is direct enough that it could readily meet the needs of commuters and experienced bicycle riders headed to or from the commuter Park & Ride lot. Because it is separated from the very edge of Route 2, often by a significant separation of grade, the path would also be accessible and even appealing to more casual bicyclists that want either to reach the Park & Ride lot or to take a more casual bicycle ride for recreation. The separation of the path from the road also makes it a viable, comfortable route for pedestrians.

The proposed path would also help create a bicycling loop to the west of Richmond Village when combined with the Cross Vermont Trail on the west side of the Route 2 Bridge. The wide paved shoulders that will be included in the reclaiming of Route 2 will also complement the proposed shared use path and provide a wider choice of facilities to potential walkers and bicyclists.

C. FLOODPLAIN & AGRICULTURAL LAND

The preferred alternative runs along the outer edge of the recorded floodplain, at the base of the side slope of Route 2. When possible, the shared use path would be cut into the shallower slopes at least halfway, minimizing the fill that needs to be added on the downhill side. The steepness of the existing Route 2 fill slopes at the edges of the floodplain minimizes the potential to cut into some of the slopes without jeopardizing the support for Route 2 at the top of the slope. If it is not possible to place the path at grade at the edge of the floodplain, it would be necessary to fill the outer edge of the floodplain. While a retaining wall could be used to minimize the spread of the fill, it would add to the overall cost of the project. The design work on the project would need to calculate the amount of fill that would go into the floodplain or agricultural soils, if any.

There are locations at either of the two upland areas along the recommended alignment that could be excavated to create compensating new floodplain areas to maintain a no net filling of the floodplain for the project. Figure 4 identifies these potential locations.

D. UTILITIES

The preferred alignment has minimal to no impacts to most of the existing utilities. It would not require the relocation of utility poles or changes to existing water or sewer lines. If the new facilities are directly over water lines in the Village, it may be necessary to add insulation over the lines to keep them from freezing in the winter. The construction of the shared use
path should not extend deep enough into the ground to impact the other underground utilities. Portions of the shared use path would lie close to or over the fiber optic line on the south side of Route 2; the construction process would need to be done carefully in these locations to not disturb it.

E. WETLANDS

There are several wetlands along the outer edges of the farm field, close to Route 2. These wetlands appear to be hydrologically connected to the Winooski River via small regular or intermittent streams so the Stantec Team has considered them to be Class 2 wetlands. The proposed alignment includes boardwalks to minimize the impacts to the wetland areas. Other than the supports for the boardwalk and the shade it will create, there should be no significant impacts to the wetlands.

F. RAILROAD & TUNNEL

The Stantec Team met with representatives from the NECR to discuss the potential for placing a shared use path in the railroad right-of-way or a perpendicular tunnel under the railroad. After discussions, the railroad representatives decided that they saw no advantages to the railroad of granting an easement for use of the right-of-way for a parallel path. They cited the potential dangers to path users that they wanted to avoid. Even at subsequent meetings, they cited potential dangers to path users. No amount of evidence of successful "rails-with-trails" from around the country that the Stantec Team presented seemed to sway them. Even though this is the current position and opinion of the railroad representatives with whom the Stantec team met, they could change over time. The reluctance of the NECR to allow the use of their ROW at this time makes the preferred alternative a long term goal of the Town.

The NECR representatives thought that the tunnel might be possible. They indicated that they would do internal inquiries to see if others with final authority might be willing to consider this option. As of the completion of this report, the Stantec Team has not received an answer to this inquiry, which is why the portion of the trail needing the tunnel was modified to be a link that would greatly expand the accessibility of the path but would not be required for the path to be functional.

If the NECR decides to allow the tunnel, it would be located at the one location where the railroad is high enough above existing grade to allow the Town to construct the tunnel under the railroad without the need to lower the final grade of the path under the railroad below existing grade. If possible, it would be desirable to actually raise the grade in the tunnel slightly above existing grade to minimize drainage issues.
V. PHASING

The preferred alignment of a shared use path along the bottom of the slope will take considerable time and funds to design and construct, even when the NECR finally allows the use of its right-of-way. Phasing the implementation will help make the project more viable.

If possible, the Stantec Team likes to recommend independent phases, segments of the path that can be implemented in any order, giving the Town the maximum flexibility so that it can move ahead when conditions are right for any one segment. In order to be eligible for State or federal funds, each of the segments also needs to be a useful addition to the overall transportation system by itself, in the event that no other phases are ever built. VTrans and the Federal Highway Administration describe this as having “independent utility.” In order to make sure that each segment has independent utility and to maximize the ability to be constructed in any order, the Stantec Team is suggesting five phases for the project. Figure 5 shows the suggested phasing for the project; overall, three phases are included in the final recommendations for the Route 2 corridor:

- The Green Phase includes the easternmost portions of the path, from the center of the Village to the Richmond Land Trust parcel and School Link Trail, as long as some acceptable method of crossing Route 2 could be developed with VTrans. This option would provide non-motorized access to the proposed new park from the Village.
- The Blue Phase includes the shared use path from the end of the Green Phase to the Park & Ride facility. If the Green Phase is not yet constructed when the Blue Phase is implemented, the Blue Phase would also include the construction of the School Link Trail (Yellow Phase) to create a reasonable eastern end to the path.
- The Orange Phase includes the shared use path from the Park & Ride intersection to the intersection of Route 2 and VT Route 117.

The two recommended links are also noted as phases:

- The Purple Phase from Volunteers Green to Route 2. This phase would create a bicycling and walking link around the western side of the Village.
- The Yellow Phase from the schools to Route 2 via the Richmond Land Trust property.

Each of these phases provides a facility that can be used by both bicyclists and walkers by itself. Together, they create a complete facility between Richmond Village and the intersection of Route 2 and VT Route 117 as well as Volunteers Green and the Richmond Elementary/Camels Hump Middle School campus.

Table 1 provides an overview of the characteristics of each phase.
Table 1: Preferred Alignment Characteristics by Phase

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Green Phase</th>
<th>Blue Phase</th>
<th>Purple Phase</th>
<th>Orange Phase</th>
<th>Yellow Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Length</td>
<td>2,800 FT</td>
<td>4,700 FT</td>
<td>1,325 FT</td>
<td>1,700 FT</td>
<td>±1,700 FT</td>
</tr>
<tr>
<td>Length of Boardwalk</td>
<td>0</td>
<td>850 FT</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Length of Tunnel</td>
<td>0</td>
<td>0</td>
<td>65 FT</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Private Property Permanent Easements</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1 (Richmond Land Trust)</td>
</tr>
<tr>
<td>Railroad Easement</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No (Area under Interstate is Interstate ROW)</td>
<td>No</td>
</tr>
<tr>
<td>Significant Physical Constraints</td>
<td>Transitioning the hill at the edge of the village residences; skirting the wetland between Route 2 and the railroad</td>
<td>Staying out of the floodplain; crossing sideslopes of Route 2 on the east side of the area level with the road; sloping boardwalk on the west side of the area level with the road</td>
<td>Tunneling under the Railroad; skirting the edges of farm fields and wetlands.</td>
<td>Traversing the side slope of Route 2 to reach the intersection with Rt. 117</td>
<td>Meeting ADA standards as the path moves between the elevation of the school and the elevation of Route 2</td>
</tr>
<tr>
<td>Environmental/Cultural Constraints</td>
<td>Wetland or Wetland Buffer Disturbance</td>
<td>0</td>
<td>850 FT of Boardwalk over the edges of wetland</td>
<td>50 FT of path at the edges of wetland</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Agricultural Land Disturbance</td>
<td>No</td>
<td>Path runs at edge of Ag. Land for 2,400 FT</td>
<td>Path runs at edge of Ag. Land for 900 FT</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Disturbs Steep Slopes</td>
<td>Disturbs the side slope of Route 2 at the Route 117 intersection</td>
<td>Disturbs the side slope of Route 2 north of farm area</td>
<td>No</td>
<td>Disturbs the side slope of Route 2 at the Route 117 intersection</td>
</tr>
<tr>
<td></td>
<td>Affects Historic Resources</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Disturbs 100 Year Floodplain</td>
<td>No</td>
<td>Path runs at edge of Floodplain for 1,775 FT</td>
<td>Path runs at edge of Floodplain for 1,600 FT</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Disturbs Hazardous Material</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Project Attributes</td>
<td>Types of Users Served</td>
<td>All Walkers &amp; Bicyclists</td>
<td>All Walkers &amp; Bicyclists</td>
<td>All Walkers &amp; Bicyclists</td>
<td>All Walkers &amp; Bicyclists</td>
</tr>
<tr>
<td></td>
<td>Avoids High Crash Areas</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Separates Motorized and Non-Motorized Users</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Number of Existing Commercial/Agricultural Driveways Crossed</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Number of Existing Residential Driveways Crossed</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Disturbances to Utilities</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Eliminates Switching Between Facility Types</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Allows Easy Link to Schools</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>ADA Issues</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Provides Access to Destinations along Route 2</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

VI. INITIAL ESTIMATE OF PROBABLE CONSTRUCTION COSTS

The Stantec Team prepared an initial estimate of probable construction costs based on the alignment shown in Figure 3. Table 2 shows the details of the estimates for the Blue, Green, Purple and Orange phases.
Table 2: Initial Estimate of Probable Construction Costs

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Blue Phase - 4,700 FT</th>
<th>Green Phase - 2,800 FT</th>
<th>Purple Phase - 1,325 FT</th>
<th>Orange Phase - 1,300 FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Excavation</td>
<td>CY</td>
<td>$20.00</td>
<td>3800</td>
<td>76,000</td>
<td>2800</td>
<td>56,000</td>
</tr>
<tr>
<td>Subbase Of Dense Graded Crushed Stone</td>
<td>CY</td>
<td>$40.00</td>
<td>2300</td>
<td>92,000</td>
<td>1700</td>
<td>68,000</td>
</tr>
<tr>
<td>Bituminous Concrete Sidewalk</td>
<td>TON</td>
<td>$200.00</td>
<td>500</td>
<td>100,000</td>
<td>400</td>
<td>80,000</td>
</tr>
<tr>
<td>Mobilization/Demobilization</td>
<td>LS</td>
<td>10%</td>
<td>110,997</td>
<td>10%</td>
<td>30,797</td>
<td>10%</td>
</tr>
<tr>
<td>Boardwalk</td>
<td>SF</td>
<td>$70.00</td>
<td>8500</td>
<td>595,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Retaining Wall</td>
<td>SY</td>
<td>$500.00</td>
<td>70</td>
<td>35,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tunnel</td>
<td>LS</td>
<td>$800,000.00</td>
<td>0</td>
<td>800,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>LS</td>
<td>5%</td>
<td>52,856</td>
<td>5%</td>
<td>14,665</td>
<td>5%</td>
</tr>
<tr>
<td>Special Provision (Paint)</td>
<td>LS</td>
<td>10%</td>
<td>2,000</td>
<td>1</td>
<td>100</td>
<td>1%</td>
</tr>
<tr>
<td>Special Provision (Signs)</td>
<td>LS</td>
<td>1%</td>
<td>8,665</td>
<td>1%</td>
<td>2,400</td>
<td>1%</td>
</tr>
<tr>
<td>Special Provision (Drainage)</td>
<td>LS</td>
<td>10%</td>
<td>87,365</td>
<td>10%</td>
<td>24,240</td>
<td>10%</td>
</tr>
<tr>
<td>Special Provision (Landscaping)</td>
<td>LS</td>
<td>10%</td>
<td>96,102</td>
<td>10%</td>
<td>26,664</td>
<td>10%</td>
</tr>
<tr>
<td>Sub Total</td>
<td></td>
<td></td>
<td>$1,220,970</td>
<td>$338,766</td>
<td>$1,271,220</td>
<td>$139,176</td>
</tr>
<tr>
<td>Contingencies (40%)</td>
<td></td>
<td></td>
<td>$488,388</td>
<td>$135,506</td>
<td>$508,488</td>
<td>$55,671</td>
</tr>
<tr>
<td>Total Estimate of Probable Construction Cost</td>
<td></td>
<td></td>
<td>$1,709,357</td>
<td>$474,273</td>
<td>$1,779,708</td>
<td>$194,847</td>
</tr>
<tr>
<td>Engineering (10%)</td>
<td></td>
<td></td>
<td>$170,935.74</td>
<td>$47,427.26</td>
<td>$177,970.78</td>
<td>$19,484.70</td>
</tr>
<tr>
<td>Rounding</td>
<td></td>
<td></td>
<td>$180,643</td>
<td>$55,727</td>
<td>$180,292</td>
<td>$25,153</td>
</tr>
<tr>
<td>Total Cost:</td>
<td></td>
<td></td>
<td>$1,890,000</td>
<td>$530,000</td>
<td>$1,960,000</td>
<td>$220,000</td>
</tr>
</tbody>
</table>

Table 2 does not include a detailed estimate for the Yellow phase because it was not studied in detail as part of this study. Based on approximate distance alone, an initial estimate of probable construction costs for the yellow phase would be $775,000 plus engineering and administration costs.

VII. IMPLEMENTATION

A. PROCEDURES

As a first step towards implementing the recommendations of this study, the Town Selectboard should accept and endorse the report. It will be difficult for the Town to proceed with the recommendations without this endorsement. Once the report is endorsed by the Town, the Town can undertake these steps, but not necessarily in the order listed here:

- Work with VTrans to add four-foot paved shoulders to the upcoming reclaiming project.
- Work with VTrans to establish an eventual acceptable pedestrian crossing of Route 2 at Baker Street and at the entrance to the Richmond Land Trust parcel.
- Begin looking and applying for funding opportunities through grants, bonding or other sources the Town considers appropriate.

December 28, 2014
- Maintain contact with the NECR with the goal of eventually securing their permission to create a shared use path in their right-of-way near Riverview Cemetery.
- Work with the NECR to secure approval for the tunnel under the rails.
- Keep the Town residents up to date on the process of implementing the recommendations.
- Work with VTrans to install the SHARE THE ROAD signs and sharrows on Route 2 in the Village.
- Request a speed study on Route 2 to consider lowering the short 50 MPH segment between the Park & Ride and the Village to 40 MPH.
- Work with VTrans to modify the signal timing at the Route 2/Jericho Road/Bridge Street intersection to better protect pedestrians from right- or left-turning vehicles while crossing the road current the concurrent pedestrian phase.
- Hire a consultant to assist with the design of the first phase to be implemented.
- Work with the landowners over whose property the path runs to secure their final agreements on granting the necessary easements.

B. PERMITTING

The construction of the shared use path, in any phase, will require floodplain clearance and possibly a floodplain permit from the Town. Work within the VTrans Route 2 right-of-way will require a permit from the utility section. Each phase of the project will most likely require a stormwater discharge permit; the exact type of permit will depend on how much new impervious surface is being created. The Blue Phase will also require a State Wetland Permit and Water Quality Certification for construction of the boardwalks and other features of the project that fall within 50 feet of Class 2 Wetlands, depending on the design.

C. FUNDING

The addition of a new crosswalk on Route 2 and the addition of SHARE THE ROAD signs on Route 2 in the Village can potentially be funded directly by the Town through their regular roadway budget. Funding for the long-term recommendations may be able to be secured from a variety of sources. Below is a list of various funding sources that could be used to help with the implementation of the road-related recommendations, including:

- Transportation Alternatives (TA) Program: TA funds can be used to increase bicycle and pedestrian mobility. These funds will cover a maximum of 80 percent of the project with the remaining 20 percent match coming directly from the project sponsoring organization if they cannot secure them from some other source. TA funds are distributed in Vermont through a competitive grant program.

- VTrans Bicycle and Pedestrian Program: These State funds cover specific bicycle and pedestrian improvement projects and are provided via a competitive grant program.
This program currently provides 90 percent of project costs with a required 10 percent non-federal match.

- CCRPC Sidewalk Grant Program: The CCRPC awards funds for scoping, design and construction of sidewalks and paths through a competitive grant program. This program currently provides 80 percent of project costs with a required 20 percent non-federal match.
- One Time Tax: A one-year-only increase in the tax rate by one or two cents by the Town could raise funds for one phase or serve as matching funds for competitive grant programs.
- Private Fundraising: The Town could work to raise private funds for the shared use path, at least in part, possibly with some memorial that acknowledges the contributions.
- Bonds: The Town could opt to use bonds to generate funds to undertake one or all of the phases at once.
- Bikes Belong Grants: These grants are given by the Bikes Belong organization to improve bicycling conditions throughout the United States. The grants are for both facilities and advocacy. Additional information can be found at: http://www.bikesbelong.org/grants/apply-for-a-grant/who-can-apply/.

A new on-line tool developed by a partnership between the Alliance for Biking and Walking and the League of American Bicyclists helps find potential federal funding sources for alternative transportation projects. The site can be reached at: http://bit.ly/11xhEtr.

Other funding sources may be available for the construction of the trails, including:

- Potential health grants promoting healthy living such as The Robert Wood Johnson Foundation;
- MCI/Worldcom Royalty Donation Program (For this and several subsequent ideas, see http://www.americantrails.org/resources/funding/TipsFund.html);
- Trail sponsorships (and possibly naming rights); and

Some additional resources that may provide insight into additional funds include:

- http://www.americantrails.org/resources/funding/Funding.html
- http://rlch.org/
D. MAINTENANCE

Construction costs for the preferred option could vary depending on the surface material selected. The initial estimates of probable construction costs in Section VI are based on an asphalt surface. The costs would be less if the Town constructed the path with a hard packed gravel surface.

The maintenance costs of the two different surfaces vary. Asphalt surfaces are typically less expensive to maintain on yearly basis but do need a new surface in anywhere from 5 to 20 years, depending on how well it was initially constructed, the amount of use it gets and the types of weather conditions it endures. The gravel surfaces usually need more maintenance on a yearly basis to stay in good bicycling and walking condition. If the asphalt surface lasts for at least 15 years, its maintenance is typically less expensive when averaged on a yearly basis than a gravel surface.

As a general rule, no matter what type of surface, Richmond should consider the maintenance costs to be in the range of five percent of the overall construction costs.
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Legend

- West Main Street (US RT 2)
- Study Area
- Town Boundaries

Study Area
Figure 2b August 16, 2013

Source: Vermont Gas Survey, CCRPC and Field Observation
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Preferred Alignment

Legend

Future Links
Preferred Alignment
Prop. Lines

Request Speed Study to lower speed to 40 MPH
Short Term Improvements - Wider Shoulders on Route 2
Add Sharrows and signs
Check Signal timing for better pedestrian crossing

Page 3

Figure 3

April 30, 2014

Stantec
BROADREACH Planning & Design
Heritage Landscapes
The proximity of the Railroad and Route 2 rights-of-way necessitates the placement of the path in the Route 2 right-of-way.

Extension of path to sidewalk will require at least one retaining wall along the side of the road at change in grade.

Tunnel under railroad helps link east and west portions of the Town.

Tunnel requires cooperation from New England Central Railroad.

Minimize fill to reduce floodplain impacts.

Minimize impacts to farmland by staying at the edge of fields.

Uses Existing Easement.

Bicyclists and walkers will need to cross Route 2 here to access the path.

A boardwalk brings the path downhill over a wetland.

Signs on the path warn users of large farm vehicles crossing.

Signs on the path warn users of the commercial driveway crossing.

Signs on the road warn turning motorists about the presence of the path and bicyclists.

Potential wetland and floodplain mitigation area.

The path climbs across the side slopes to reach the level of Route 2.

A level area above the wetland and farm field accommodates the path.

A boardwalk minimizes impacts to wetlands.

Property Lines

Delineated Wetland Edge

105 - 923 Floodway

100 Year Floodplain

FID_S_FLD

S_FLD_HAZ_Area_Richmond

Legend

New Crosswalk
Preferred Alternative
Existing Path

Issues & Impacts

Route 2 Non-Motorized Transportation Scoping Study
Chittenden County Regional Planning Commission
Town of Richmond, VT

August 26, 2013  Figure 4
Green Phase
Blue Phase
Orange Phase
Yellow Phase
Purple Phase
Prop. Lines

Legend

Request Speed Study to lower speed to 40 MPH
Add Sharrows and signs
Check Signal timing for better pedestrian crossing

Route 2 Non-Motorized Transportation Scoping Study
Chittenden County Regional Planning Commission
Town of Richmond, VT

Phases

April 30, 2014  Figure 5
Appendix A
Existing Conditions Summary
Existing Conditions

Submitted by:
Stantec Consulting

In conjunction with
Broadreach Planning & Design
Heritage Landscapes LLC

June 4, 2013
A. INTRODUCTION

1. OVERVIEW

The Town of Richmond has long contemplated a better bicycle and pedestrian link between Richmond Village and the Richmond Park & Ride on Route 2 close to Interstate 89 Exit 11. The Chittenden County Regional Planning Commission (CCRPC) has been able to assist with funding to study the feasibility of creating such a connection. The CCRPC staff is providing project management on behalf of the Town of Richmond.

With the assistance of the Town, the CCRPC organized a Steering Committee (SC) of local officials and citizens to provide direction for the study. The CCRPC selected a Consulting Team (CT) from their list of on-call consultants to help them with the feasibility study; the team is led by Stantec Consulting Service and supported by Broadreach Planning & Design and Heritage Landscapes LLC.

The Study Area for this project extends in the east from the center of Richmond Village and Bridge Street west to the Route 2 Checker Bridge over the Winooski River and from the southern edge of the Interstate right-of-way on the north to the Winooski River on the south. Figures A1 and A2 show the location of the project and the general extent of the Study Area.

This summary report is the first product of the work of the SC and the CT. The summary describes the existing conditions in the Study Area. The report is formatted for double-sided printing; blank pages are intentional.

2. PURPOSE AND NEED

The purpose of the Route 2 bicyclist and walker project is to create improved walking and bicycling conditions between Richmond Village and the Richmond Park & Ride, especially for commuters, and to consider better bicycling and walking access and connections to the other destinations within or adjacent to the Study Area, including the Richmond Elementary School and Camel's Hump Middle School.

Needs for the improvements include:

- The minimal shoulders and poor pavement conditions on Route 2 in the Study Area;
- The poor existing conditions for bicycle commuters which make the trip between the Village and the Park & Ride to reach the transit service there; and
- The lack of comfortable, convenient walking facilities along Route 2.
3. PROJECTED USERS

While the primary focus of the study is to make it easier for walkers and bicyclists to reach the Park & Ride, Richmond officials would also like to improve bicycling and walking conditions for people of all ages and abilities. This means that as much as possible, the improvements should be usable by school children, elderly citizens and those with disabilities, as well as experienced bicyclists and walkers.

The following sections provide more information on the abilities and needs of the different types of walkers and bicyclists.

**Walkers:** People vary significantly in their walking skills, experience and willingness to walk different distances. Strong determining factors for walkers are the time and mobility required to reach their destinations. Time and mobility constraints also dictate their usable geographic space; few walkers will venture more than one mile from point to point; most will only undertake trips shorter than ½ mile, unless the trip is recreational or there is some visible destination or landmark.

There are three basic types of walkers:

- Active walkers,
- Basic walkers, and
- Circumscribed walkers.

*Active walkers* use the road system regularly for transportation, as well as for fitness. They know and generally follow the rules of the road. *Basic walkers* include the majority of older children and healthy adult walkers. *Circumscribed walkers* are those whose speed and mobility are extremely limited. In all cases, when walking on roads, people should walk FACING traffic on the left side of the road in the direction of travel for safety and visibility reasons, in addition to the fact that it is Vermont State Law.

**Bicyclists:** Among bicyclists, there are three typical user groups that can be expected to use the bicycle facilities:

- Advanced bicyclists,
- Basic bicyclists, and
- Beginner bicyclists or children.

*Advanced bicyclists* are highly experienced bicycle riders who feel comfortable riding their bikes in heavy traffic and typically prefer to ride on roadways. *Basic bicyclists* comprise the largest category of bicycle riders, including older children, inexperienced adult riders, occasional bicycle commuters, recreational adult bicyclists and experienced riders who still fear or dislike riding in heavy traffic conditions. Basic bicyclists are reasonably competent in handling their bicycles and they generally understand the rules of the road, but they ride at more moderate speeds and are generally uncomfortable on busy streets unless a striped,
obstacle-free shoulder is provided and traffic volumes are low. Beginner bicyclists have the weakest bicycling skills. Beginner bicyclists ride more slowly, don’t always understand the rules of the road, and are typically uncomfortable riding with motor vehicles. They are best accommodated on low-speed local roads and multi user paths or even sidewalks for the very young where there are few, if any driveway crossings.

When riding on roadways, bicyclists should always ride with traffic on the right side of the road in the direction of travel. Unless the road is clear, bicyclists should ride single file.

4. ORIGINS, DESTINATIONS & TRAVEL PATTERNS

In addition to the Village center and the Park & Ride, there are several other important destinations within the Study Area for walkers and bicyclists. Figures B1 and B2 show the locations of these areas. In addition to these larger destinations, there are several smaller businesses as well as residences that also serve as origins or destinations for walking or bicycling trips.

B. LAND USE

The Study Area includes residential, institutional, commercial and recreational land uses. Outside of agricultural use of the land, the largest land use type in the Village is residential, while most land uses further west on Route 2 are commercial. Figures B1 and B2 show the larger land use types within the Study Area.

C. TRANSPORTATION FACILITIES

1. OVERVIEW

The Study Area is focused on US Route 2 (Route 2) between the Richmond Village and the intersection with VT Route 117. There are several intersections along this portion of Route 2; heading from north to south, they include:

- Route 117,
- The northbound entrance and exit ramps for Interstate 89,
- The southbound exit ramp and entrance to the Park & Ride lot,
- The southbound entrance ramp to Interstate 89,
- Baker Street,
- Millet Street, and
- Jericho Road/Bridge Street.

Figures C1 and C2 show the general location of the transportation facilities in the Study Area.
2. ROUTE 2 ROADWAY DATA

Route 2 in Richmond is functionally classified by the Vermont Agency of Transportation (VTrans) as a Major Collector on a State Highway. The posted speed varies from 40 miles per hour (mph) to 50 mph along the rural portion of the corridor and drops to 30 mph through the Village.

Throughout the corridor, Route 2 generally consists of two 12-foot travel lanes with varying shoulder widths from one to six feet. By the park & ride and extending southerly to just past the first curve in the road, the pavement width varies from 34 to 36 feet. From that point on, the roadway width varies from 28 to 30 feet to the Village where the road widens for on-street parking. The Richmond Trails Committee has mapped the shoulder widths more specifically between the southbound Interstate entrance ramp and the Jericho Road/Bridge Street intersection.

In the Village, the roadway is curbed and has five-foot wide sidewalks on both sides of the road. A five-foot wide grass strip separates the sidewalk and the roadway on the south side of the road in this area. On the north side there is about 150 feet of on-street parking just prior to the intersection with Jericho Road and Bridge Street.

The roadway surface is in poor condition throughout the project area. VTrans intends to resurface the roadway in 2015. Current plans for the resurfacing include widening the shoulders to at least three feet wide and up to four feet wide where possible.

The roadway is relatively level with a maximum grade of 7 percent for a short distance heading into the Village. Banks along each side of the road are steep throughout the majority of the project corridor. Generally the banks slope downhill from east to west and can drop as much as 20 feet. Guard rails line the sides of the road where the slopes are significant.

Two intersections along the corridor are signalized: Route 2 at VT Route 117 at the northwestern end of the Study Area and Route 2 at Jericho Road and Bridge Street in Richmond Village center.

3. ROUTE 2 RIGHT-OF-WAY WIDTHS

In general, the right-of-way (ROW) limits are 33 feet from the centerline for a 66-foot wide ROW. The ROW limits begin the typical 33 feet from centerline at approximately 650 feet south of the gas station by the Park & Ride. In the area by the interstate interchange, the ROW limits are 55 feet to the east and 41 feet to the west.
4. ROUTE 2 TRAFFIC VOLUMES

Table A summarizes the Average Annual Daily Traffic (AADT) for segments of Route 2 within the study area. AADT’s are as reported by VTrans 2010 (Route Log) AADT’s for State Highways. Additionally, according to the 2011 Automatic Vehicle Classification Report, the peak average of truck traffic was reported at 4.0% in the project area which is below average for Major Collectors in Vermont.

Table A1: AADT by Roadway Segment

<table>
<thead>
<tr>
<th>Segment</th>
<th>AADT</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT 117 to I89 NB on and off ramps</td>
<td>8100</td>
<td>2010 E</td>
</tr>
<tr>
<td>I89 NB on and off ramps to I89 SB off ramp</td>
<td>7100</td>
<td>2010 E</td>
</tr>
<tr>
<td>I89 SB off-ramp to I89 SB on ramp</td>
<td>5900</td>
<td>2010 E</td>
</tr>
<tr>
<td>I89 SB on ramp to Baker St.</td>
<td>8500</td>
<td>2010</td>
</tr>
<tr>
<td>Baker St. to Bridge St/Jericho Rd</td>
<td>8700</td>
<td>2010 E</td>
</tr>
</tbody>
</table>

E = Estimated

5. CRASH HISTORY

The Study Area includes one intersection and three roadway segments that are High Crash Locations (HCL) as reported in the most recent VTrans HCL report from 2006-2010. Table B provides a summary from this listing. Figures C1 and C2 show the locations of these HCLs.

These locations are considered to be HCLs because they have had at least five crashes over a five-year period and the actual crash rate, the number of crashes per million vehicles, exceeds the critical crash rate. The critical crash rate is based on the average crash rates of similar roadways in Vermont and is related to the functional class of a highway and whether it is located in an urban or rural area.

Over the same five-year period there was a single pedestrian-related crash within the project area reported in the vicinity of the intersection with Bridge Street (13 W Main St.). The accident resulted in a non-incapacitating injury.
Table B: High Crash Information

<table>
<thead>
<tr>
<th>Ranking (Int/Segment)</th>
<th>Location</th>
<th># Crashes</th>
<th>Injuries</th>
<th>Fatalities</th>
<th>Actual/Critical Ratio</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 (Intersection)</td>
<td>Bridge Street/Jericho Road</td>
<td>24</td>
<td>4</td>
<td>0</td>
<td>1.972</td>
<td>$17,600</td>
</tr>
<tr>
<td>133 (Segment)</td>
<td>Winooski R. Bridge (MM 0.853) to Park &amp; Ride –(MM 1.153)</td>
<td>15</td>
<td>9</td>
<td>0</td>
<td>1.805</td>
<td>$44,187</td>
</tr>
<tr>
<td>642 (Segment)</td>
<td>From Park &amp; Ride (MM 1.153) to Curve (MM 1.453)</td>
<td>11</td>
<td>6</td>
<td>0</td>
<td>1.015</td>
<td>$39,918</td>
</tr>
<tr>
<td>632</td>
<td>430 W Main St. (MM 2.353) to 77 W Main St. (MM 2.653)</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>1.023</td>
<td>$13,318</td>
</tr>
</tbody>
</table>

5. RICHMOND PARK & RIDE FACILITY

The existing Park & Ride is heavily used and is over capacity as evidenced by vehicles parking in undesignated parking spaces or on lawn areas adjacent to Route 2. According to VTrans’ website, the existing Park & Ride has 105 designated spaces. In 2013, VTrans will construct an expansion of the Park & Ride. The project will expand the Park & Ride in all directions and will include 158 parking spaces. It will improve bus access with the addition of a bus loop at the center of the Park & Ride and includes construction of a new bus shelter and bicycle rack adjacent to the drive. The project includes replacement of the existing lighting with new energy-efficient LED lighting. In addition, it includes the installation of a new traffic signal at the intersection of Route 2 and the southbound off ramp/park-and-ride drive.

D. UTILITIES

Figures C1 and C2 show the general location of the utilities in the Study Area.

Utility poles owned by Green Mountain Power (GMP) run along the east side of the roadway to the cemetery and move to the western side of the roadway for the rest of the project. GMP has indicated that Comcast and Champlain Valley Communications are co-
located on the poles. A Vermont Electric aerial transmission line crosses the roadway just past the gas station by the Park & Ride and then continues off project limits.

Fairpoint Communications owns an underground fiber optic cable that runs along the west side of the road. Several other utility companies, that have yet to be identified, run in a duct bank along the east side of the road. Waitsfield Telecom has verified their presence in this duct so far.

A natural gas line was recently installed along the eastern side of the roadway for the length of the project. The gas line runs on both sides of the street through the Village.

Water and sewer begin at 222 W. Main Street and head south to the intersection with Bridge Street and Jericho Road. The waterline runs on both sides of Route 2 east from Baker Street.

A closed drainage system exists on the north side of the road in the vicinity of Millet Street. The system crosses to the south side and outlets to an unknown location. There are a total of 11 cross culverts located within the project limits. The largest being an eight-foot by eight-foot concrete box culvert at the intersection with VT Route 117. Swales run along the east and western side of the roadway intermittently.

The Vermont Gas company recently completed a survey of portions of the Study Area in preparation for their gas line extension. Attachment 1 includes portions of this survey, which shows the more specific location of utilities in the Study Area.

E. NATURAL RESOURCES

1. TOPOGRAPHY

The topography in the Study Area is generally level, being in the Winooski River Valley. The Village center is approximately 25 feet higher than the lower floodplain areas. Route 2 itself, as it leaves the Village area, descends towards the floodplain but remains several feet above the adjacent land, either by hugging the slow rise at the edge of the floodplain or by means of an elevated causeway made to keep the road above flood levels. Figure D shows the general topography in the Study Area as recorded by LIDAR information created by the Federal Emergency Management Agency as part of its work in identifying floodplains.

2. WATERCOURSES

The Winooski River is the primary watercourse in the Study Area, forming the southern edge of the Study Area. Numerous small, unnamed intermittent streams flow across the Study Area towards the Winooski River. Figures E1 and E2 show the general location of the smaller intermittent streams.
3. WETLANDS

The wetlands in the Study Area are located primarily along the edges of the Winooski River. There are a few more smaller isolated wetlands in the agricultural fields southwest of Route 2. **Figures E1 and E2** show the location of these wetland areas.

4. WATERBODIES

There are no significant water bodies within the Study Area.

5. FLOODPLAINS.

The Winooski River floodplain covers a large portion of the Study Area, including the Richmond Park & Ride site. **Figure E1** and **E2** show the extent of the floodplain, as well as the location of the somewhat narrower floodway.

6. FLORA & FAUNA

The State of Vermont has not identified natural areas of special importance within the Study Area. There are also no deer wintering areas or other important fauna habitats within the Study Area but there is a significant deer wintering area on the northeast side of the Interstate, just outside of the Study Area. Not surprisingly, there are several locations with high occurrences of wildlife road kills on the Interstate located between the deer wintering area and the Winooski River. **Figures E1 and E2** show the general location of the deer wintering areas.

7. ENDANGERED SPECIES & SPECIAL ENVIRONMENTAL AREAS

There are several endangered species listed with the State of Vermont that are located in the wetland areas along the Winooski River. There are several other listings in the upland areas on the northeastern side of the Interstate, just outside of the Study Area. **Figures E1 and E2** show the general habitat location of the endangered species.

F. CULTURAL RESOURCES

1. OPEN SPACE AND PUBLIC LANDS

In addition to the public rights-of-way associated with the Interstate, Route 2, the Park & Ride and other local roads, there are several other publicly owned parcels in the Study Area:

- Volunteer Park along the Winooski River on Bridge Street in Richmond Village,
- The Richmond Elementary and Camels Hump Middle Schools on northeast side of the study area adjacent to the Interstate on Jericho Road,
- Riverview Cemetery on the northeast side of Route 2 just on the western edge of the Village and
- Holy Rosary Cemetery east of River View Cemetery.

Figures B1 and B2 show the general location of the open space areas.

2. AGRICULTURAL LANDS

Most of the land in the Study Area west of the Village on the southeast side of Route 2 is in agricultural use. These fields cover more than half of the Study Area. Attachment 2 includes a copy of a soils report for the Study Area. It provides information on the agricultural soils as well as other soils data.

G. PLANNING DOCUMENTS

1. MUNICIPAL PLANS

The Richmond Town Plan supports the development of better bicycle and pedestrian facilities between the Village and the Park & Ride. The Town Plan, in the Transportation section, notes that, “Many residents desire a safe link between the Park & Ride to the Village and Jonesville along Route 2.”

2. REGIONAL PLANS

The Chittenden County Regional Pedestrian-Bicycle Plan recommends a series of interconnected on-road bicycle facilities and off-road shared use paths throughout the county. The on-road network includes an existing on-road bicycle facility designation on Route 2 in the study area from Richmond Village west. Attachment 3 includes a copy of the regional plan figure showing this designation. The Cross Vermont Trail, on the opposite side of the Winooski from Route 2, is designated as part of the regional off-road system.

3. STATE PLANS

The 2008 VTrans Pedestrian and Bicycle Policy Plan includes goals and objectives that directly support the upgrading of bicycling and walking facilities along the Route 2 corridor, including:

Goals

- Cultural Environment. Enhance the human scale and livability of Vermont’s communities by improving opportunities for pedestrian and bicycle mobility and access in and between towns, downtowns, villages and rural landscapes.

- Health. Improve the health of Vermonter and reduce health care costs by making it easier, safer and more convenient for citizens to be more physically active by walking and bicycling on a regular basis.
Transportation Choice. Enhance pedestrian and bicycle transportation options in Vermont so that citizens, regardless of location socioeconomic status, or health can choose a seamless, convenient and comfortable mode that meets their needs. Promote a transportation network, including roadways, shared use paths, rail trails, rails with trails, and accessible walker facilities, which allow pedestrians and bicyclists to reach their destinations throughout the State or to connect to other modes of travel.

Objectives

- Objective 8. Work with citizens, municipalities, regional planning organizations, and other State agencies to develop, plan, and implement pedestrian and bicycle plans, projects, and programs.

- Objective 12. Provide a seamless transportation network for pedestrians and bicyclists by improving linkages between walking, bicycling and other modes of transportation.

4. OTHER PLANS OR STUDIES

Bridge Street Bicycle and Pedestrian Feasibility Study

The Bridge Street Study recommended replacing the existing sidewalks on the west side of Bridge Street south of the railroad crossing with new, wider sidewalks and an extension of the existing sidewalk on the east side of Bridge Street south to Esplanade. It also recommended increasing the paved shoulder width for better bicycling access. There is also a recommendation to upgrade an existing trail at the western end of Church Street to be a shared use path extending from Volunteer Green to Railroad Street with connections to Esplanade and Church Street.

Chittenden County Park & Ride and Intercept Facility Plan

The County’s latest Park & Ride plan includes the results of a survey of Park & Ride users. Among the responses are that about ten percent of frequent Park & Ride lot users access the lots via bicycle while approximately eight percent sometime access the lot via bicycle. The survey also showed that approximately 20 percent of the respondents indicated that additional sidewalks or bike lanes accessing the Park & Ride lot would be a motivation to use the Park & Ride lot more.

June 4, 2013
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Legend
- Study Area
- Town Boundaries

March 25, 2013 Figure A1
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Legend

- West Main Street (US RT 2)
- Study Area
- Town Boundaries

Detailed Study Area

April 16, 2013 Figure A2
Route 2 Non-Motorized Transportation Scoping Study

Chittenden County Regional Planning Commission
Town of Richmond, VT

Legend

- Hazardous Waster Site
- Railroad
- Destinations
- Agricultural Use
- Commercial Land Use
- Public Land

Source: VCGI and Field Observations
April 16, 2013
Figure B1

Existing Conditions
Land Use - North

River View Cemetery
Richmond Park & Ride

Route 2 Non-Motorized Transportation Scoping Study

Chittenden County Regional Planning Commission
Town of Richmond, VT

Legend

- Hazardous Waster Site
- Railroad
- Destinations
- Agricultural Use
- Commercial Land Use
- Public Land

Source: VCGI and Field Observations
April 16, 2013
Figure B1

Existing Conditions
Land Use - North

River View Cemetery
Richmond Park & Ride

Route 2 Non-Motorized Transportation Scoping Study

Chittenden County Regional Planning Commission
Town of Richmond, VT

Legend

- Hazardous Waster Site
- Railroad
- Destinations
- Agricultural Use
- Commercial Land Use
- Public Land

Source: VCGI and Field Observations
April 16, 2013
Figure B1

Existing Conditions
Land Use - North

River View Cemetery
Richmond Park & Ride
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County Regional Planning Commission
Town of Richmond, VT

Legend

- Destinations
- Commercial Land Use
- Railroad
- Agricultural Land
- Light
- Public Land

Existing Conditions
Land Use

March 21, 2013  Figure B2
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Existing Conditions
Topography

Legend

Two-Foot Contour

Source: CCRPC LIDAR Data
March 31, 2013
Figure D
Route 2 Non-Motorized Transportation Scoping Study

Chittenden County Regional Planning Commission
Town of Richmond, VT

Legend

Street Trees
Delineated Wetland
GIS Wetland
Rare/Threat./Endanger.
Deer Wintering
High Roadkill
Property Line
Railroad

Flood Hazard
FID_S_FLD
100 Year Flood Plain
105 - 923
Floodway
105 - 923

Source: VCGI, CCRPC & Vermont Gas Survey

Existing Conditions
Natural Resources - North

April 16, 2013   Figure E1
Route 2 Non-Motorized Transportation Scoping Study
Chittenden County
Regional Planning Commission
Town of Richmond, VT

Existing Conditions
Natural Resources - South

Legend

- Street Trees
- Delineated Wetland
- GIS Wetland
- Rare/Threat./Endang.
- High Roadkill
- Deer Wintering
- Railroad
- Property Line
- 100 Year Flood Plain
- 105 - 923 Floodway
- 105 - 923

Source: VCGI, CCRPC & Vermont Gas Survey

April 16, 2013 Figure E2
Attachment 1
VERMONT GAS SURVEY
(Partial)
G R A V E L  P U L L  O F F  A R E A

W E S T  M A I N  S T R E E T  (U S  R O U T E  2)

B O N D E D  8 - 3 0 - 2 0 1 2
L O C .  B O X  W /  2  W I R E S
6 "  E N D  O T  1 0 0 8 - 3 0 - 2 0 1 2
6 "  E L E C T R O  F U S I O N  C O U P .  ( 7 - 2 5 - 2 0 1 2 )

I N T E R S T A T E  E X I T  R A M P

D I R E C T I O N
P U L L E D  2  T R A C E R  W I R E S  I N  E A C H

N O T E :
E L E C .  L I N E  C O N T A C T  V A O T  T O  L O C A T E

W E S T  M A I N  S T R E E T  (U S  R O U T E  2)

DISTURBANCE AREAS, Pipeline Strings May Lay To Stay On PAVEMENT Outside OF Wetlands And Buffer Areas, EQUIMENT TO BE USED TO String Pipeline (US ROUTE 2) 5' - 30' - 20' - 12'.

Note: No Equipment To Be Used To String Pipeline In Wetlands And 50' Buffer Areas, EQUIPMENT NOT TO USE ON SIDE OF Lane

MILE MARKER, SOUTH LOC. BOX, NORTH LOC. BOX, W/ LINE
DISTURBANCE AREAS, PIPELINE STRINGS MAY LAY TO STAY ON PAVEMENT OUTSIDE OF WETLANDS AND BUFFER AREAS, EQUIPMENT NO NOTE: NO EQUIPMENT TO BE USED TO STRING PIPE.
DISTURBANCE AREAS, PIPELINE STRINGS MAY LAY TO STAY ON PAVEMENT OUTSIDE OF WETLANDS AND 50' BUFFER AREAS, EQUIPMENT NOTE: NO EQUIPMENT TO BE USED TO STRING PIPE
Attachment 2
SOILS DATA
Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.
Custom Soil Resource Report

MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Units

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

**Special Line Features**
- Gully
- Short Steep Slope
- Other

**Political Features**
- Cities

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:16,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chittenden County, Vermont
Survey Area Data: Version 15, Jan 19, 2010

Date(s) aerial images were photographed: 8/20/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
# Map Unit Legend

Chittenden County, Vermont (VT007)

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdB</td>
<td>Adams and Windsor loamy sands, 5 to 12 percent slopes</td>
<td>1.2</td>
<td>0.2%</td>
</tr>
<tr>
<td>AgA</td>
<td>Agawam fine sandy loam, 0 to 5 percent slopes</td>
<td>41.2</td>
<td>5.2%</td>
</tr>
<tr>
<td>AgD</td>
<td>Agawam fine sandy loam, 12 to 30 percent slopes</td>
<td>9.1</td>
<td>1.2%</td>
</tr>
<tr>
<td>AgE</td>
<td>Agawam fine sandy loam, 30 to 60 percent slopes</td>
<td>1.3</td>
<td>0.2%</td>
</tr>
<tr>
<td>An</td>
<td>Alluvial land</td>
<td>9.6</td>
<td>1.2%</td>
</tr>
<tr>
<td>BIA</td>
<td>Belgrade and Eldridge soils, 0 to 3 percent slopes</td>
<td>17.1</td>
<td>2.2%</td>
</tr>
<tr>
<td>BiB</td>
<td>Belgrade and Eldridge soils, 3 to 8 percent slopes</td>
<td>1.5</td>
<td>0.2%</td>
</tr>
<tr>
<td>Br</td>
<td>Borrow pits</td>
<td>1.2</td>
<td>0.2%</td>
</tr>
<tr>
<td>DdA</td>
<td>Duane and Deerfield soils, 0 to 5 percent slopes</td>
<td>2.6</td>
<td>0.3%</td>
</tr>
<tr>
<td>DdB</td>
<td>Duane and Deerfield soils, 5 to 12 percent slopes</td>
<td>39.5</td>
<td>5.0%</td>
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<tr>
<td>Fu</td>
<td>Fill land</td>
<td>4.3</td>
<td>0.5%</td>
</tr>
<tr>
<td>Hf</td>
<td>Hadley very fine sandy loam</td>
<td>124.3</td>
<td>15.8%</td>
</tr>
<tr>
<td>Hh</td>
<td>Hadley very fine sandy loam, frequently flooded</td>
<td>171.1</td>
<td>21.7%</td>
</tr>
<tr>
<td>HIC</td>
<td>Hartland very fine sandy loam, 6 to 12 percent slopes</td>
<td>1.3</td>
<td>0.2%</td>
</tr>
<tr>
<td>HID</td>
<td>Hartland very fine sandy loam, 12 to 25 percent slopes</td>
<td>8.4</td>
<td>1.1%</td>
</tr>
<tr>
<td>HIE</td>
<td>Hartland very fine sandy loam, 25 to 60 percent slopes</td>
<td>30.1</td>
<td>3.8%</td>
</tr>
<tr>
<td>Le</td>
<td>Limerick silt loam</td>
<td>104.0</td>
<td>13.2%</td>
</tr>
<tr>
<td>LF</td>
<td>Limerick silt loam, very wet</td>
<td>12.6</td>
<td>1.6%</td>
</tr>
<tr>
<td>LyE</td>
<td>Lyman-Marlow very rocky loams, 30 to 60 percent slopes</td>
<td>2.4</td>
<td>0.3%</td>
</tr>
<tr>
<td>MuD</td>
<td>Munson and Belgrade silt loams, 12 to 25 percent slopes</td>
<td>18.7</td>
<td>2.4%</td>
</tr>
<tr>
<td>MyB</td>
<td>Munson and Raynham silt loams, 2 to 6 percent slopes</td>
<td>46.3</td>
<td>5.9%</td>
</tr>
<tr>
<td>MyC</td>
<td>Munson and Raynham silt loams, 6 to 12 percent slopes</td>
<td>4.0</td>
<td>0.5%</td>
</tr>
<tr>
<td>PsC</td>
<td>Peru extremely stony loam, 0 to 20 percent slopes</td>
<td>0.6</td>
<td>0.1%</td>
</tr>
<tr>
<td>Rk</td>
<td>Rock land</td>
<td>2.1</td>
<td>0.3%</td>
</tr>
<tr>
<td>ScA</td>
<td>Scantic silt loam, 0 to 2 percent slopes</td>
<td>1.8</td>
<td>0.2%</td>
</tr>
<tr>
<td>TeE</td>
<td>Terrace escarpments, silty and clayey</td>
<td>26.1</td>
<td>3.3%</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
<td>49.8</td>
<td>6.3%</td>
</tr>
<tr>
<td>Wo</td>
<td>Winooski very fine sandy loam</td>
<td>55.3</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

Totals for Area of Interest 787.5 100.0%
Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly
indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.
Chittenden County, Vermont

AdB—Adams and Windsor loamy sands, 5 to 12 percent slopes

Map Unit Setting
- **Landscape:** River valleys
  - **Elevation:** 90 to 1,200 feet
  - **Mean annual precipitation:** 30 to 50 inches
  - **Mean annual air temperature:** 37 to 52 degrees F
  - **Frost-free period:** 90 to 180 days

Map Unit Composition
- **Windsor and similar soils:** 43 percent
- **Adams and similar soils:** 43 percent
- **Minor components:** 14 percent

Description of Adams

Setting
- **Landform:** Terraces
  - **Landform position (three-dimensional):** Tread
  - **Down-slope shape:** Linear
  - **Across-slope shape:** Linear
  - **Parent material:** Sandy glaciofluvial deposits

Properties and qualities
- **Slope:** 5 to 12 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Somewhat excessively drained
- **Capacity of the most limiting layer to transmit water (Ksat):** High to very high (6.00 to 20.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Low (about 3.4 inches)

Interpretive groups
- **Farmland classification:** Farmland of statewide importance
- **Land capability (nonirrigated):** 4e
- **Hydrologic Soil Group:** A

Typical profile
- **0 to 7 inches:** Loamy sand
- **7 to 30 inches:** Loamy fine sand
- **30 to 65 inches:** Loamy fine sand

Description of Windsor

Setting
- **Landform:** Terraces
  - **Landform position (three-dimensional):** Tread
  - **Down-slope shape:** Linear
  - **Across-slope shape:** Linear
  - **Parent material:** Sandy glaciofluvial deposits
Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 4s
Hydrologic Soil Group: A

Typical profile

0 to 6 inches: Loamy sand
6 to 23 inches: Loamy sand
23 to 65 inches: Coarse sand

Minor Components

Agawam
Percent of map unit: 5 percent

Deerfield
Percent of map unit: 5 percent
Landform: Deltas, terraces

Duane
Percent of map unit: 4 percent

AgA—Agawam fine sandy loam, 0 to 5 percent slopes

Map Unit Setting

Landscape: River valleys
Elevation: 90 to 1,200 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 37 to 52 degrees F
Frost-free period: 90 to 180 days

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent

Description of Agawam

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Coarse-loamy glaciofluvial deposits over sandy and gravelly
              glaciofluvial deposits

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups
Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 1
Hydrologic Soil Group: B

Typical profile
0 to 9 inches: Fine sandy loam
9 to 18 inches: Fine sandy loam
18 to 32 inches: Loamy sand
32 to 65 inches: Gravelly loamy fine sand

Minor Components
Adams
Percent of map unit: 3 percent
Landform: Terraces

Deerfield
Percent of map unit: 3 percent
Landform: Deltas, terraces

Hartland
Percent of map unit: 3 percent

Ninigret
Percent of map unit: 3 percent

Windsor
Percent of map unit: 3 percent
Landform: Terraces

AgD—Agawam fine sandy loam, 12 to 30 percent slopes

Map Unit Setting
Landscape: River valleys
Elevation: 90 to 1,200 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 37 to 52 degrees F
Frost-free period: 90 to 180 days

Map Unit Composition
Agawam and similar soils: 85 percent
Minor components: 15 percent

Description of Agawam

Setting
Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Parent material: Coarse-loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits

Properties and qualities
Slope: 12 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile
0 to 9 inches: Fine sandy loam
9 to 18 inches: Fine sandy loam
18 to 32 inches: Loamy sand
32 to 65 inches: Gravelly loamy fine sand

Minor Components
Adams
Percent of map unit: 5 percent
Landform: Terraces

Hartland
Percent of map unit: 5 percent

Windsor
Percent of map unit: 5 percent
Landform: Terraces
AgE—Agawam fine sandy loam, 30 to 60 percent slopes

Map Unit Setting

Landscape: River valleys
Elevation: 90 to 1,200 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 37 to 52 degrees F
Frost-free period: 90 to 180 days

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent

Description of Agawam

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B

Typical profile

0 to 9 inches: Fine sandy loam
9 to 18 inches: Fine sandy loam
18 to 32 inches: Loamy sand
32 to 65 inches: Gravelly loamy fine sand

Minor Components

Adams
Percent of map unit: 3 percent
Landform: Terraces
Munson
Percent of map unit: 3 percent

Raynham
Percent of map unit: 3 percent
Landform: Drainageways

Scantic
Percent of map unit: 3 percent
Landform: Drainageways

Windsor
Percent of map unit: 3 percent
Landform: Terraces

An—Alluvial land

Map Unit Setting
Landscape: River valleys
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition
Udifluvents and similar soils: 100 percent

Description of Udifluvents

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and gravelly alluvium

Properties and qualities
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
BIA—Belgrade and Eldridge soils, 0 to 3 percent slopes

Map Unit Setting
- Landscape: Lake plains
- Elevation: 90 to 1,000 feet
- Mean annual precipitation: 30 to 50 inches
- Mean annual air temperature: 45 to 52 degrees F
- Frost-free period: 120 to 180 days

Map Unit Composition
- Eldridge and similar soils: 45 percent
- Belgrade and similar soils: 45 percent
- Minor components: 10 percent

Description of Belgrade

Setting
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
- Slope: 0 to 3 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
- Depth to water table: About 18 to 42 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: High (about 9.2 inches)

Interpretive groups
- Farmland classification: All areas are prime farmland
- Land capability (nonirrigated): 2w
- Hydrologic Soil Group: B

Typical profile
- 0 to 7 inches: Very fine sandy loam
- 7 to 23 inches: Very fine sandy loam
- 23 to 60 inches: Very fine sandy loam

Description of Eldridge

Setting
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Linear
- Across-slope shape: Linear
Parent material: Sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.5 inches)

Interpretive groups
Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C

Typical profile
0 to 9 inches: Loamy fine sand
9 to 27 inches: Loamy fine sand
27 to 60 inches: Silt loam

Minor Components
Enosburg
Percent of map unit: 5 percent
Landform: Depressions

Raynham
Percent of map unit: 5 percent
Landform: Depressions

BIB—Belgrade and Eldridge soils, 3 to 8 percent slopes

Map Unit Setting
Landscape: Lake plains
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition
Eldridge and similar soils: 45 percent
Belgrade and similar soils: 45 percent
Minor components: 10 percent
Description of Belgrade

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.2 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile
0 to 7 inches: Very fine sandy loam
7 to 23 inches: Very fine sandy loam
23 to 60 inches: Very fine sandy loam

Description of Eldridge

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.5 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C
Typical profile
 0 to 9 inches: Loamy fine sand
9 to 27 inches: Loamy fine sand
27 to 60 inches: Silt loam

Minor Components

Enosburg
  Percent of map unit: 5 percent
  Landform: Depressions

Raynham
  Percent of map unit: 5 percent
  Landform: Depressions

Br—Borrow pits

Map Unit Setting
  Elevation: 300 to 2,000 feet
  Mean annual precipitation: 36 to 50 inches
  Mean annual air temperature: 37 to 46 degrees F
  Frost-free period: 90 to 135 days

Map Unit Composition
  Pits, borrow: 100 percent

Description of Pits, Borrow

Setting
  Down-slope shape: Convex
  Across-slope shape: Convex

Interpretive groups
  Farmland classification: Not prime farmland
  Land capability (nonirrigated): 8e

Typical profile
  0 to 60 inches: Variable

DdA—Duane and Deerfield soils, 0 to 5 percent slopes

Map Unit Setting
  Landscape: River valleys
  Elevation: 90 to 1,200 feet
  Mean annual precipitation: 30 to 50 inches
  Mean annual air temperature: 37 to 52 degrees F
**Frost-free period:** 90 to 180 days

**Map Unit Composition**
- Deerfield and similar soils: 45 percent
- Duane and similar soils: 45 percent
- Minor components: 10 percent

**Description of Duane**

**Setting**
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Sandy and gravelly glaciofluvial deposits

**Properties and qualities**
- Slope: 0 to 5 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
- Depth to water table: About 18 to 24 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: Very low (about 1.5 inches)

**Interpretive groups**
- Farmland classification: Farmland of statewide importance
- Land capability (nonirrigated): 3w
- Hydrologic Soil Group: B

**Typical profile**
- 0 to 4 inches: Fine sandy loam
- 4 to 11 inches: Gravelly loamy fine sand
- 11 to 15 inches: Gravelly loamy fine sand
- 15 to 52 inches: Very gravelly sand

**Description of Deerfield**

**Setting**
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Sandy glaciofluvial deposits

**Properties and qualities**
- Slope: 0 to 5 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
- Depth to water table: About 18 to 36 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: Low (about 3.6 inches)
Interpretive groups
  
  Farmland classification: Farmland of statewide importance  
  Land capability (nonirrigated): 3w  
  Hydrologic Soil Group: B

Typical profile
  
  0 to 6 inches: Fine sandy loam  
  6 to 22 inches: Loamy sand  
  22 to 65 inches: Sand

Minor Components
  
  Au gres  
  10 percent of map unit

DdB—Duane and Deerfield soils, 5 to 12 percent slopes

Map Unit Setting
  
  Landscape: River valleys  
  Elevation: 90 to 1,200 feet  
  Mean annual precipitation: 30 to 50 inches  
  Mean annual air temperature: 37 to 52 degrees F  
  Frost-free period: 90 to 180 days

Map Unit Composition
  
  Deerfield and similar soils: 42 percent  
  Duane and similar soils: 42 percent  
  Minor components: 16 percent

Description of Duane

Setting
  
  Landform: Terraces  
  Landform position (three-dimensional): Tread  
  Down-slope shape: Concave  
  Across-slope shape: Concave  
  Parent material: Sandy and gravelly glaciofluvial deposits

Properties and qualities
  
  Slope: 5 to 12 percent  
  Depth to restrictive feature: More than 80 inches  
  Drainage class: Moderately well drained  
  Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)  
  Depth to water table: About 18 to 24 inches  
  Frequency of flooding: None  
  Frequency of ponding: None  
  Available water capacity: Very low (about 1.5 inches)

Interpretive groups
  
  Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: B

**Typical profile**
- 0 to 4 inches: Fine sandy loam
- 4 to 11 inches: Gravelly loamy fine sand
- 11 to 15 inches: Gravelly loamy fine sand
- 15 to 52 inches: Very gravelly sand

**Description of Deerfield**

**Setting**
- Landform: Terraces
- Down-slope shape: Concave
- Across-slope shape: Concave
- Parent material: Sandy glaciofluvial deposits

**Properties and qualities**
- Slope: 5 to 12 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Moderately well drained
- Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
- Depth to water table: About 18 to 36 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: Low (about 3.6 inches)

**Interpretive groups**
- Farmland classification: Farmland of statewide importance
- Land capability (nonirrigated): 3e
- Hydrologic Soil Group: B

**Typical profile**
- 0 to 6 inches: Fine sandy loam
- 6 to 22 inches: Loamy sand
- 22 to 65 inches: Sand

**Minor Components**

**Adams**
- Percent of map unit: 3 percent
- Landform: Terraces

**Colton**
- Percent of map unit: 3 percent
- Landform: Terraces

**Stetson**
- Percent of map unit: 3 percent

**Windsor**
- Percent of map unit: 3 percent
- Landform: Terraces

**Agawam**
- Percent of map unit: 2 percent

**Au gres**
- Percent of map unit: 2 percent
**Fu—Fill land**

**Map Unit Setting**
- *Elevation:* 90 to 1,000 feet
- *Mean annual precipitation:* 30 to 50 inches
- *Mean annual air temperature:* 45 to 52 degrees F
- *Frost-free period:* 120 to 180 days

**Map Unit Composition**
- *Udorthents and similar soils:* 100 percent

**Description of Udorthents**

**Setting**
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Mine spoil or earthy fill

**Properties and qualities**
- *Depth to restrictive feature:* More than 80 inches
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high
  - (0.20 to 6.00 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Moderate (about 6.6 inches)

**Interpretive groups**
- *Farmland classification:* Not prime farmland
- *Land capability (nonirrigated):* 8s

**Typical profile**
- 0 to 65 inches: Gravelly sandy loam

**Hf—Hadley very fine sandy loam**

**Map Unit Setting**
- *Landscape:* River valleys
- *Elevation:* 90 to 1,000 feet
- *Mean annual precipitation:* 30 to 50 inches
- *Mean annual air temperature:* 45 to 52 degrees F
- *Frost-free period:* 120 to 180 days

**Map Unit Composition**
- *Hadley and similar soils:* 85 percent
Minor components: 15 percent

Description of Hadley

Setting
- **Landform**: Flood plains
- **Landform position (three-dimensional)**: Tread
- **Down-slope shape**: Linear
- **Across-slope shape**: Linear
- **Parent material**: Coarse-silty alluvium

Properties and qualities
- **Slope**: 0 to 3 percent
- **Depth to restrictive feature**: More than 80 inches
- **Drainage class**: Well drained
- **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately high to high (0.60 to 2.00 in/hr)
- **Depth to water table**: About 48 to 72 inches
- **Frequency of flooding**: Occasional
- **Frequency of ponding**: None
- **Available water capacity**: High (about 10.5 inches)

Interpretive groups
- **Farmland classification**: All areas are prime farmland
- **Land capability (nonirrigated)**: 1
- **Hydrologic Soil Group**: B

Typical profile
- **0 to 11 inches**: Very fine sandy loam
- **11 to 68 inches**: Very fine sandy loam
- **68 to 72 inches**: Silt loam

Minor Components

- **Agawam**
  - Percent of map unit: 5 percent

- **Occum**
  - Percent of map unit: 5 percent
  - **Landform**: Flood plains

- **Winooski**
  - Percent of map unit: 5 percent
  - **Landform**: Flood plains

Hh—Hadley very fine sandy loam, frequently flooded

Map Unit Setting
- **Landscape**: River valleys
- **Elevation**: 90 to 1,000 feet
- **Mean annual precipitation**: 30 to 50 inches
- **Mean annual air temperature**: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition

Hadley and similar soils: 85 percent
Minor components: 15 percent

Description of Hadley

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty alluvium

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 10.5 inches)

Interpretive groups

Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season
Land capability (nonirrigated): 1
Hydrologic Soil Group: B

Typical profile

0 to 11 inches: Very fine sandy loam
11 to 68 inches: Very fine sandy loam
68 to 72 inches: Silt loam

Minor Components

Limerick

Percent of map unit: 5 percent
Landform: Depressions on flood plains

Occum

Percent of map unit: 5 percent
Landform: Flood plains

Winooski

Percent of map unit: 5 percent
Landform: Flood plains
HIC—Hartland very fine sandy loam, 6 to 12 percent slopes

Map Unit Setting
- Landscape: Lake plains
- Elevation: 90 to 1,000 feet
- Mean annual precipitation: 30 to 50 inches
- Mean annual air temperature: 45 to 52 degrees F
- Frost-free period: 120 to 180 days

Map Unit Composition
- Hartland and similar soils: 90 percent
- Minor components: 10 percent

Description of Hartland

Setting
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Concave
- Across-slope shape: Concave
- Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
- Slope: 6 to 12 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: High (about 11.2 inches)

Interpretive groups
- Farmland classification: Farmland of statewide importance
- Land capability (nonirrigated): 3e
- Hydrologic Soil Group: B

Typical profile
- 0 to 1 inches: Very fine sandy loam
- 1 to 23 inches: Very fine sandy loam
- 23 to 65 inches: Very fine sandy loam

Minor Components

Agawam
- Percent of map unit: 5 percent

Belgrade
- Percent of map unit: 5 percent
HID—Hartland very fine sandy loam, 12 to 25 percent slopes

Map Unit Setting
- **Landscape:** Lake plains
- **Elevation:** 90 to 1,000 feet
- **Mean annual precipitation:** 30 to 50 inches
- **Mean annual air temperature:** 45 to 52 degrees F
- **Frost-free period:** 120 to 180 days

Map Unit Composition
- **Hartland and similar soils:** 90 percent
- **Minor components:** 10 percent

Description of Hartland

Setting
- **Landform:** Terraces
- **Landform position (three-dimensional):** Riser
- **Down-slope shape:** Concave
- **Across-slope shape:** Concave
- **Parent material:** Coarse-silty glaciolacustrine deposits

Properties and qualities
- **Slope:** 12 to 25 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Well drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.20 to 2.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** High (about 11.2 inches)

Interpretive groups
- **Farmland classification:** Not prime farmland
- **Land capability (nonirrigated):** 4e
- **Hydrologic Soil Group:** B

Typical profile
- **0 to 1 inches:** Very fine sandy loam
- **1 to 23 inches:** Very fine sandy loam
- **23 to 65 inches:** Very fine sandy loam

Minor Components

**Agawam**
- **Percent of map unit:** 5 percent

**Belgrade**
- **Percent of map unit:** 5 percent
HIE—Hartland very fine sandy loam, 25 to 60 percent slopes

Map Unit Setting
- Landscape: Lake plains
- Elevation: 90 to 1,200 feet
- Mean annual precipitation: 30 to 50 inches
- Mean annual air temperature: 37 to 52 degrees F
- Frost-free period: 90 to 180 days

Map Unit Composition
- Hartland and similar soils: 85 percent
- Minor components: 15 percent

Description of Hartland

Setting
- Landform: Terraces
- Landform position (three-dimensional): Riser
- Down-slope shape: Concave
- Across-slope shape: Concave
- Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
- Slope: 25 to 60 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Well drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: High (about 11.2 inches)

Interpretive groups
- Farmland classification: Not prime farmland
- Land capability (nonirrigated): 7e
- Hydrologic Soil Group: B

Typical profile
- 0 to 1 inches: Very fine sandy loam
- 1 to 23 inches: Very fine sandy loam
- 23 to 65 inches: Very fine sandy loam

Minor Components

Adams
- Percent of map unit: 5 percent
- Landform: Terraces

Agawam
- Percent of map unit: 5 percent
Windsor
Percent of map unit: 5 percent
Landform: Terraces

Le—Limerick silt loam

Map Unit Setting
Landscape: River valleys
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition
Limerick and similar soils: 85 percent
Minor components: 15 percent

Description of Limerick

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty alluvium

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Very high (about 13.3 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: C

Typical profile
0 to 5 inches: Silt loam
5 to 28 inches: Silt loam
28 to 65 inches: Silt loam

Minor Components

Winooski
Percent of map unit: 8 percent
Landform: Flood plains

Rippowam
  Percent of map unit: 7 percent
  Landform: Flood plains

Lf—Limerick silt loam, very wet

Map Unit Setting
  Landscape: River valleys
  Elevation: 90 to 1,000 feet
  Mean annual precipitation: 30 to 50 inches
  Mean annual air temperature: 45 to 52 degrees F
  Frost-free period: 120 to 180 days

Map Unit Composition
  Limerick and similar soils: 85 percent
  Minor components: 15 percent

Description of Limerick

Setting
  Landform: Flood plains
  Landform position (three-dimensional): Tread
  Down-slope shape: Linear
  Across-slope shape: Linear
  Parent material: Coarse-silty alluvium

Properties and qualities
  Slope: 0 to 1 percent
  Depth to restrictive feature: More than 80 inches
  Drainage class: Poorly drained
  Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
  Depth to water table: About 0 to 18 inches
  Frequency of flooding: Frequent
  Frequency of ponding: None
  Available water capacity: Very high (about 13.3 inches)

Interpretive groups
  Farmland classification: Not prime farmland
  Land capability (nonirrigated): 4w
  Hydrologic Soil Group: C

Typical profile
  0 to 5 inches: Silt loam
  5 to 28 inches: Silt loam
  28 to 65 inches: Silt loam
Minor Components

Winooski
Percent of map unit: 8 percent
Landform: Flood plains

Rippowam
Percent of map unit: 7 percent
Landform: Flood plains

LyE—Lyman-Marlow very rocky loams, 30 to 60 percent slopes

Map Unit Setting
Landscape: Uplands
Elevation: 300 to 2,000 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition
Lyman and similar soils: 65 percent
Marlow and similar soils: 20 percent
Minor components: 15 percent

Description of Lyman

Setting
Landform: Mountains, hills
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Mountaintop, mountainflank, interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy till

Properties and qualities
Slope: 30 to 60 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.0 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: D

**Typical profile**
- 0 to 6 inches: Loam
- 6 to 19 inches: Channery loam
- 19 to 23 inches: Unweathered bedrock

**Description of Marlow**

**Setting**
- **Landform:** Mountains, hills
- **Landform position (two-dimensional):** Backslope, summit
- **Landform position (three-dimensional):** Mountaintop, mountainflank, interfluve, side slope
- **Down-slope shape:** Convex
- **Across-slope shape:** Convex
- **Parent material:** Coarse-loamy basal till

**Properties and qualities**
- **Slope:** 30 to 60 percent
- **Surface area covered with cobbles, stones or boulders:** 1.6 percent
- **Depth to restrictive feature:** 20 to 40 inches to dense material
- **Drainage class:** Well drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately low to moderately high (0.06 to 0.60 in/hr)
- **Depth to water table:** About 24 to 42 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Low (about 3.0 inches)

**Interpretive groups**
- **Farmland classification:** Not prime farmland
- **Land capability (nonirrigated):** 7s
- **Hydrologic Soil Group:** C

**Typical profile**
- 0 to 11 inches: Loam
- 11 to 24 inches: Fine sandy loam
- 24 to 65 inches: Gravelly fine sandy loam

**Minor Components**

**Rock outcrop**
- **Percent of map unit:** 5 percent

**Stetson**
- **Percent of map unit:** 3 percent

**Tunbridge**
- **Percent of map unit:** 3 percent

**Cabot**
- **Percent of map unit:** 2 percent
- **Landform:** Drainageways

**Peru**
- **Percent of map unit:** 2 percent
MuD—Munson and Belgrade silt loams, 12 to 25 percent slopes

Map Unit Setting
- **Landscape**: Lake plains
- **Elevation**: 90 to 2,000 feet
- **Mean annual precipitation**: 30 to 50 inches
- **Mean annual air temperature**: 37 to 52 degrees F
- **Frost-free period**: 90 to 180 days

Map Unit Composition
- **Belgrade and similar soils**: 43 percent
- **Munson and similar soils**: 43 percent
- **Minor components**: 14 percent

Description of Munson

**Setting**
- **Landform**: Terraces
- **Landform position (three-dimensional)**: Riser
- **Down-slope shape**: Concave
- **Across-slope shape**: Concave
- **Parent material**: Coarse-silty glaciolacustrine deposits over clayey glaciolacustrine deposits

**Properties and qualities**
- **Slope**: 12 to 25 percent
- **Depth to restrictive feature**: More than 80 inches
- **Drainage class**: Somewhat poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat)**: Very low to moderately high (0.00 to 0.20 in/hr)
- **Depth to water table**: About 6 to 24 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Available water capacity**: High (about 10.6 inches)

**Interpretive groups**
- **Farmland classification**: Not prime farmland
- **Land capability (nonirrigated)**: 4e
- **Hydrologic Soil Group**: D

**Typical profile**
- **0 to 8 inches**: Silt loam
- **8 to 15 inches**: Silt loam
- **15 to 65 inches**: Silty clay

Description of Belgrade

**Setting**
- **Landform**: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
Slope: 12 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.2 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile
0 to 7 inches: Very fine sandy loam
7 to 23 inches: Very fine sandy loam
23 to 60 inches: Very fine sandy loam

Minor Components
Cabot
Percent of map unit: 5 percent
Landform: Depressions

Hartland
Percent of map unit: 5 percent

Peru
Percent of map unit: 4 percent

MyB—Munson and Raynham silt loams, 2 to 6 percent slopes

Map Unit Setting
Landscape: Lake plains
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition
Raynham and similar soils: 45 percent
Munson and similar soils: 45 percent
Minor components: 10 percent
Description of Munson

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty glaciolacustrine deposits over clayey glaciolacustrine deposits

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.6 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: D

Typical profile
0 to 8 inches: Silt loam
8 to 15 inches: Silt loam
15 to 65 inches: Silty clay

Description of Raynham

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty glaciolacustrine deposits

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: High (about 11.6 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: C
Typical profile
0 to 6 inches: Silt loam
6 to 22 inches: Silt loam
22 to 65 inches: Silt loam

Minor Components

Belgrade
Percent of map unit: 5 percent

Hartland
Percent of map unit: 5 percent

MyC—Munson and Raynharm silt loams, 6 to 12 percent slopes

Map Unit Setting
Landscape: Lake plains
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days

Map Unit Composition
Raynharn and similar soils: 45 percent
Munson and similar soils: 45 percent
Minor components: 10 percent

Description of Munson

Setting
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-silty glaciolacustrine deposits over clayey glaciolacustrine deposits

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.6 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: D

**Typical profile**
- 0 to 8 inches: Silt loam
- 8 to 15 inches: Silt loam
- 15 to 65 inches: Silty clay

**Description of Raynham**

**Setting**
- Landform: Terraces
- Landform position (three-dimensional): Tread
- Down-slope shape: Concave
- Across-slope shape: Concave
- Parent material: Coarse-silty glaciolacustrine deposits

**Properties and qualities**
- Slope: 6 to 12 percent
- Depth to restrictive feature: More than 80 inches
- Drainage class: Poorly drained
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
- Depth to water table: About 0 to 24 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Calcium carbonate, maximum content: 5 percent
- Available water capacity: High (about 11.6 inches)

**Interpretive groups**
- Farmland classification: Farmland of statewide importance
- Land capability (nonirrigated): 3w
- Hydrologic Soil Group: C

**Typical profile**
- 0 to 6 inches: Silt loam
- 6 to 22 inches: Silt loam
- 22 to 65 inches: Silt loam

**Minor Components**

- Belgrade
  - Percent of map unit: 5 percent

- Hartland
  - Percent of map unit: 5 percent

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PsC—Peru extremely stony loam, 0 to 20 percent slopes

**Map Unit Setting**
- Landscape: Uplands
Elevation: 300 to 2,000 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition
Peru and similar soils: 85 percent
Minor components: 15 percent

Description of Peru

Setting
Landform: Hills, mountains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Mountaintop, mountainbase, base slope, interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy basal till

Properties and qualities
Slope: 0 to 20 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 34 inches to dense material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.9 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C

Typical profile
0 to 3 inches: Loam
3 to 22 inches: Gravelly fine sandy loam
22 to 65 inches: Gravelly fine sandy loam

Minor Components

Cabot
Percent of map unit: 5 percent
Landform: Depressions

Lyman
Percent of map unit: 5 percent

Marlow
Percent of map unit: 5 percent
Rk—Rock land

Map Unit Setting

*Landscape:* Uplands  
*Elevation:* 300 to 4,400 feet  
*Mean annual precipitation:* 36 to 50 inches  
*Mean annual air temperature:* 37 to 46 degrees F  
*Frost-free period:* 90 to 135 days

Map Unit Composition

*Rock outcrop:* 70 percent  
*Minor components:* 30 percent

Description of Rock Outcrop

Setting

*Landform:* Mountains  
*Landform position (two-dimensional):* Backslope, summit, shoulder  
*Landform position (three-dimensional):* Mountainflank, free face, mountaintop  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex

Properties and qualities

*Depth to restrictive feature:* 0 inches to lithic bedrock  
*Capacity of the most limiting layer to transmit water (Ksat):* Low to very high (0.01 to 20.00 in/hr) 
*Available water capacity:* Very low (about 0.0 inches)

Interpretive groups

*Farmland classification:* Not prime farmland  
*Land capability (nonirrigated):* 8s  
*Hydrologic Soil Group:* D

Typical profile

0 to 10 inches: Unweathered bedrock

Minor Components

*Unnamed, very shallow*  
*Percent of map unit:* 15 percent

*Unnamed, shallow*  
*Percent of map unit:* 15 percent
ScA—Scantic silt loam, 0 to 2 percent slopes

Map Unit Setting
- **Landscape:** Lake plains
- **Elevation:** 90 to 1,200 feet
- **Mean annual precipitation:** 30 to 50 inches
- **Mean annual air temperature:** 37 to 52 degrees F
- **Frost-free period:** 90 to 180 days

Map Unit Composition
- **Scantic and similar soils:** 85 percent
- **Minor components:** 15 percent

Description of Scantic

Setting
- **Landform:** Terraces
- **Landform position (three-dimensional):** Tread
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear
- **Parent material:** Clayey glaciolacustrine deposits

Properties and qualities
- **Slope:** 0 to 2 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Very low to moderately high (0.00 to 0.20 in/hr)
- **Depth to water table:** About 0 to 12 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** High (about 10.2 inches)

Interpretive groups
- **Farmland classification:** Farmland of statewide importance
- **Land capability (nonirrigated):** 3w
- **Hydrologic Soil Group:** D

Typical profile
- 0 to 13 inches: Silt loam
- 13 to 26 inches: Silty clay loam
- 26 to 65 inches: Silty clay

Minor Components

**Livingston**
- **Percent of map unit:** 5 percent
- **Landform:** Depressions

**Munson**
- **Percent of map unit:** 5 percent
Raynham
- Percent of map unit: 5 percent
- Landform: Knolls

TeE—Terrace escarpments, silty and clayey

Map Unit Setting
- Landscape: Lake plains
- Elevation: 90 to 1,000 feet
- Mean annual precipitation: 30 to 50 inches
- Mean annual air temperature: 45 to 52 degrees F
- Frost-free period: 120 to 180 days

Map Unit Composition
- Udorthents and similar soils: 100 percent

Description of Udorthents

Setting
- Landform: Terraces
- Landform position (three-dimensional): Riser
- Down-slope shape: Concave
- Across-slope shape: Concave
- Parent material: Mine spoil or earthy fill

Properties and qualities
- Depth to restrictive feature: More than 80 inches
- Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: Moderate (about 6.6 inches)

Interpretive groups
- Farmland classification: Not prime farmland
- Land capability (nonirrigated): 7e

Typical profile
- 0 to 65 inches: Gravelly sandy loam

W—Water

Map Unit Composition
- Water: 100 percent
Wo—Winooski very fine sandy loam

Map Unit Setting
  Landscape: River valleys
  Elevation: 90 to 1,000 feet
  Mean annual precipitation: 30 to 50 inches
  Mean annual air temperature: 45 to 52 degrees F
  Frost-free period: 120 to 180 days

Map Unit Composition
  Winooski and similar soils: 85 percent
  Minor components: 15 percent

Description of Winooski

Setting
  Landform: Flood plains
  Landform position (three-dimensional): Tread
  Down-slope shape: Linear
  Across-slope shape: Linear
  Parent material: Coarse-silty alluvium

Properties and qualities
  Slope: 0 to 3 percent
  Depth to restrictive feature: More than 80 inches
  Drainage class: Moderately well drained
  Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
  Depth to water table: About 18 to 36 inches
  Frequency of flooding: Occasional
  Frequency of ponding: None
  Available water capacity: High (about 10.4 inches)

Interpretive groups
  Farmland classification: All areas are prime farmland
  Land capability (nonirrigated): 2w
  Hydrologic Soil Group: B

Typical profile
  0 to 10 inches: Very fine sandy loam
  10 to 60 inches: Very fine sandy loam

Minor Components

Hadley
  Percent of map unit: 5 percent
  Landform: Flood plains

Limerick
  Percent of map unit: 5 percent
  Landform: Depressions on flood plains

Pootatuck
  Percent of map unit: 5 percent
  Landform: Flood plains
Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Building Site Development

Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Lawns, Landscaping, and Golf Fairways

This interpretation rates soils for their use in establishing and maintaining turf for lawns and golf fairways and ornamental trees and shrubs for residential or commercial landscaping. Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required.

The ratings are based on the use of soil material at the site, which may have been altered by some land smoothing. Irrigation may or may not be needed and is not a criterion in rating. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.
Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. Soils that are subject to flooding are limited by the duration and intensity of flooding and the season when flooding occurs. In planning for lawns, landscaping, or golf fairways, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.
Custom Soil Resource Report

**MAP LEGEND**

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Units

**Soil Ratings**
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

**Political Features**
- Cities

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**MAP INFORMATION**

Map Scale: 1:16,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chittenden County, Vermont
Survey Area Data: Version 15, Jan 19, 2010

Date(s) aerial images were photographed: 8/20/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Tables—Lawns, Landscaping, and Golf Fairways

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
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<td>Hartland very fine sandy loam, 12 to 25 percent slopes</td>
<td>Very limited</td>
<td>Hartland (90%)</td>
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<td>HIE</td>
<td>Hartland very fine sandy loam, 25 to 60 percent slopes</td>
<td>Very limited</td>
<td>Hartland (85%)</td>
<td>Too steep (1.00)</td>
<td>30.1</td>
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<td>Le</td>
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<td>Very limited</td>
<td>Limerick (85%)</td>
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</table>
| LyE             | Lyman-Marlow very rocky loams, 30 to 60 percent slopes | Very limited | Lyman (65%) | Too steep (1.00)  
Depth to bedrock (1.00)  
Droughty (0.43)  
Large stones (0.03) | 2.4 | 0.3% |
|                 | Marlow (20%) | Too steep (1.00)  
Droughty (0.46)  
Large stones (0.01) | |
|                 | Stetson (3%) | Too steep (1.00)  
Large stones (0.08)  
Droughty (0.04)  
Gravel (0.01) | |
|                 | Tunbridge (3%) | Too steep (1.00)  
Depth to bedrock (0.42) | |
|                 | Cabot (2%) | Too steep (1.00)  
Depth to saturated zone (1.00)  
Droughty (0.99)  
Large stones (0.03) | |
|                 | Peru (2%) | Too steep (1.00)  
Depth to saturated zone (0.68)  
Droughty (0.54)  
Large stones (0.32) | |
| MuD             | Munson and Belgrade silt loams, 12 to 25 percent slopes | Very limited | Munson (43%) | Depth to saturated zone (1.00)  
Too steep (1.00) | 18.7 | 2.4% |
|                 | Belgrade (43%) | Too steep (1.00)  
Depth to saturated zone (0.35) | |
|                 | Cabot (5%) | Depth to saturated zone (1.00)  
Too steep (1.00)  
Droughty (0.87)  
Large stones (0.00) | |
|                 | Hartland (5%) | Too steep (1.00) | |
|                 | Peru (4%) | Too steep (1.00)  
Depth to saturated zone (0.68)  
Droughty (0.42)  
Large stones (0.00) | |
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<th>Map unit symbol</th>
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<th>Acres in AOI</th>
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<td>Raynham (45%)</td>
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<td>MyC</td>
<td>Munson and Raynham silt loams, 6 to 12 percent slopes</td>
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<td>Depth to saturated zone (1.00)</td>
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<td>0.5%</td>
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<td>Large stones (0.32)</td>
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<td>Marlow (5%)</td>
<td>Slope (0.96)</td>
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<td></td>
<td>Too clayey (1.00)</td>
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<td>Munson (5%)</td>
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<td></td>
<td></td>
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<td>Raynham (5%)</td>
<td>Depth to saturated zone (1.00)</td>
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</tr>
<tr>
<td>TeE</td>
<td>Terrace escarpments, silty and clayey</td>
<td>Not rated</td>
<td>Udorthents (100%)</td>
<td></td>
<td>26.1</td>
<td>3.3%</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
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<td>6.3%</td>
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<tr>
<td>Wo</td>
<td>Winooski very fine sandy loam</td>
<td>Somewhat limited</td>
<td>Winooski (85%)</td>
<td>Flooding (0.60)</td>
<td>55.3</td>
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<td>Depth to saturated zone (0.03)</td>
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<td></td>
<td></td>
<td></td>
<td>Hadley (5%)</td>
<td>Flooding (0.60)</td>
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<td>Totals for Area of Interest</td>
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<td>787.5</td>
<td>100.0%</td>
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### Lawns, Landscaping, and Golf Fairways—Summary by Rating Value

<table>
<thead>
<tr>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very limited</td>
<td>412.4</td>
<td>52.4%</td>
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</tbody>
</table>
Rating Options—Lawns, Landscaping, and Golf Fairways

Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: Higher

Local Roads and Streets

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown.
for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.
MAP LEGEND

Area of Interest (AOI)

Soils

Soil Ratings

Very limited
Somewhat limited
Not limited
Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

MAP INFORMATION

Map Scale: 1:16,600 if printed on A size (8.5” × 11”) sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chittenden County, Vermont
Survey Area Data: Version 15, Jan 19, 2010

Date(s) aerial images were photographed: 8/20/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Local Roads and Streets—Summary by Map Unit—Chittenden County, Vermont (VT007)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdB</td>
<td>Adams and Windsor loamy sands, 5 to 12 percent slopes</td>
<td>Somewhat limited</td>
<td>Adams (43%)</td>
<td>Slope (0.04)</td>
<td>1.2</td>
<td>0.2%</td>
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<td></td>
<td></td>
<td></td>
<td>Windsor (43%)</td>
<td>Slope (0.04)</td>
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<td></td>
<td></td>
<td></td>
<td>Agawam (5%)</td>
<td>Slope (0.04)</td>
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<td></td>
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<td></td>
<td>Deerfield (5%)</td>
<td>Frost action (0.50)</td>
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<td>Slope (0.04)</td>
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<td>Depth to saturated zone (0.03)</td>
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<td>Duane (4%)</td>
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<td>Slope (0.04)</td>
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<tr>
<td>AgA</td>
<td>Agawam fine sandy loam, 0 to 5 percent slopes</td>
<td>Not limited</td>
<td>Agawam (85%)</td>
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<td>41.2</td>
<td>5.2%</td>
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<td>Windsor (3%)</td>
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<tr>
<td>AgD</td>
<td>Agawam fine sandy loam, 12 to 30 percent slopes</td>
<td>Very limited</td>
<td>Agawam (85%)</td>
<td>Too steep (1.00)</td>
<td>9.1</td>
<td>1.2%</td>
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<td>Adams (5%)</td>
<td>Too steep (1.00)</td>
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<td>Hartland (5%)</td>
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<td>Windsor (5%)</td>
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<td>AgE</td>
<td>Agawam fine sandy loam, 30 to 60 percent slopes</td>
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<td>Depth to saturated zone (1.00) Frost action (1.00)</td>
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<td>Depth to saturated zone (1.00) Frost action (1.00)</td>
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<td>Raynham (5%)</td>
<td>Depth to saturated zone (1.00) Frost action (1.00)</td>
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<td>0.2%</td>
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<td>Somewhat limited</td>
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<td>0.3%</td>
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<td>Deerfield (45%)</td>
<td>Frost action (0.50) Depth to saturated zone (0.03)</td>
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<td>Duane (42%)</td>
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<td>Windsor (3%)</td>
<td>Slope (0.04)</td>
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<td>Hadley (85%)</td>
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<td>Occum (5%)</td>
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<td></td>
<td>Winooski (5%)</td>
<td>Frost action (0.50)</td>
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<td>Hh</td>
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<td>Flooding (1.00)</td>
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<td>Occum (5%)</td>
<td>Flooding (1.00)</td>
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<td>Winooski (5%)</td>
<td>Frost action (0.50)</td>
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<td>Depth to saturated zone (0.03)</td>
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<td>Hartland (90%)</td>
<td>Frost action (1.00)</td>
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<td>0.2%</td>
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<td>Belgrade (5%)</td>
<td>Frost action (1.00)</td>
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<td>Depth to saturated zone (0.35)</td>
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<td>Slope (0.04)</td>
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<td>Belgrade (5%)</td>
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<td>Too steep (1.00)</td>
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<td>Depth to saturated zone (0.35)</td>
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<tr>
<td>HIE</td>
<td>Hartland very fine sandy loam, 25 to 60 percent slopes</td>
<td>Very limited</td>
<td>Hartland (85%)</td>
<td>Too steep (1.00)</td>
<td>30.1</td>
<td>3.8%</td>
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<td></td>
<td>Adams (5%)</td>
<td>Frost action (1.00)</td>
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<td>Agawam (5%)</td>
<td>Too steep (1.00)</td>
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<td></td>
<td>Windsor (5%)</td>
<td>Too steep (1.00)</td>
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<td>Le</td>
<td>Limerick silt loam</td>
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<td>Rippowam (7%)</td>
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<td>Rippowam (7%)</td>
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<td>Peru (2%)</td>
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<td>Hartland (5%)</td>
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<td>Peru (4%)</td>
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<td>46.3</td>
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<td>Raynham (45%)</td>
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<td>Munson and Raynham silt loams, 6 to 12 percent slopes</td>
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<td>Slope (0.04)</td>
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<td>Raynham (45%)</td>
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<td>PsC</td>
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<td>Depth to saturated zone (0.68)</td>
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<td>Rock outcrop (70%)</td>
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<td>Scantic (85%)</td>
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<td>Livingston (5%)</td>
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<td>Munson (5%)</td>
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<td>Raynham (5%)</td>
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<td>Udorthents (100%)</td>
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<td>Hadley (5%)</td>
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<td>Flooding (1.00)</td>
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<td>Limerick (5%)</td>
<td>Depth to saturated zone (1.00)</td>
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<td>Frost action (1.00)</td>
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<td>Pootatuck (5%)</td>
<td>Flooding (1.00)</td>
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<td>Frost action (0.50)</td>
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<td>Depth to saturated zone (0.19)</td>
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<td>Totals for Area of Interest</td>
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<td></td>
<td></td>
<td></td>
<td>787.5</td>
<td>100.0%</td>
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</table>
Local Roads and Streets—Summary by Rating Value

<table>
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<tr>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
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<tbody>
<tr>
<td>Very limited</td>
<td>609.9</td>
<td>77.4%</td>
</tr>
<tr>
<td>Somewhat limited</td>
<td>43.4</td>
<td>5.5%</td>
</tr>
<tr>
<td>Not limited</td>
<td>41.2</td>
<td>5.2%</td>
</tr>
<tr>
<td>Null or Not Rated</td>
<td>93.0</td>
<td>11.8%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td><strong>787.5</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

**Rating Options—Local Roads and Streets**

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

**Land Management**

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

**Erosion Hazard (Off-Road, Off-Trail)**

The ratings in this interpretation indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect.
of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.
Custom Soil Resource Report

MAP LEGEND

- **Area of Interest (AOI)**
- **Soils**
- **Soil Ratings**
  - Very severe
  - Severe
  - Moderate
  - Slight
  - Not rated or not available
- **Political Features**
  - Cities
- **Water Features**
  - Streams and Canals
- **Transportation**
  - Rails
  - Interstate Highways
  - US Routes
  - Major Roads
  - Local Roads

MAP INFORMATION

Map Scale: 1:16,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chittenden County, Vermont
Survey Area Data: Version 15, Jan 19, 2010

Date(s) aerial images were photographed: 8/20/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Tables—Erosion Hazard (Off-Road, Off-Trail)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdB</td>
<td>Adams and Windsor loamy sands, 5 to 12 percent slopes</td>
<td>Slight</td>
<td>Adams (43%)</td>
<td></td>
<td>1.2</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Windsor (43%)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Agawam (5%)</td>
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<td></td>
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<td></td>
<td>Deerfield (5%)</td>
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<td></td>
<td>Duane (4%)</td>
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<tr>
<td>AgA</td>
<td>Agawam fine sandy loam, 0 to 5 percent slopes</td>
<td>Slight</td>
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<td></td>
<td>Deerfield (3%)</td>
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<td>Hartland (3%)</td>
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<td></td>
<td>Ninigret (3%)</td>
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<td></td>
<td></td>
<td>Windsor (3%)</td>
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<tr>
<td>AgD</td>
<td>Agawam fine sandy loam, 12 to 30 percent slopes</td>
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<td>Slope/erodibility (0.50)</td>
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<td>Slope/erodibility (0.50)</td>
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<td>Slope/erodibility (0.50)</td>
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<td>Slope/erodibility (0.50)</td>
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</tr>
<tr>
<td>AgE</td>
<td>Agawam fine sandy loam, 30 to 60 percent slopes</td>
<td>Severe</td>
<td>Agawam (85%)</td>
<td>Slope/erodibility (0.75)</td>
<td>1.3</td>
<td>0.2%</td>
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<td></td>
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<td>Adams (3%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>Windsor (3%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>An</td>
<td>Alluvial land</td>
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<td>Enosburg (5%)</td>
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<td></td>
<td></td>
<td>Raynham (5%)</td>
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<td>Eldridge (45%)</td>
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<td>Enosburg (5%)</td>
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<td>Raynham (5%)</td>
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<tr>
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<td>Borrow pits</td>
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<td>Pits, borrow (100%)</td>
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<td>Duane and Deerfield soils, 0 to 5 percent slopes</td>
<td>Slight</td>
<td>Duane (45%)</td>
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<td>2.6</td>
<td>0.3%</td>
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<td></td>
<td></td>
<td>Deerfield (45%)</td>
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<td></td>
<td></td>
<td></td>
<td>Au Gres (10%)</td>
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</tr>
<tr>
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<td>Map unit name</td>
<td>Rating</td>
<td>Component name (percent)</td>
<td>Rating reasons (numeric values)</td>
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<td>Percent of AOI</td>
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<td>Colton (3%)</td>
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<td>Windsor (3%)</td>
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<td></td>
<td>Agawam (2%)</td>
<td>Au Gres (2%)</td>
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<td>Fu</td>
<td>Fill land</td>
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<td>Udorthents (100%)</td>
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<td>Hf</td>
<td>Hadley very sandy loam</td>
<td>Slight</td>
<td>Hadley (85%)</td>
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<td></td>
<td></td>
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<td>Occum (5%)</td>
<td>Winooski (5%)</td>
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<tr>
<td>Hh</td>
<td>Hadley very sandy loam, frequently flooded</td>
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<td>Limerick (5%)</td>
<td>171.1</td>
<td>21.7%</td>
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<td>Occum (5%)</td>
<td>Winooski (5%)</td>
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<td>HIC</td>
<td>Hartland very fine sandy loam, 6 to 12 percent slopes</td>
<td>Slight</td>
<td>Hartland (90%)</td>
<td>Agawam (5%)</td>
<td>1.3</td>
<td>0.2%</td>
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<td></td>
<td></td>
<td>Belgrade (5%)</td>
<td></td>
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<tr>
<td>HID</td>
<td>Hartland very fine sandy loam, 12 to 25 percent slopes</td>
<td>Moderate</td>
<td>Hartland (90%)</td>
<td>Slope/erodibility (0.50)</td>
<td>8.4</td>
<td>1.1%</td>
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<td>Slope/erodibility (0.50)</td>
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<td>Belgrade (5%)</td>
<td>Slope/erodibility (0.50)</td>
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<td>HIE</td>
<td>Hartland very fine sandy loam, 25 to 60 percent slopes</td>
<td>Very severe</td>
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<td>Slope/erodibility (0.95)</td>
<td>30.1</td>
<td>3.8%</td>
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<tr>
<td>Le</td>
<td>Limerick silt loam</td>
<td>Slight</td>
<td>Limerick (85%)</td>
<td></td>
<td>104.0</td>
<td>13.2%</td>
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<td></td>
<td></td>
<td>Winooski (8%)</td>
<td>Rippowam (7%)</td>
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<tr>
<td>Lf</td>
<td>Limerick silt loam, very wet</td>
<td>Slight</td>
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<td>12.6</td>
<td>1.6%</td>
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<td>Winooski (8%)</td>
<td>Rippowam (7%)</td>
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<tr>
<td>LyE</td>
<td>Lyman-Marlow very rocky loams, 30 to 60 percent slopes</td>
<td>Severe</td>
<td>Lyman (85%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>0.3%</td>
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<td>Marlow (20%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>Stetson (3%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>Tunbridge (3%)</td>
<td>Slope/erodibility (0.75)</td>
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<td></td>
<td></td>
<td>Peru (2%)</td>
<td>Slope/erodibility (0.75)</td>
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<td>Map unit symbol</td>
<td>Map unit name</td>
<td>Rating</td>
<td>Component name</td>
<td>Rating reasons (numeric values)</td>
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<td>Percent of AOI</td>
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</tr>
<tr>
<td>MuD</td>
<td>Munson and Belgrade silt loams, 12 to 25 percent slopes</td>
<td>Moderate</td>
<td>Munson (43%)</td>
<td>Slope/erodibility (0.50)</td>
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<td>2.4%</td>
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<td>Belgrade (43%)</td>
<td>Slope/erodibility (0.50)</td>
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<td>Cabot (5%)</td>
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<td>Slope/erodibility (0.50)</td>
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<td>Peru (4%)</td>
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<td>MyB</td>
<td>Munson and Raynham silt loams, 2 to 6 percent slopes</td>
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<td>Raynham (45%)</td>
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<td>Belgrade (5%)</td>
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<td>Hartland (5%)</td>
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<tr>
<td>MyC</td>
<td>Munson and Raynham silt loams, 6 to 12 percent slopes</td>
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<td>4.0</td>
<td>0.5%</td>
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<td>Raynham (45%)</td>
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<td></td>
<td></td>
<td>Belgrade (5%)</td>
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<td></td>
<td></td>
<td>Hartland (5%)</td>
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<tr>
<td>PsC</td>
<td>Peru extremely stony loam, 0 to 20 percent slopes</td>
<td>Slight</td>
<td>Peru (85%)</td>
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<td>0.6</td>
<td>0.1%</td>
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<td></td>
<td>Cabot (5%)</td>
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<td></td>
<td></td>
<td>Lyman (5%)</td>
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<td></td>
<td></td>
<td>Marlow (5%)</td>
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<td>Unnamed, shallow (15%)</td>
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<tr>
<td>ScA</td>
<td>Scantic silt loam, 0 to 2 percent slopes</td>
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<td>1.8</td>
<td>0.2%</td>
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<td>Livingston (5%)</td>
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<td>Munson (5%)</td>
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<td></td>
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<td>Raynham (5%)</td>
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<tr>
<td>TeE</td>
<td>Terrace escarpments, silty and clayey</td>
<td>Not rated</td>
<td>Udorthents (100%)</td>
<td></td>
<td>26.1</td>
<td>3.3%</td>
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<tr>
<td>W</td>
<td>Water</td>
<td>Not rated</td>
<td>Water (100%)</td>
<td></td>
<td>49.8</td>
<td>6.3%</td>
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<tr>
<td>Wo</td>
<td>Winooski very fine sandy loam</td>
<td>Slight</td>
<td>Winooski (85%)</td>
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<td>55.3</td>
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<td></td>
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<td>Hadley (5%)</td>
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<td>Limerick (5%)</td>
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<td>Pootatuck (5%)</td>
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**Totals for Area of Interest**  
787.5  100.0%

<table>
<thead>
<tr>
<th>Erosion Hazard (Off-Road, Off-Trail)— Summary by Rating Value</th>
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<tbody>
<tr>
<td>Rating</td>
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</tr>
<tr>
<td>Slight</td>
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<tr>
<td>Moderate</td>
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<tr>
<td>Very severe</td>
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</table>
### Rating Options—Erosion Hazard (Off-Road, Off-Trail)

**Aggregation Method:** Dominant Condition

**Component Percent Cutoff:** None Specified

**Tie-break Rule:** Higher

### Recreational Development

Recreational Development interpretations are tools designed to guide the user in identifying and evaluating the suitability of the soil for specific recreational uses. Example interpretations include camp areas, picnic areas, playgrounds, paths and trails, and off-road motorcycle trails.

### Paths and Trails

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling.

The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).
The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.
**MAP LEGEND**

<table>
<thead>
<tr>
<th>Area of Interest (AOI)</th>
<th>Area of Interest (AOI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils</td>
<td>Soil Map Units</td>
</tr>
<tr>
<td>Soil Ratings</td>
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<tr>
<td>Very limited</td>
<td></td>
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<tr>
<td>Somewhat limited</td>
<td></td>
</tr>
<tr>
<td>Not limited</td>
<td></td>
</tr>
<tr>
<td>Not rated or not available</td>
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**Political Features**

- Cities

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**MAP INFORMATION**

Map Scale: 1:16,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chittenden County, Vermont
Survey Area Data: Version 15, Jan 19, 2010

Date(s) aerial images were photographed: 8/20/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
# Tables—Paths and Trails

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<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
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</thead>
<tbody>
<tr>
<td>AdB</td>
<td>Adams and Windsor loamy sands, 5 to 12 percent slopes</td>
<td>Somewhat limited</td>
<td>Adams (43%)</td>
<td>Too sandy (0.55)</td>
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<td>0.2%</td>
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<td></td>
<td>Windsor (43%)</td>
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<tr>
<td>AgA</td>
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<td>Not limited</td>
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<td>41.2</td>
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<td>Deerfield (3%)</td>
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<td>Hartland (3%)</td>
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<td>Ninigret (3%)</td>
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<td>AgD</td>
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<td>Duane (45%)</td>
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<td>30.1</td>
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<td>Stetson (3%)</td>
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<td>Cabot (2%)</td>
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### Paths and Trails— Summary by Map Unit — Chittenden County, Vermont (VT007)

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### Paths and Trails— Summary by Rating Value

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### Rating Options—Paths and Trails

**Aggregation Method:** Dominant Condition  
**Component Percent Cutoff:** None Specified  
**Tie-break Rule:** Higher
References


Attachment 3

CCRPC REGIONAL PEDESTRIAN BICYCLE PLAN
ON-ROAD BICYCLE FACILITIES NETWORK
OFF-ROAD FACILITIES NETWORK
4.1-A 2008 Recommended On-Road Facilities
Pedestrian & Bicycle Plan Update

Definitions:
- **Designated** = designated for on-road bicycle travel by sign and/or shoulder striping, or identified on a municipal map.
- **Common Route Not Designated** = commonly used for on-road bicycle travel, but may not have adequate shoulder or be signed for bicycle travel.
- **Shared Use Link** = in order to convey a continuous network, critical shared use facilities are shown.

Sources:
- On-Road Facility - CCRPC, 9/2008
- Roads - e911 (2008)
- Railroad (2003) - VTrans
- Town Boundary (2007) and Water Body (2005) - VCGI

Map created by P. Brangan using ArcGIS 9.3.

All data is in State Plane Coordinate System, NAD 1983.

Disclaimer:
The boundaries of the Planning Areas are approximate. The accuracy of information presented is determined by its sources. Errors and omissions may exist. The Chittenden County Regional Planning Commission is not responsible for these.

September 9, 2008
4.1-B 2008 Recommended Shared Use Facilities Bicycle & Pedestrian Plan Update

Legend

- **Existing**
- **Proposed**
- **Sidewalk or On-Road Link**
- **Road Centerline**
- **Proposed Road**
- **Railroad**
- **Water Body**
- **Chittenden County**

*NOTE: In order to convey a continuous network, critical sidewalks and/or on-road facilities are shown.*

Sources:
- Shared Use Facility - CCRPC, 9/2008
- Roads - e911 (2008)
- Railroad (2003) - VTrans
- Town Boundary (2007) and Water Body (2005) - VCGI

Map created by P. Brangan using ArcGIS 9.3. All data is in State Plane Coordinate System, NAD 1983.

Disclaimer:
The boundaries of the Planning Areas are approximate. The accuracy of information presented is determined by its sources. Errors and omissions may exist. The Chittenden County Regional Planning Commission is not responsible for these.

In order to convey a continuous network, critical sidewalks and/or on-road facilities are shown.

Questions of on-the-ground location can be resolved by site inspections and/or surveys by registered surveyor. This map is not sufficient for delineation of features on the ground. This map identifies the presence of features, and may indicate relationships between features, but is not a replacement for surveyed information or engineering studies.
Appendix B
Alternatives Summary
Chittenden County Regional Planning Commission
Town of Richmond

Vermont Route 2 Bicycle and Pedestrian
Scoping Report

Alternatives

Submitted by:
Stantec Consulting

In conjunction with
Broadreach Planning & Design
Heritage Landscapes LLC

June 4, 2013
A. INTRODUCTION

1. OVERVIEW

The Town of Richmond has long contemplated a better bicycle and pedestrian link between Richmond Village and the Richmond Park & Ride on Route 2 close to Interstate 89 Exit 11. The Chittenden County Regional Planning Commission (CCRPC) has been able to assist with funding to study the feasibility of creating such a connection. The CCRPC staff is providing project management on behalf of the Town of Richmond.

With the assistance of the Town of Richmond (the Town), the CCRPC organized a Steering Committee (SC) of local officials and citizens to provide direction for the study. The CCRPC selected a Consulting Team (CT) from their list of on-call consultants to help them with the feasibility study; the team is led by Stantec Consulting Service and supported by Broadreach Planning & Design and Heritage Landscapes LLC.

The Study Area for this project extends in the east from the center of Richmond Village and Bridge Street west to the Route 2 Checkered House Bridge over the Winooski River and from the southern edge of the Interstate right-of-way on the north to the Winooski River on the south. Figures A1a and A2 in the Existing Conditions Summary show the location of the project and the general extent of the Study Area.

This summary report is the second product of the work of the SC and the CT. It describes and compares the various different alternatives under consideration for this project. The report is formatted for double-sided printing; blank pages are intentional.

2. PURPOSE AND NEED

The purpose of the Route 2 bicyclist and walker project is to create improved walking and bicycling conditions between Richmond Village and the Richmond Park & Ride, especially for commuters, and to consider better bicycling and walking access and connections to the other destinations within or adjacent to the Study Area, including the Richmond Elementary School and Camel's Hump Middle School.

Needs for the improvements include:

- The minimal shoulders and poor pavement conditions on Route 2 in the Study Area;
- The poor conditions for existing bicycle commuters which make the trip between the Village and the Park & Ride to reach the transit service there; and
- The lack of comfortable, convenient walking facilities along Route 2.
C. ALTERNATIVES DEVELOPMENT PROCESS

Once the CT examined the existing conditions and held an initial public work session on April 30, 2013 with assistance from the Town, the CT led a work session with the SC to identify as many alternatives as possible for bicycle and pedestrian improvements between the Park & Ride and Richmond Village that also provided access to at least some of the noted destinations between the two. The group worked together to do an initial analysis of the alternatives to refine or eliminate those that did not meet the purpose and need or were otherwise unsuitable. Subsequently, the CT conducted a more detailed analysis of the remaining alternatives and developed a concise, viable set for public discussion. The CT prepared an initial comparison matrix to help in reviewing and understanding the various initial alternatives. Attachment 4 includes information on the various alternative alignments that were initially considered and the initial evaluation conclusions for them.

Figure F shows the location of the alternatives initially developed by the CT; Figures G, H and I show the alternatives that remained viable after the initial analysis. Tables C1 and C2 provide a comparison of the different remaining alternatives.

During the analysis of the initial alternatives, the SC and the CT concluded that the alternatives that led towards the two schools would not provide a convenient, direct link between the Village and the Park & Ride. The grade changes and extra distance would likely be a deterrent to people wishing to regularly walk or bicycle between the Village and the Park & Ride. They consequently eliminated these alternatives from further consideration, although they could still potentially serve as good link between the future facility and the school. They made the ease of linking to these potential trails one of the evaluation criteria for the remaining alternatives presented in the next section.

II. ALTERNATIVES

A. INTRODUCTION

1. OVERVIEW

The following description of the alternatives typically begin on the east side of the alignment and head west. To help in the ease of presentation and review of the alternatives, the CT divided the alternatives into two sections. Section A is the eastern portion, extending from the vicinity of Richmond Village west to the area near Riverview Cemetery. Section B extends from Riverview Cemetery west to the Park & Ride and the Winooski River Bridge. The identification of the alternatives in this section are not the same as those used to describe the various initial alternatives.

In order to help differentiate between the types of potential facilities and alignments, the Study Team developed a simple nomenclature to describe the alternatives.
The preferred alternative might ultimately include several different types or locations of facilities.

2. **SHARED USE PATHS**

Wide off-road alternatives are considered to be shared use paths; they are at least eight feet wide but more typically ten feet wide with two-foot gravel shoulders on either side. **Illustration 1** provides a typical cross section of a shared use path. They meet the Americans with Disabilities Act (ADA) regulations in terms of grade and surface material. Shared use paths are usable by walkers and bicyclists of all ages and abilities. **Illustration 1** shows an asphalt surface because they are typically the most cost effective surfacing in the long run. This section would be similar if the surface consisted of crushed stone or other type of surfaces meeting ADA requirements.

**Illustration 1: Typical Shared Use Path Cross Section**

3. **ON-ROAD FACILITIES**

On-road facilities can be either wide paved shoulders that are less than four feet wide or bicycle lanes that are four feet wide or wider. Bicycle lanes are typically used in more congested areas in the villages or where there is a high volume of motor vehicle traffic on the road. Wide paved shoulders are typically more appropriate in rural areas where there is not a lot of development or high motor vehicle volumes on the road. The *Vermont State Standards for the Design of Transportation Construction, Reconstruction and Rehabilitation on Freeways, Roads and Streets* provide more specific details on the types of facilities that are appropriate on different types of roads.

4. **FOOT & MOUNTAIN BIKE PATHS**

Foot & mountain bike paths are paths with either a mineral soil or hard packed crushed gravel surface that are typically no wider than three feet. They are not necessarily accessible to all users due to the narrow width, the surface material and the grade. Foot & mountain bike paths can have grades that are greater than maximum ADA grades.
B. SECTION A (Bridge Street/Jericho Road to Riverview Cemetery)

1. ALTERNATIVE A1: VOLUNTEER GREEN SHARED USE PATH

Alternative A1 leaves Volunteer Green via the existing right-of-way the Town currently holds heading north towards Esplanade and Church Street. Alternative A1 wraps around the eastern edges of the farm field and forests west of Railroad Street until it intersects the railroad. The path tunnels under the railroad, turns west as it meets Route 2 and gradually rises up the side slope to be at a similar grade as the road. From there, the path continues to the north within the outer edge of the right-of-way as much as possible.

A variant of this alternative continues to skirt the eastern edge of the farmland heading further north until it intersects the railroad. At this point it crosses the tracks via an old farm crossing to reach Route 2, using an old road grade between the railroad and the roadway. Illustration 1 shows a typical cross section of this path. Where the path is in or directly next to the floodplain, it will be constructed flush with the grade to minimize net fill and to reduce the potential for damage to the path by floods.

2. ALTERNATIVE A2: RAILROAD WEST SIDE SHARED USE PATH

This alternative starts at Bridge Street on the south side of the double set of railroad tracks. As the path heads northwest, it shifts to the outside edge of the alignment of the siding where the tracks have been removed. A minimum of ten feet will be maintained between the centerline of the railroad and the closer edge of the path. Ideally, a fence would divide the path from the active rail line. The Alternative A2 path continues along the side of the existing railroad roughly in the alignment of the removed tracks (see the cover photo) to the point where an old farm crossing exists. The shared use path crosses the tracks at this point and follows the alignment of Alternative A1 to Route 2. Illustration 2 shows a typical cross section of this path for that portion of the alignment where the rails have been removed.

Illustration 2: Alternative A2 Typical Cross Section
3. ALTERNATIVE A3 RAILROAD EAST SIDE SHARED USE PATH

The shared use path in Alternative A3 starts on Bridge Street on the north side of the railroad. It follows the northeast side of the railroad at the outer edge of the railroad right-of-way to the western end of the area where Route 2 and the Railroad are adjacent to each other. At this point, the path follows the alignment of Alternative A1 to Route 2. Illustration 3 shows a typical cross section of this path where the railroad lies close to Route 2. The closest edge of the path in this location will be at least ten feet away from the center line of the rails. Ideally, a fence would also divide the path from the active railroad.

Illustration 3: Alternative A3 Typical Cross Section

4. ALTERNATIVE A4: SIDEWALK & SOUTH SIDE FOOTPATH EXTENSION

Alternative A4 creates a foot & mountain bike path extending from the end of the sidewalk on the south side of Route 2. The path would be approximately five feet away from the edge of the pavement, except where existing grading requires it to be closer to the roadway. In locations where there are guardrails, the path would ideally go behind the guardrail. Illustration 4 shows a typical cross section of Alternative A4 outside of the Village area where there is a steep slope adjacent to the roadway.
5. ALTERNATIVE A5: ROUTE 2 SHARED LANES & BICYCLE LANES

Alternative A5 starts as shared lanes for bicyclists and sidewalks within the village area. At the western end of the sidewalks the shoulders of Route 2 are gradually widened down the hill so that they are continuously a full five feet wide. The five-foot wide shoulders are marked as bike lanes but are also available to pedestrians. The travel lane is limited to eleven feet wide where there is an adjacent bike lane. **Illustration 5** shows a typical cross section of Alternative A5 inside the Village area where it consists of shared lanes.

**Illustration 5: Alternative A5 Typical Cross Section**
6. ALTERNATIVE A6: SIDEWALK NORTH SIDE FOOTPATH EXTENSION

Alternative A6 creates foot & mountain bike path extending from the end of the sidewalk on the north side of Route 2. The path would be approximately five feet away from the edge of the pavement. Illustration 6 shows a typical cross section of Alternative A6 where it is adjacent to a steep slope.

Illustration 6: Alternative A5 Typical Cross Section

7. ALTERNATIVE A7: TILDEN STREET & CEMETERY SHARED USE PATH

Baker Street and the adjacent sidewalk serve as the start of Alternative A7. The alternative continues as a shared lane facility for both walkers and bicyclists on Tilden Street heading west. It converts to a shared use path at the entry to Holy Rosary Cemetery. The path wraps around the edge of the cemetery, crosses the ravine on the western edge of the cemetery via a prefabricated walking and bicycling bridge and enters Riverview Cemetery at the eastern end of the main service road. The path follows the service road down the hill to the intersection with Route 2.

A variation of Alternative A7 substitutes a foot & mountain bike path for the shared use path through Holy Rosary Cemetery. A second variation would continue the shared use lanes on Tilden Street to the trail linking the eastern end of Tilden Street with Jericho Road. The slopes on this existing paved path exceed five percent. Illustration 1 shows a typical cross section of the shared use path portion of this path.

C. SECTION B (Riverview Cemetery to Checkered House Bridge)

1. ALTERNATIVE B1: TOE-OF-SLOPE WEST SIDE SHARED USE PATH

Alternative B-1 starts on the south side of Route 2 at the point where it diverges from the railroad right-of-way, opposite Riverview Cemetery. It continues west on the west and south sides of Route 2 at the toe of the slope that borders the Winooski River floodplain. At some
locations on this path will be close to Route 2 but potentially at much lower grades. It will lie mostly outside of the Route 2 right-of-way. It ends at the intersection with the eastbound Interstate on-ramp. Users will cross Route 2 via the new signal at the intersection to gain access to the Park & Ride. *Illustration 7* shows a typical cross section of this path where it lies close to the road.

**Illustration 7: Alternative B1 Typical Cross Section**

2. ALTERNATIVE B2: RIGHT-OF-WAY WEST SIDE SHARED USE PATH

Alternative B-1 places a shared use path on the west side of Route 2 within the existing right-of-way as much as possible. There is approximately 15 feet of right-of-way on either side of the roadway outside of the paved areas. The shared use path should be at least five feet away from the edge of the road or guardrail, further if possible. Given the desire to have at least a ten-foot wide shared use path and the need to cut or fill the adjacent grades to provide sufficient level ground for the path, it is likely that at least portions of the path or the adjacent shoulders and/or grading will need to extend beyond the limits of the current right-of-way. The fill slopes should be no more than one to three and the surface should be grassed or vegetated for the safety of bicyclists.

The shared use path would extend to the Route 2 intersection with Route 17. Users will cross Route 2 as needed to convert to on-road walking or riding via the existing signal at the Route 17 intersection or to access the park and ride via the new signal to be installed at the entrance to the expanded Park & Ride. *Illustration 8* shows a typical cross section of this path where there are steep slopes adjacent to the road. The option of adding a retaining wall to side slope where cuts or fills are necessary will minimize the impacts on the floodplain area at the bottom of the slope. A protective fence or other barrier should be on top of the retaining wall when used to minimize fill.
3. ALTERNATIVE B3: WEST SIDE FOOT & MOUNTAIN BIKE PATH

Alternative B3 is a footpath along the west side of Route 2, mostly inside the existing right-of-way. The footpath would begin near the Riverview Cemetery entrance drive and continue west to the Route 2 Checkered House Bridge over the Winooski River. The path would generally be at least five feet away from the outer edge of the roadway pavement. It would also go behind existing guardrails. Small prefabricated bridges would carry the path over streams or drainage channels where there is not enough room to use the existing area behind the guardrails for the path. Users would cross Route 2 via the new signal at the entrance to the park & ride or at the existing signal at the intersection with Route 17. Illustration 9 shows a typical section of Alternative B3.

4. ALTERNATIVE B4: ROUTE 2 BICYCLE LANES

This alternative adds five-foot wide bicycle lanes to both sides of Route 2 from the entrance to Riverview Cemetery to the Route 2 Checker Bridge across the Winooski River. The travel lanes for Route 2 would be reduced to eleven feet wide. This alternative would require fill in
several locations. The fill slopes should be no more than one to three and the surface should be grassed or vegetated for the safety of bicyclists. Illustration 10 shows a typical cross section for Alternative B4

5. ALTERNATIVE B5: EAST SIDE FOOT/MOUNTAIN BIKE PATH

Alternative B5 is a footpath along the east side of Route 2, mostly inside the existing right-of-way. The footpath would begin near the Riverview Cemetery entrance drive and continue west to the Route 2 Checker Bridge over the Winooski River. The path would generally be at least five feet away from the outer edge of the roadway pavement. It would also go behind existing guardrails. Small prefabricated bridges would carry the path over streams or drainage channels where there is not enough room to use the existing area behind the guardrails for the path. Users would cross Route 2 via the existing signal at the intersection with Route 17 to access the footpath when coming from the east via bicycle. Users would cross the eastbound Interstate on-ramp and the entrance to the expanded Park & Ride via the new signals to be added to these intersections. Illustration 11 shows a typical cross section for Alternative B5.
6. ALTERNATIVE B6 RIGHT-OF-WAY EAST SIDE SHARED USE PATH

Alternative B6 places a shared use path on the east side of Route 2 within the existing right-of-way as much as possible. There is approximately 15 feet of right-of-way on either side of the roadway outside of the paved areas. The shared use path should be at least five feet away from the edge of the road, further if possible. Given the presence of drainage ditches in a few locations, the desire to have at least a ten-foot wide shared use path and the need to cut or fill the adjacent grades to provide sufficient level ground for the path, it is likely that at least portions of the path or the adjacent shoulders and/or grading will need to extend beyond the limits of the current right-of-way. The shared use path would extend to the Route 2 intersection with Route 17. Users would cross the eastbound Interstate on-ramp and the entrance to the expanded Park & Ride via the new signals to be added to these intersections. Users will cross Route 2 as needed to convert to on-road walking or riding via the existing signal at the Route 17 intersection. Yield signs will alert path users to driveways that cross the path. Illustration 12 shows a typical cross section for Alternative B6.

Illustration 12: Alternative B6 Typical Cross Section

C. NO ACTION

The No Action alternative will keep Route 2 as it is after the reconstruction work planned by VTrans for 2014. This will include three-foot wide shoulders at a minimum between the Village and the intersection with the Interstate eastbound access ramp. Between this intersection and the Route 17 intersection west of the Interstate, the shoulder will be a minimum of four feet wide. It will also include the expansion of the Park & Ride and new traffic signals at the intersection of Route 2 with the eastbound entry and exit ramps.

III. IMPACTS & ISSUES

A. OVERVIEW

Each of the potential alternatives has numerous issues and potential impacts associated with them. Tables C1 and C2 provides a comparison of several issues and impacts of the different alternatives. Figure J shows the locations of various issues and potential impacts of the different alternative alignments and facilities. There are several common issues that
are shared by many of the alternatives. The following text briefly presents these issues, which should be considered when comparing the different alternatives and evaluating which alternative, or combination of alternatives, would be the most appropriate solution for the towns.

**B. PURPOSE & NEED**

Because this Town would like this project to provide improved bicycling and walking circulation within the Study Area for users of all ages and abilities, those alignments that most likely will not serve all these users are considered to not meet the purpose and need of the project on their own. The on-road facilities typically will not serve beginning bicyclists or inexperienced or circumscribed walkers. Shared use paths do not typically meet the needs of experienced bicyclists because their alignments are often not as direct as on-road facilities and they are often congested with slower walkers or bicyclists. The footpaths are not necessarily serving beginner or advanced bicyclists or impaired walkers. This does not mean that these various alternatives do not have merit. They may, in combination with other alignments, jointly meet the purpose and need, such as an on-road paved shoulder or shared lane in combination with an off-road shared use path.

**C. ROUTE 2 RIGHT-OF-WAY**

The four-rod (66 FT) Route 2 right-of-way (ROW) outside of the village areas is controlled by VTrans. The VTrans staff has indicated that they may need to preserve at least some of the additional space outside of the paved areas and gravel shoulders for future roadway uses. This means that it is very likely that a shared use path located adjacent to Route 2 would still need to be located at least partially outside of the right-of-way. (The illustrations show possible placement totally within the right-of-way.)

**D. EASEMENTS**

As currently envisioned, every shared use path alignment being considered will require several easements in order to be realized. These easements will be either construction or permanent easement. Tables C1 and C2 show the number of permanent easements needed by each alternative.

**E. FLOODPLAIN**

The Winooski River floodplain covers a large portion of the study area and lies at the toe of the slope for much of Route 2 west of the Village. The Town of Richmond has a “no net fill” requirement for floodplain areas, so construction in the floodplain will need to stay very close to grade. Construction adjacent to the floodplain will need to keep fill out of the floodplain or will need to otherwise work to create a no net fill situation. Alternatives A5, B2 and B4 may need to address floodplain impact mitigation.
F. UTILITIES

Most of the alternatives will have minimal impacts on the existing utilities. Only Alternatives B2, B4 and B5 may require relocation of some of the utility poles. Alternatives B2 and B5 may be able to be located so as to place the utility poles between the path and the roadway. The utility poles would need to be a minimum of two feet away from the edge of the shared use path and preferable three feet away. The construction of the shared use or foot paths should not extend deep enough into the ground to impact the underground utilities. The construction needed to add the of five-foot wide paved shoulders on either side of the road will extend deeper into the ground; care will need to be taken to not disturb the buried duct bank. Illustration 11 shows the proximity of the roadway widening to the duct bank.

G. COSTS

The CT has prepared very preliminary estimates of possible construction costs for the various alternatives. Tables C1 and C2 include these estimates. Attachment 5 includes more information on how these estimates were developed.
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<th>A2</th>
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<td>Crosing culvert and steep side slopes</td>
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<td>Yes</td>
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Route 2 Non-Motorized Transportation Scoping Study
Chittenden County Regional Planning Commission
Town of Richmond, VT

Initial Alternatives

Legend:
- Alt 1-A
- Alt 7-A
- Alt 1-B
- Alt 7-B
- Alt 2-A
- Alt 8-A
- Alt 2-B
- Alt 8-B
- Alt 3-A
- Alt 9-A
- Alt 3-B
- Path
- Alt A-4
- Alt 10-A
- Alt 4-B
- Alt 5-A
- Alt 11-A
- Alt 5-B
- Alt 6-A
- Alt 12-A
- Alt 6-B
Route 2 Non-Motorized Transportation Scoping Study

Legend

- Path
- Railroad
- Prop. Lines
- Delineated Wetland Edge
- Guard Rails
- Utility Line

Note: Alignments not in a right-of-way will require easements from landowners.

Issues & Impacts

June 5, 2013 Figure J
Attachment 4
Initial Alternatives
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<td>Shared use path from Volunteer Park that goes along the edge of the farm fields, tunnels under the railroad and along the west side of Route 2</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A1</td>
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<tr>
<td>Alternative 2-A</td>
<td>Shared use path along the west side of the railroad, using the location of the former siding</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A2</td>
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<td>Alternative 3-A</td>
<td>Shared use path along the east side of the railroad, located at the edge of the railroad right-of-way, at least 10 feet away from the outer rail</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A3</td>
</tr>
<tr>
<td>Alternative 4-A</td>
<td>A shared use path or foot path along the south/west side of Route 2 between the Village and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A4</td>
</tr>
<tr>
<td>Alternative 5-A</td>
<td>Five foot bicycle lanes on both sides of Route 2 between the Village and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A5</td>
</tr>
<tr>
<td>Alternative 6-A</td>
<td>A shared use path or foot path along the north/east side of Route 2 between the Village and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A6</td>
</tr>
<tr>
<td>Alternative 7-A</td>
<td>On-road facility and shared use path that uses Baker and Tilden Streets as shared lanes leading to a path through the cemeteries with a bridge linking them.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative A3</td>
</tr>
<tr>
<td>Alternative 8-A</td>
<td>This alternative uses Jericho Road as shared lanes that lead to the schools where a shared use path would pass along the northern edge of the campus.</td>
<td>This alternative was eliminated from further consideration because of the steep grade on Jericho Road, the extra distance it would require to ultimately reach the Park &amp; Ride and because of the elimination of each of the connecting alternatives at the western end from further consideration.</td>
<td>Deleted</td>
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<tr>
<td>Alternative 9-A</td>
<td>A shared use path that generally follows the alignment of the power transmission line that heads north east from the wester edge of the village to the eastern edge of the school campus. It deviates from the power line right-of-way to avoid especially steep slopes or residential properties.</td>
<td>This alternative was eliminated from further consideration because of the circuitous route that users would need to follow between the Village and the Park &amp; Ride as well as the steepness of the route and the proximity to residences.</td>
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<tr>
<td>Alternative 10-A</td>
<td>A shared use path that starts at the eastern entrance to the school campus and steps around the southeastern edge of the campus to the western end of the playing fields, where it would descend the hill towards the cemetery through a series of switchbacks. In the cemetery, the path would follow the eastern edge roadways down to Route 2, using the southern access gate to link with the road.</td>
<td>This alternative was eliminated from further consideration as a primary alternative because of the circuitous routing that it would require for users going between the Village and the Park &amp; Ride, the steep grade on the hillside leading to the cemetery and the need to create switchback in the pine plantation. It should still be considered as a possible method of linking the school campus to Route 2 and the recommended facility that will emerge from this study.</td>
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<tr>
<td>Alternative 11-A</td>
<td>A shared use path that links the western side of the school with Route 2 via the edge of the field on the adjacent property.</td>
<td>This alternative was eliminated from further consideration because of the circuitous route that users would need to follow between the Village and the Park &amp; Ride as well as the steepness of the route; the lower portion of the alignment is the same as A7.</td>
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<tr>
<td>Alternative 12-A</td>
<td>A shared use path that links the western side of the school with Route 2 via the western side of the playing fields and then down as ravine that leads up to the edge of the playing fields.</td>
<td>This alternative was eliminated from further consideration because of the circuitous route that users would need to follow between the Village and the Park &amp; Ride as well as the steepness of the route and the limitations of using the ravine.</td>
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<td>Alternative 1-B</td>
<td>Shared use path that follows the toe of the slopes on the western side of Route 2.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
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<td>Alternative 2-B</td>
<td>A shared use path along the south/west side of Route 2 between Riverview Cemetery and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative B2</td>
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<tr>
<td>Alternative 3-B</td>
<td>A foot path along the south/west side of Route 2 between Riverview Cemetery and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative B3</td>
</tr>
<tr>
<td>Alternative 4-B</td>
<td>Five foot bicycle lanes on both sides of Route 2 between Riverview Cemetery and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative B4</td>
</tr>
<tr>
<td>Alternative 5-B</td>
<td>A shared use path along the north/east side of Route 2 between Riverview Cemetery and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative B5</td>
</tr>
<tr>
<td>Alternative 6-B</td>
<td>A foot path along the north/east side of Route 2 between Riverview Cemetery and the Checker Bridge.</td>
<td>This alternative was kept and refined for consideration at the public work session.</td>
<td>Alternative B6</td>
</tr>
<tr>
<td>Alternative 7-B</td>
<td>A shared use path within the western edge of the Interstate right-of-way.</td>
<td>This alternative was eliminated from further consideration due to the irregularity of the grade along the edge of the right-of-way and the amount of cut and fill that would be needed to create a ADA compliant path.</td>
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</tr>
<tr>
<td>Alternative 8-B</td>
<td>A shared use path along the west side of the railroad right-of-way.</td>
<td>This alternative was eliminated from further consideration because of the difficulty of constructing the path within the railroad right-of-way, floodplain impacts, the lack of access to other destinations and the circuitous route between the Village and the Park &amp; Ride.</td>
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Attachment 5

Initial Estimate of Possible Construction Cost Details
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<th>Location:</th>
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<td>Shared-use Path</td>
<td>Foot-path</td>
<td>bike lanes/paint/widening</td>
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<td>$ 3,027,000.00</td>
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Appendix C
Revised Alternatives
Chittenden County Regional Planning Commission
Town of Richmond

Vermont Route 2 Bicycle and Pedestrian Scoping Report

Revised Alternatives

Submitted by:
Stantec Consulting

In conjunction with
Broadreach Planning & Design
Heritage Landscapes LLC

June 12, 2014
A. INTRODUCTION

1. OVERVIEW

The Town of Richmond has long contemplated a better bicycle and pedestrian link between Richmond Village and the Richmond Park & Ride on Route 2 close to Interstate 89 Exit 11. The Chittenden County Regional Planning Commission (CCRPC) has been able to assist with funding to study the feasibility of creating such a connection. The CCRPC staff is providing project management on behalf of the Town of Richmond.

With the assistance of the Town of Richmond (the Town), the CCRPC organized a Steering Committee (SC) of local officials and citizens to provide direction for the study. The CCRPC selected a Consulting Team (CT) from their list of on-call consultants to help them with the feasibility study; the team is led by Stantec Consulting Service and supported by Broadreach Planning & Design and Heritage Landscapes LLC.

The Study Area for this project extends in the east from the center of Richmond Village and Bridge Street west to the Route 2 Checkered House Bridge over the Winooski River and from the southern edge of the Interstate right-of-way on the north to the Winooski River on the south. Figures A1a and A2 in the Existing Conditions Summary show the location of the project and the general extent of the Study Area.

During the summer and fall of 2013, the CT and the SC completed an initial study of alternatives and, after three public work sessions, developed a preferred alternative. Figure K shows the alignment of the preferred alternative. The alignment included the potential of a tunnel under the railroad as well as a portion of the path lying within the railroad right-of-way, where it runs close to Route 2. The railroad has been reluctant to consider granting an easement for the development of a shared use path in the preferred alignment. Knowing that the consent of the railroad was required to implement the preferred alignment, the SC and the CT sought a second option from the public during the public work session. Those attending the public work sessions preferred the addition of five-foot-wide bicycle lanes on Route 2 as a second option if the preferred alternative could not be constructed.

The SC decided that it wanted to review the alternatives again to see if anything else might be preferable to bike lanes on Route 2. They were concerned that the bicycle lanes would not provide better bicycling or walking conditions for a large part of the population, which would not be comfortable bicycling or walking along the side of Route 2; it wouldn't fully meet the purpose and need of the project, described in more detail on the next page. This revision of the earlier Alternatives report reexamines several of the earlier alternatives, either as initially proposed or with some modifications to the original alignments. It includes the preferred alignment of a shared use path on the south/west side of Route 2 as well as the second choice of bicycle lanes on Route 2, so that the Town can decide if they are still the most preferred alternatives, despite potential problems with implementation.
Figure L shows the various alignments that the SC is considering in its reexamination.

The report is formatted for double-sided printing; blank pages are intentional.

2. PURPOSE AND NEED

The purpose of the Route 2 bicyclist and walker project is to create improved walking and bicycling conditions between Richmond Village and the Richmond Park & Ride, especially for commuters, and to consider better bicycling and walking access and connections to the other destinations within or adjacent to the Study Area, including the Richmond Elementary School and Camel’s Hump Middle School.

Needs for the improvements include:

- The minimal shoulders and poor pavement conditions on Route 2 in the Study Area;
- The poor conditions for existing bicycle commuters which make the trip between the Village and the Park & Ride to reach the transit service there; and
- The lack of comfortable, convenient walking facilities along Route 2.

II. REVISED ALTERNATIVES

A. INTRODUCTION

1. OVERVIEW

The following descriptions of the alternatives typically begin on the east side of the Study Area and head west or north.

With the exception of five-foot-wide bicycle lanes on Route 2, the revised alternatives are all shared use paths. These bicycling and walking facilities are at least eight feet wide but more typically ten feet wide with two-foot gravel shoulders on either side. Illustration 1 provides a typical cross section of a shared use path. They meet the Americans with Disabilities Act (ADA) regulations in terms of grade and surface material. Shared use paths are usable by walkers and bicyclists of all ages and abilities. They can lie either in an existing right-of-way for a road or be in their own independent right-of-way. Illustration 1 shows an asphalt surface because they are typically the most cost effective surfacing in the long run. This section would be similar if the surface consisted of crushed stone or other type of surfaces meeting ADA requirements.
2. **ALTERNATIVE C1: THE PREFERRED ALIGNMENT**

The shared use path of the preferred alternative leaves Volunteer Green via the existing right-of-way the Town currently holds heading north towards Esplanade and Church Street. It wraps around the eastern edges of the farm field and forests west of Railroad Street until it intersects the railroad. The path tunnels under the railroad, turns west as it meets Route 2 and stays at the bottom of the slope leading up to Route 2. It follows the bottom of the slope west, using a level area above the wetland and farm field for a while and then descending to the edge of the field. As the path continues west, it converts to a boardwalk several times to avoid filling wetland areas. The path stays as close to the bottom of the slope as possible to avoid both negative impacts to the adjacent farm fields and the Winooski River floodplain. Throughout this area, the path lies generally partially or totally outside of the Route 2 right-of-way.

**Illustration 2** shows a typical cross section of this path where it lies close to the road. The limit of right of way may be closer to the road depending on the actual limits of the slope.

**Illustration 2: Alternative C1 Typical Cross Section**
As the grade rises over an area that is higher than the floodplain, the path also rises at a five percent slope across the steep side slope of Route 2. At the top of the slope, the path continues either on the adjacent property or at the outer edges of the right-of-way across the higher ground. It may be necessary to remove several small elm trees growing outside of the right-of-way and trim up the limbs of two spruce trees at the driveway entrance to the chiropractic office. At the western edge of the higher ground, the grade drops back down to the floodplain. A wetland lies at the base of the slope, so the path again converts to a boardwalk which will initially slope down towards the toe of the slope and then levels when it reaches the lower grade. At the end of the wetland, the path returns to the typical shared use path cross section, staying just above the floodplain.

At the intersection with the southbound Interstate off-ramp, the path links with a new crosswalk that will take path users across Route 2 via the new signal at the intersection to gain access to the Park & Ride. The path would continue along the toe of the outside slope of the exit ramp, heading towards the interstate Winooski River/Railroad. The path would cross under the interstate overpass and then turn north and west to climb up to the intersection of Route 2 and VT Route 117. A new crosswalk at the intersection would allow path users to head west on the proper side of the road on either VT 117 or Route 2.

The Consultant Team discussed with the New England Central Railroad the possibility of running the shared use path under the rail line through a tunnel. The railroad indicated that they were open to the construction of a tunnel under the rail line but did not provide a definite answer on whether they would seriously consider the idea.

Since the potential to create the tunnel is not clear, the Consultant Team discussed the opportunities for other alignments to link the bottom of the slope alignment to the Village. The participants at the second public work session endorsed the concept of extending the Route 2 sidewalk on the south side of the road further west, down the slope, cutting through the steep side slope on the road. The sidewalk would be widened as possible through this section and then widened to a full ten feet at the bottom of the hill. The existing sidewalk would also be widened, as possible east to the Baker Street intersection. A new crosswalk at this intersection would link the north side sidewalk and paved shoulder to the south side widened sidewalk.

VTrans has indicated that the addition of a second crosswalk on Route 2 in this location could be possible.

**Attachment 6** shows the potential alignment of Alternative C1 in more detail.

3. ALTERNATIVE C2: ROUTE 2 EAST SIDE SHARED USE PATH

a. Alternative C2 - Primary Alternative

Alternative C2 creates a shared use path along the side of Route 2 at the outer edge of the right-of-way. **Attachment 7** shows the potential alignment of Alternative C2 in more detail.
It would begin at the intersection of Baker Street with Route 2 with a widening of the existing sidewalk to eight feet wide and the addition of a crosswalk on Route 2 to aid pedestrian and bicyclists (walking their bicycles) heading west. At the end of the existing sidewalk, the path would widen to ten feet and head down the drop in grade. Retaining walls would limit the amount of cut and fill associated with the new path. If the right-of-way is 66-feet at the edge of the Village, the retaining wall would be at the outer edge of the right-of-way. Illustration 3 shows a cross section through the path as it heads down the hill and shows the right-of-way at 50 feet wide.

Illustration 3: Alternative C2 Cross Section on Route 2 at the Edge of the Village

As the path hits the bottom of the hill, it would remain at or partially outside of the outer edge of the right-of-way. As it passes in front of the Mann & Machine business, the project would include a reduction of the business curb cut by limiting the entrance to two 24-foot-wide openings. The path would be differentiated from the adjacent impervious surface by a different surface treatment to continually remind users of the business of the presence of the path. Signs for both the path and business users would warn each group about the potential presence of occasional vehicles on the path as they enter and exit the Mann & Machine garage. Illustration 4 shows a cross section of the path in front of Mann & Machine; it assumes a three-rod right-of-way at this location, 50 feet.

Illustration 4: Alternative C2 Cross Section in Front of Mann & Machine
North of the garage, the path would begin to rise to the northwest of the existing house. The existing culvert under Route 2 would need to be extended to accommodate the path. After the culvert, the path would begin to rise to merge with the existing driveway on the outer edge of the cemetery paralleling Route 2 but at a higher elevation. Retaining walls would limit the cut and fill as the path rises across the side of the slope on the east side of Route 2. The path would move outside of the Route 2 right-of-way at this point, as it moves onto the cemetery parcel. It would actually also lie within an extension of the railroad parcel as it transitions from the Route 2 right-of-way to the cemetery parcel. The path would follow the alignment of the cemetery road almost to the northern end of the cemetery. As the road turns north to join with the entrance road, the path would head down hill to rejoin the Route 2 right-of-way. The path may need to have a switchback in order to meet ADA maximum slope requirements of eight percent.

The path would continue to head north and west along the edge of the right-of-way on the east side of Route 2 within the existing right-of-way as much as possible. There is approximately 12 feet of right-of-way on either side of the roadway outside of the paved areas. The shared use path should be at least five feet away from the edge of the road, further if possible. Given the presence of drainage ditches in a few locations, the desire to have at least a ten-foot wide shared use path and the need to cut or fill the adjacent grades to provide sufficient level ground for the path, at least portions of the path will need to extend beyond the limits of the current right-of-way. To avoid filling wetland or floodplains, much several sections of the path would need to be located on boardwalks. The shared use path would extend to the Route 2 intersection with Route 117.

Users would cross the southbound Interstate on-ramp and the entrance to the expanded Park & Ride via the new signals to be added to these intersections. Users will cross Route 2 as needed to convert to on-road walking or riding via the existing signal at the Route 117 intersection. Yield signs will alert path users to driveways that cross the path. Illustration 5 shows a typical cross section for Alternative C2 outside of the Village area. The retaining walls may be outside of the right-of-way if the right-of-way is three rods wide, as the illustration shows.

**Illustration 5: Alternative C2 Typical Cross Section Outside of the Village**

June 12, 2014
b. Alternative C2a - Mann & Machine Substitute Route

To avoid the potential conflict between motor vehicles and path users in front of Mann & Machine associated with Alternative C2, the Steering Committee also considered the alternate of routing the path around the rear of the Mann & Machine building. This alignment would take the path along the edge of the wetland on the adjacent property. A retaining wall would keep fill out of the adjacent wetland. The path would wrap around the rear of the property and begin to head back towards the Route 2 right-of-way and climb the hill towards the cemetery property. The curve at the back of the property would need warning signs because it would be tighter than a typical curve on a shared use path. The path would require a new crossing of the small stream and wetland on the west side of the Mann & Machine parcel. Retaining walls would minimize the cut and fill needed to bring the path up the hill. The path would merge with the cemetery road paralleling Route 2 and then continue to follow the rest of the original Alternative C2 alignment. Attachment 8 shows the Alternative C2a alignment in more detail.

4. ALTERNATIVE C3: ROUTE 2 BICYCLE LANES

Alternative C3 (Alternative A5 and B5 in the original Alternatives Report) starts as shared lanes for bicyclists and sidewalks within the village area. At the western end of the sidewalks the shoulders of Route 2 are gradually widened down the hill so that they are continuously a full five feet wide. The five-foot wide shoulders are marked as bike lanes but are also available to pedestrians. The travel lane is limited to eleven feet wide where there is an adjacent bike lane. Illustration 6 shows a typical cross section of Alternative C3 inside the Village area where it consists of shared lanes.

Illustration 6: Alternative C3 Typical Village Cross Section

They would continue as five-foot wide bicycle lanes on both sides of Route 2 to the Route 2 Checker Bridge across the Winooski River. The travel lanes for Route 2 would continue to be striped as eleven feet wide. This alternative would require fill in several locations. The fill slopes should be no more than one to three and the surface should be grassed or vegetated.
for the safety of bicyclists. **Illustration 7** shows a typical cross section for Alternative 2-C outside of the Village; the right-of-way is shown as four-rods, 66-feet, wide.

**Illustration 7: Alternative C3 Typical Cross Section**

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5. **ALTERNATIVE C4: HOLY ROSARY CEMETERY LINK**

   a. **Alternative C4 - Primary Alternative**

   Alternative C4 would begin at the intersection of Baker Street and Route 2 and use the road and the adjacent sidewalk. At the northern end of Baker Street, the alternative continues as a shared lane facility for both walkers and bicyclists on Tilden Street heading west. It converts to a shared use path at the entry to Holy Rosary Cemetery. The path wraps around the southern edge of the cemetery but then passes down the slope to join with Alternative C2 and follow that alignment to the Park & Ride.

   b. **Alternative C4a - Cemetery Road Substitute Route**

   As an alternative to heading down the steep slope on the east side of the Holy Rosary Cemetery and joining the alignment of Alternative C2, the path could also continue around the outer edge of the cemetery to the northwest corner and then cross the ravine via a new prefabricated bridge. The path would then follow the existing roadways in the Town Cemetery leading northwest towards the entry. The path would follow the existing roadway down the hill to the cemetery entrance and then head towards the Park & Ride lot following the alignment of Alternative C2.

6. **ALTERNATIVE C5: NO ACTION**

   The No Action alternative will keep Route 2 as it is after the reconstruction work planned by VTrans for 2016. This will include three-foot wide shoulders at a minimum between the Village and the intersection with the Interstate southbound access ramp. VTrans has
indicated that they will work to create at least four-foot wide paved shoulders if they can, given the limits of the repaving project. Between the southbound access ramp intersection and the Route 117 intersection west of the Interstate, the shoulder will definitely be a minimum of four feet wide. It will also include the expansion of the Park & Ride and new traffic signals at the intersection of Route 2 with the eastbound entry and exit ramps.

No matter which alternatives might be selected, the wider shoulders will still be added to Route 2 after the reconstruction project. Each of the other alternatives should be considered as including the wider shoulders on the road as part of the overall package of improvements that would be completed.

III. IMPACTS & ISSUES

A. OVERVIEW

Each of the potential alternatives has issues and potential impacts associated with them. Table D1 provides a comparison of several issues and impacts of the different alternatives. Figure M shows the locations of various issues and potential impacts of the different alternative alignments and facilities. There are several common issues that are shared by many of the alternatives. The following text briefly presents these issues, which should be considered when comparing the different alternatives and evaluating which alternative, or combination of alternatives, would be the most appropriate solution for the towns.

B. PURPOSE & NEED

Because the Town would like this project to provide improved bicycling and walking circulation within the Study Area for users of all ages and abilities, those alignments that most likely will not serve all these users are considered to not meet the purpose and need of the project on their own. The on-road facilities typically will not serve beginning bicyclists or inexperienced or circumscribed walkers. Shared use paths do not typically meet the needs of experienced bicyclists because their alignments are often not as direct as on-road facilities and they are often congested with slower walkers or bicyclists. This does not mean that the various alternatives do not have merit. They may, in combination with other alignments, jointly meet the purpose and need, such as an on-road paved shoulder or shared lane in combination with an off-road shared use path.

C. ROUTE 2 RIGHT-OF-WAY

This portion of Route 2 is a part of the original Winooski Turnpike. The 1811 Winooski Turnpike survey shows a series of tangents with courses of bearings and distances but no curves. The survey shows some similarities between the old route and the present alignment of Route 2, especially in the Village area that has a long tangent. The survey describes the Turnpike as four rods wide (66 ft). It describes beginning and ending points as the intersections with the road to be constructed, with the Town lines of Williston on the north
and Bolton to the south. The Turnpike road was altered over time in many areas for new highway projects, to accommodate the coming railroad and presumably after the flood of 1927. To be certain of areas that are in the original right-of-way width of four rods width would require much more detailed investigation. The area most likely to fit the four-rod width would be the Village area, the long straight stretch that seems to closely match the original 1811 survey, with the exception of areas acquired for the railroad. Where there are no prior highway projects for RT 2 showing ROW and acquisition, including portions of the road west of the Village, it is safer to assume a statutory three-rod right-of-way width until such time as VTrans can investigate this area and advise otherwise.

The VTrans staff has indicated that they may need to preserve at least some of the additional space outside of the paved areas and gravel shoulders for future roadway uses. This means that it is very likely that a shared use path located adjacent to Route 2 would still need to be located at least partially outside of the right-of-way.

D. EASEMENTS

As currently envisioned, the shared use path alignments being considered will require easements in order to be realized. These easements will be either construction or permanent easement. Table D1 shows the number of permanent easements needed by each alternative. One significant easement will be needed from Riverview Cemetery. The Richmond Cemetery Commission has submitted a letter saying that they do not believe that using cemetery land for a shared use path is appropriate and would oppose granting an easement for such use. Attachment 9 includes a copy of the letter.

E. UTILITIES

Alternative C2 may require relocation of some of the utility poles north and west of the Cemetery, where they are located on the same side of the road as the proposed shared use path. It may be possible to separate the shared use path from the roadway with enough width that the utility poles could remain in the current location. If moved, the utility poles would need to be a minimum of two feet away from the edge of the shared use path and preferable three feet away.

There are also two wells in front of Mann & Machine that might be impacted by the construction of Alternative C2

The construction of the shared use paths should not extend deep enough into the ground to impact the underground utilities. The construction needed to add the of five-foot wide paved shoulders on either side of the road will extend deeper into the ground; care will need to be taken to not disturb the buried duct bank.
F.  GRADING

Each of the alternatives includes grading, sometimes extensive on slopes. To minimize the amount of disturbance caused by grading, retaining walls have been shown on several of the alternatives. The retaining walls minimize the amount of disturbance to the slopes but increase the overall cost of the project. The extent, both in height and length, can be examined in more detail during the design phase, if one of the alternatives that requires retaining walls is selected as the preferred alternative.

G.  COSTS

The CT has prepared very preliminary estimates of possible construction costs for the various alternatives. Table D1 includes these estimates.

IV.  OTHER ALTERNATIVES

A.  SIGNAL IMPROVEMENTS

During the discussion of community concerns at the start of the project, the public work session participants expressed concern about the pedestrian crossings at the intersection of Route 2 and Bridge Street/Jericho Road. While there are crosswalks and pedestrian signals, those crossing Route 2, especially children going to and from school, are often cut off by motorists turning west on Route 2 from either Bridge Street or Jericho Road. The BRPD Team took a look at the intersection and the timing of the traffic signal and recommend adding a short lead phase for pedestrians crossing Route 2 which would allow them more time to cross the road as well as make them more visible to motorists making the turn. No matter which alternative might be selected, this improvement should be considered.

B.  SPEED REDUCTION

There is a short section of Route 2 between the Park & Ride and the edge of the Village where the speed limit is 50 miles per hour (MPH). The speed limit is 40 MPH on either side of this short section. To create better conditions for bicyclists that opt to use the three-foot shoulders on Route 2, the Town should request VTrans to review the speed limit with the goal of creating a continuous 40 MPH speed limit between the Park & Ride and Richmond Village. This request should be made no matter which alternative might be selected.
## TABLE D1: Revised Alternative Analysis

Chittenden County Regional Planning Commission

Town of Richmond

Route 2 Pedestrian & Bicycle Scoping Study

March 29, 2014

<table>
<thead>
<tr>
<th>Project Description</th>
<th>No Action</th>
<th>Alternative C1</th>
<th>Alternative C2</th>
<th>Alternative C3</th>
<th>Alternative C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>3,500 FT</td>
<td>5,850 FT</td>
<td>2,625 FT</td>
<td>2,625 FT</td>
<td>3,550 FT</td>
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<tr>
<td>Total Length</td>
<td>0</td>
<td>11,650 FT</td>
<td>10,450 FT</td>
<td>10,450 FT</td>
<td>11,175 FT</td>
</tr>
<tr>
<td>Length of New Shared Use Path</td>
<td>0</td>
<td>11,650 FT</td>
<td>10,450 FT</td>
<td>0</td>
<td>1,945 FT</td>
</tr>
<tr>
<td>Type &amp; Length of On-Road Facilities</td>
<td>Shared lane 1,300 FT</td>
<td>None</td>
<td>None</td>
<td>Shared lane 1,300 FT</td>
<td>Shared lane 1,300 FT</td>
</tr>
<tr>
<td></td>
<td>Paved 3 FT Shoulder 2,200 FT</td>
<td>None</td>
<td>None</td>
<td>Bike Lane 9,150 FT</td>
<td>Bike Lane 8,020 FT</td>
</tr>
<tr>
<td>Number of Road Crossings</td>
<td>0</td>
<td>1 (Route 2 with Crosswalk)</td>
<td>1 (Interstate access drive)</td>
<td>0</td>
<td>1 (Interstate Access Drive)</td>
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<tr>
<td>Length in Existing ROW</td>
<td>3,500 FT</td>
<td>2,100 FT</td>
<td>9,450 FT</td>
<td>10,450 FT</td>
<td>9,230 LF</td>
</tr>
<tr>
<td>Number of Bridges</td>
<td>0</td>
<td>1 (50 FT +)</td>
<td>0</td>
<td>0</td>
<td>1 (100 FT +)</td>
</tr>
<tr>
<td>Boardwalks</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Private Property Permanent Easements</td>
<td>0</td>
<td>4</td>
<td>At least 3 &amp; Possibly More</td>
<td>0</td>
<td>At least 1 &amp; Possibly More</td>
</tr>
<tr>
<td>Significant Physical Constraints</td>
<td>None</td>
<td>Tunneling under the Railroad; skirting the edges of farm fields and wetlands, changing elevations with retaining walls and raised boardwalk</td>
<td>Traversing the slope out of the village; crossing in front of Man &amp; Machine; traversing slopes by cemetery, crossing driveways; passing near wetlands</td>
<td>Traversing the narrow opening &amp; steep slopes at the western edge of the village; linking eastbound bicyclists to the on-road shared lane</td>
<td>Ringing the edge of the Holy Rosary cemetery, crossing the gully between the two cemeteries, using the existing access drive to Riverview Cemetery and providing a link for eastbound on-road bicyclists</td>
</tr>
</tbody>
</table>

Environmental/Cultural Constraints

| Disturbs Forests | Yes | No | No | No | Yes | No |
| Disturb Wetland or Wetland Buffer Disturbance | No | Yes | 0 | 0 | 0 |
| Disturbs Natural Area/RTE Species | Yes | No | No | No | No |
| Uses Agricultural Land | Yes | No | No | No | Yes |
| Disturbs Steep slopes | Yes | Yes | No | No | Yes |
| Affects Historic Resources | Yes | No | No | No | No |
| Protects Street Trees | Yes | Yes | Yes | Yes | Yes |
| Disturbs Hazardous Material | Yes | No | No | No | Yes |

Project Attributes

| Meets Purpose and Need Statement by Itself | No | No | No | No | No |
| Types of Users Served | Active & Basic Walkers | Advanced & Basic Bicyclists | All Walkers & Bicyclists | All Walkers & Bicyclists | Active Walkers | Advanced and Basic Bicyclists | All Walkers | Basic & Beginner Bicyclists |
| Avoids High Crash Areas | Yes | Yes | No | No | Yes |
| Separates Motorized and Non-Motorized Users | Yes | Yes | Yes | No | Yes |
| Number of Existing Commercial/Agricultural Driveways Crossed | 0 | 2 | 5 | 0 | 4 |
| Number of Existing Residential Driveways Crossed | 0 | 0 | 12 | 0 | 6 |
| Minimizes Disturbances to Utilities | Yes | Yes | Yes | Yes | Yes |
| Eliminates Switching Between Facility Types | Yes | Yes | Yes | Yes | No |
| Allows Easy Link to Schools | Yes | Yes | Yes | Yes | Yes |
| Provides Access to Destinations along Route 2 | Yes | Yes | Yes | Yes | Yes |
| Order of Magnitude Cost | $0 | $4,800,000 | $4,800,000 | $480,000 | $3,885,000 |

Other Issues

| Positive Considerations | Negative Considerations | Neutral |
Route 2 Non-Motorized Transportation Scoping Study

Chittenden County
Regional Planning Commission
Town of Richmond, VT

Initial Preferred Alignment

Legend

- Shared Use Path
- Prop. Lines

March 22, 2014 Figure K
Request Speed Study to lower speed to 40 MPH

Check Signal timing for better pedestrian crossing

Legend

- Alt C1
- Alt C2
- Alt C2a
- Alt C3
- Alt C4
- Alt C4a
- Prop. Lines

Route 2 Non-Motorized Transportation Scoping Study

Chittenden County
Regional Planning Commission
Town of Richmond, VT

Revised Alternatives

BROADREACH
Planning, Design
Stantec
Heritage Landscapes

March 22, 2014  Figure L
Route 2 Non-Motorized Transportation Scoping Study

Chittenden County Regional Planning Commission
Town of Richmond, VT

Revised
Impacts & Issues

Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt C1</td>
<td></td>
</tr>
<tr>
<td>Alt C2</td>
<td>Prop. Lines</td>
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<tr>
<td>Alt C2a</td>
<td></td>
</tr>
<tr>
<td>Alt C3</td>
<td></td>
</tr>
<tr>
<td>Alt C4</td>
<td></td>
</tr>
</tbody>
</table>

NOTE:
Pink boxes are issues to be addressed.
Green boxes are positive attributes.

C1: New traffic signal brings path users across Interstate exit ramp, Route 2 or Park & Ride entrance
C2/C4: Multiple driveways on east side of Route 2 require notifications for bicyclists and motorists
C1: Sloping boardwalk needed to bring path down from high point & keep it out of the floodplain
C2/C4: Boardwalk needed to minimize impact to wetland & floodplain
C1: Path on west side minimizes driveway crossings
C2/C4: Boardwalk needed to avoid wetland & stream
C5: New 3-foot wide shoulders on Route 2 at a minimum

C2: Use of minor cemetery road eliminates routing path around tight curve with steep side slopes
C2/C2a: Retaining walls required on steep slopes
C1: Railroad possibly open to tunneling under the rails

C1/C2: Retaining walls needed to bring path down to lower grade; requires removal of several larger trees
C1: Railroad possibly open to tunneling under the rails

C2/C4: Boardwalk needed to avoid wetland
C2/C4: Boardwalk needed to avoid wetland & stream
C2: Boardwalk needed to avoid wetland & stream

C4: Existing cemetery access is very steep
C4: New bridge needed
C4: Easement needed from Holy Rosary Cemetery

C1: Easement from Railroad might be difficult to obtain
C2: Conflicts between Mann & Machine vehicles and path users

C1/C2: Retaining walls needed to bring path down to lower grade; requires removal of several larger trees
C1: Sloping boardwalk needed to bring path down from high point & keep it out of the floodplain

C2: Use of minor cemetery road eliminates routing path around tight curve with steep side slopes
C2/C2a: Retaining walls required on steep slopes
C1: Railroad possibly open to tunneling under the rails

C1: Sloping boardwalk needed to bring path down from high point & keep it out of the floodplain
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C1/C2: Retaining walls needed to bring path down to lower grade; requires removal of several larger trees
C1: Railroad possibly open to tunneling under the rails

March 29, 2014 Figure M
Attachment 6
Alternative C1 - Schematic Layout
BEGIN BOARDWALK

10' SHARED USE PATH

EXISTING ROW (TYP.)

BEGIN RAMPING UP BOARDWALK (≤5%)(HEADED EAST)

WETLANDS

SCALE IN FEET

VT STATE PLANE GRID
False Northing: 0.0000
False Easting: 1640416.6667
Origin Latitude: 42°30'00.0000"N
Central Meridian: 72°30'00.0000"W
US Survey Foot Transverse Mercator NAD83 Vermont State Planes VT83
EXTEND CULVERT
Attachment 7
Alternative C2 - Schematic Layout
Attachment 9
Richmond Cemetery Letter
Appendix D
Schematic Layout
Cut areas are shown in green
Fill areas are shown in red
The floodplain is outlined in purple
Edges of nearby wetlands are outlined in aqua
Cut areas are shown in green
Fill areas are shown in red
The floodplain is outlined in purple
Edges of nearby wetlands are outlined in aqua
Route 2 Non-Motorized Transportation Scoping Study

Cut areas are shown in green
Fill areas are shown in red
The floodplain is outlined in purple
Edges of nearby wetlands are outlined in aqua

Appendix D
Route 2 Non-Motorized Transportation Scoping Study

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Route 2 Non-Motorized Transportation Scoping Study
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Chittenden County
Regional Planning Commission
Town of Richmond, VT

Appendix D
Route 2 Non-Motorized Transportation Scoping Study
Cut areas are shown in green
Fill areas are shown in red
The floodplain is outlined in purple
Edges of nearby wetlands are outlined in aqua
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Chittenden County
Regional Planning Commission
Town of Richmond, VT

Appendix D

August 26, 2013  Appendix D-7
Route 2 Non-Motorized Transportation Scoping Study

Cut areas are shown in green
Fill areas are shown in red
The floodplain is outlined in purple
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Chittenden County Regional Planning Commission
Town of Richmond, VT

Appendix D
Route 2 Non-Motorized Transportation Scoping Study

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Appendix D
Appendix E

CCRPC Complete Streets Form
CCRPC Complete Streets Project Reporting Form

This project reporting form and attached checklist can serve to document that Complete Streets practices and principles were considered and implemented where appropriate for the project listed below. This form should be completed after preliminary plans and retained in the project file.

Municipality: Town of Richmond

Study Name: Vermont Route 2 Bicycle and Pedestrian Scoping Report

Date: August 22, 2013

Complete Streets Exemptions:

Is the use of the transportation facility by pedestrians, bicyclists, or other users prohibited by law?

NO

Is the cost of including complete streets principles disproportionate to the need or probable use?

NO

Are complete streets principles outside the scope of the subject project because of its very nature?

NO

Supporting documentation can be attached to this document and retained in the project’s file. For all other instances a brief description of the Complete Streets practices and principles that have been incorporated into the subject project’s design can be included below.

Describe Complete Streets elements included in project:

VT Route 2 serves as a primary travel corridor between Richmond Village and the Richmond Park & Ride and features mixed use commercial and residential development along the highway. The purpose of this study is to create improved walking and bicycling conditions between Richmond Village and the Richmond Park & Ride, especially for commuters, and to consider better bicycling and walking access and connections to the other destinations within or adjacent to the Study Area, including the Richmond Elementary School and Camel’s Hump Middle School.
Complete Streets - Municipal Planning/Scoping Project Checklist

Obtain the Municipal/Regional Plan(s)
- ☑ Determine multi-modal status of subject facility per plan(s) recommendations

Determine Land Use Context
- ☑ Ascertain land use type & density: existing; future/desired
- ☑ Determine context zone: existing; future/desired

Identify Current Transportation Modes and Facilities; Transportation Data
- ☑ Determine roadway classification: existing; future/desired
- ☑ Determine pedestrian and bicycle facilities: existing; future/desired
- ☑ Identify existing and projected transit service features
- ☑ Obtain current and projected traffic volumes
- ☑ Identify current and projected pedestrian/bicyclist use
- ☑ Obtain existing crash data (including pedestrian and bicycle crashes)

Identify Constraints on Transportation Project Development
- ☑ Determine existing roadway right-of-way
- ☑ Determine location of traveled way within right-of-way
- ☑ Assess potentially available private front yard space
- ☑ Identify existing natural resource constraints
- ☑ Identify existing historic resource constraints

Other Factors (explain any that apply)
- ☐ Environment_______________________________________________________________
- ☐ Economic development_____________________________________________________
- ☐ Aesthetics_____________________________________________________________________
- ☐ Historic preservation_______________________________________________________
- ☐ Health______________________________________________________________________

Describe Alternatives Considered
Alternatives considered can be found in Appendix B Alternatives Summary.

Describe Preferred Alternative and indicate complete streets elements in final recommendation
The Preferred Alternative can be found in Section III Recommendations.