

**Town of Warren  
Sugarbush Access Road Path  
Scoping Study  
Alternatives**



*Submitted by:*

**Broadreach Planning & Design**

*In conjunction with*

**Lamoureux & Dickinson Consulting Engineers**

**Heritage Landscapes, LLC**

**University of Vermont Consulting Archeology Program**

**October 4, 2016**

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## A. INTRODUCTION

### 1. OVERVIEW

This study is updating the feasibility of creating a path in the vicinity of the Sugarbush Access Road in the Town of Warren, Vermont (the Town). The study area includes the land on either side of the road's right-of-way that might be suitable and appropriate for the location of a path. The primary Study Area extends from the western end of the road at the intersection with Inferno and Village Roads to the intersection with Eurich Pond Road. The study will also examine the potential for the path in the secondary portion of the Study Area, along the rest of the Sugarbush Access Road, from the Eurich Pond Road intersection to its eastern end at Route 100. The level of detail accorded the secondary area might be less than that provided for the primary Study Area.

The Sugarbush Access Road Path Scoping Study builds on previous work that looked at the potential for creating a path alongside the road, as well as earlier discussions and efforts within the Town that considered the development of a Sugarbush Access Road path.

The Town received a grant from the Vermont Agency of Transportation (VTrans) to undertake this study. Town officials, after circulating a Request for Proposals, selected a consulting team consisting of Broadreach Planning & Design, Lamoureux & Dickinson, Heritage Landscapes LLC and the University of Vermont Consulting Archeology Program (the BRPD Team) to assist them with the project. The Town also assembled an Advisory Committee to guide the project.

During the first public work session for this project, the public expressed a desire to have the project extend even further to include Inferno Road. Subsequently, the Warren Selectboard authorized the BRPD Team to include Inferno Road in the project.

This Alternatives report, which includes information on both Sugarbush Access Road and Inferno Road alternatives, is the second product of the work of the Town officials, Advisory Committee, and the BRPD Team. It describes for both roads the different alternatives that were initially considered, the results of initial analysis, and the final alternatives that are being considered further by the Town.

### 2. PURPOSE AND NEED

The purpose of the Sugarbush Access Road Path is to provide a non-motorized connection, especially for pedestrians, to the Sugarbush Ski Resort, the surrounding residential development, and other existing walking and bicycling trails and facilities in Warren and the larger Mad River Valley.

Needs for the improvements include:

- The recommendation for a path along Sugarbush Access Road in the Mad River Valley Active Transportation Plan, completed in 2016 after an extensive public input process throughout the Mad River Valley;
- The presence of a bus route and stops along the Sugarbush Access Road without adequate pedestrian access;
- The minimal width of the existing Sugarbush Access Road shoulders, which limit its effective use by either walkers or bicyclists; and
- Frequent pedestrian activity along the Sugarbush Access Road, especially observed at its western end.

The purpose of the Inferno Road walking and bicycling improvements is to provide better conditions for those that walk and bicycle along Inferno Road. The need for the improvements includes:

- The lack of paved or unpaved shoulders along Inferno Road adjacent to the numerous guardrails;
- The steepness of the grade close to the edge of the road, creating difficult walking conditions; and
- The large number of one time visitors to the area using the road that are unfamiliar with the horizontal and vertical curves in the road that conceal the presence of bicyclists and walkers along the side of the road.

### 3. ALTERNATIVES DEVELOPMENT PROCESS

Following an examination of the updated existing conditions, the BRPD team, Town staff, and advisory committee conducted a work session to identify as many alternative ways of providing a path for walking and bicycling in the Sugarbush Access Road corridor. The group also worked together to do an initial analysis of alternatives to refine or eliminate those that did not meet the purpose and need or were otherwise unsuitable. The BRPD Team then refined the descriptions, added a few links or additional segments as appropriate, did further analysis, and developed a concise viable set of alternatives. Wanting landowners whose property would be affected to have a chance to review and comment on the alternative prior to a general public review and discussion, the Selectboard held a special meeting with them on the alternatives at their regularly scheduled meeting of September 27, 2016. The BRPD Team made additional refinements to the alternatives based on the landowners' comments, and prepared a final set of alternatives for public review.

**Table B-1** shows all of the alternatives that BRPD Team and the advisory committee initially developed; they also highlight whether these initial alternatives were kept or eliminated prior to the public work session. **Figures B-1** and **B-2** show the location of the initial alternatives. If the BRPD Team and advisory committee decided to eliminate an alternative, **Table B-1** explains the basis for the elimination.

Illustrations in the text show typical cross sections for the alternatives. **Figures B-3 and B-4** show the plans and main elements of most of the alternatives. **Tables B-2 and B-3** provide an analysis of the remaining Sugarbush Access Road and Inferno Road alternatives.

After the Selectboard authorized the inclusion of Inferno Road, the BRPD Team expanded the Existing Conditions summary to include information on Inferno Road and developed a set of alternatives for the Advisory Committee's consideration. The Advisory Committee reviewed the alternatives during their meeting to review the draft of the Alternatives Report. After adding a few additional alternatives, the Advisory Committee provided comments, information, and analysis on the various alternatives as the first step towards refining the list for presentation to the public.

The BRPD Team completed the analysis and prepared the Inferno Road portion of the Alternatives report for public review. **Figure B-5** provides an overview of the initial Inferno Road alternatives; **Figure B-6** shows the final set of alternatives being considered for Inferno Road. **Table B-3** provides an analysis of the Inferno Road alternatives.

**Even though the initial paths might be more like trails, the descriptions, analyses, and ballpark cost of the paths in the alternatives assume a full ten-foot wide, ADA accessible path, so that the feasibility and potential impacts of such a path can be evaluated now, unless specifically noted otherwise for a particular alternative.**

## **B. SUGARBUSH ACCESS ROAD ALTERNATIVES**

### **1. OVERVIEW**

The BRPD Team divided the Sugarbush Access Road alternatives into three types:

- Alignment alternatives along the entire length of the road,
- Alignment alternatives for shorter segments of the road, and
- Intersection alternatives.

They further divided the alternatives along the entire length of the road into two pieces. The first extends from Inferno Road to Eurich Pond Road. The second lies between Eurich Pond Road and Route 100. The alternatives fall both inside and outside of the right-of-way (ROW), and close to and far from the road itself. The segment alternatives provide a variation that could be applied to a portion of the full length alternative in the eastern portion of the path, altering the alignment of a short piece of the eastern portion of the full length alternatives.

The report includes separate sections for each type of alternative. Figures and Illustrations help describe each alternative. The first section of the Sugarbush Access

Road alternative descriptions focuses on the full length alternatives and segments between Inferno and Eurich Pond Roads. The second section of the descriptions covers the full and segment alternatives for the piece of the path from Eurich Pond Road to Route 100.

The descriptions of the alternatives and segments typically go from the west to the east.

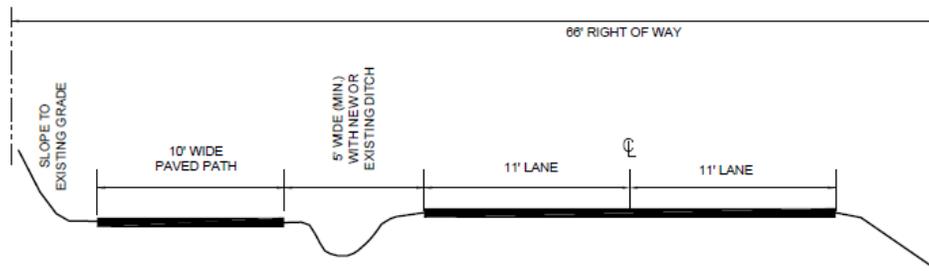
## 2. SUGARBUSH ACCESS ROAD ALTERNATIVES - INFERNO ROAD TO EURICH POND ROAD

### a. Alternative A West: North Side Shared Use Path

This alternative would create a shared use path, mostly within the ROW, on the north side of Sugarbush Access Road between Inferno Road and Eurich Pond Road. The exact location within the ROW would depend on specific grade, vegetative, and development conditions, but would generally be near the outer edges of the ROW. The path would be at or close to the level of the road, with greater variation as needed to minimize grading and impacts to adjacent land uses.

**Figure B-3** shows the potential location of the path within the ROW along with the various issues associated with the potential development of this path. **Illustration B-1** provides a generalized cross section for this alternative.

### Illustration B-1: Typical Cross Section of Alternative A Next to the Road



Alternative A would begin by heading north from the Sugarbush Access Road/Sugarbush Village Road intersection along the west side of Sugarbush Village Road. The path would follow the west side of the road north to the intersection with Sports Center Drive. The path would then turn east and run along the north side of Sports Center Drive, staying on the northern edge of the sports and maintenance facilities along the road. At the end of Sports Center Drive, the path would continue across a second Sugarbush Resort Property, probably staying close to a proposed subdivision road until it reaches Sugarbush Access Road. Once next to the road, the path would turn east at the outer edge of the ROW.

In front of the Sugartree Bed & Breakfast, the path would require the relocation of an existing retaining wall within the right-of-way. The path would also need to accommodate an existing nearby well and other utilities. The photo on the right shows a picture of the retaining wall and its proximity to the road. Alternately, the path could be narrowed to fit between the retaining wall and the edge of the pavement. The mailbox would need to be moved, and a barrier provided between the road and the path.



The path would continue eastward in a similar manner past the intersection with

Golf Course Road. East of the intersection, the existing drainage ditch gets larger and deeper, as the photo on the right. The path would likely be closer to the road in this location to avoid significant changes to the drainage ditch. It would be necessary to create a small retaining wall, most likely of precast concrete blocks or gabions, along the edge of the ditch to minimize reducing the carrying capacity of the ditch.



As the path approaches the western end of Club Sugarbush Road South, the path would gradually ascend to the rise on the north side of the road, seen on the left side of the road in the picture on the right. This would put the utility poles between the path and the road. The path would descend the rise on the east side, keeping to the outside of the utility poles, at the outer edges of the right-of-way. The path would rise and fall with the grade adjacent to the road when the change is less than five feet, but if the slope drops down significantly, such as near the intersection with Club Sugarbush Road North, a retaining wall would be used to keep the path relatively level with the road while minimizing the fill needed to do so.



At German Flats Road, the path would shift slightly closer to the road to be between the utility poles and the pavement. At the intersection, the path would cross German Flats Road via a new crosswalk at the stop sign.



East of German Flats Road, the path would again lie outside of the utility poles at the edge of the right-of-way. Between the poles in front of the secondary building close to the road, shown on the left in the photo, the path would shift toward the road to maximize the separation from the building. The alignment would require the relocation or replacement of the existing hedge in front of the building as part of the project.



Further east, the path would continue to lie adjacent to the road, crossing the Sugarbush Inn driveway close to its intersection with the Access Road. The fire hydrant and sign on the north side of the driveway, seen in the photo on the left, would need to be relocated further away from the road as part of the project.

On the south side of the Sugarbush Inn driveway, also seen in the photo on page 6, the path would stay very close to the road to minimize impacts on the historic house east of the Sugarbush Inn Driveway.



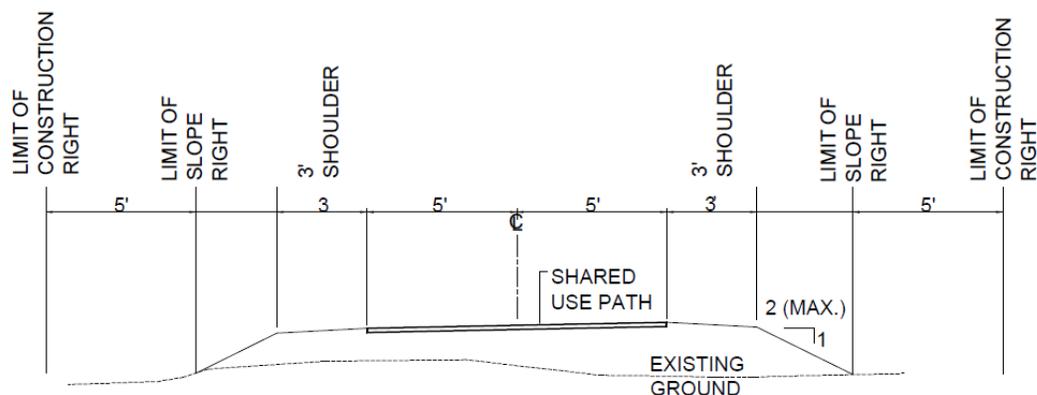
The historic maple tree to the right of the house in the picture above, already disfigured due to pruning around the overhead utility lines, would need to be removed. The white picket fence, seen in the photo on the left, would be relocated closer to the house at the edge of the right-of-way as part of the project.

South of the historic house, the path would again move away from the road to maintain a small drainage swale between the road and the path. This section of the path would end at Eurich Pond Road.

b. Alternative B: South Side Shared Use Path

This alternative would create a shared use path along the south side of Sugarbush Access Road, in and out of the ROW between Inferno Road and Eurich Pond Road. **Figure B-3** shows the alignment of this alternative. The path would start on the southeast corner of Sugarbush Access Road and Inferno Road and head east using the existing path on the south side of the road. It would be slightly regraded and the surface improved to meet ADA requirements. **Illustration B-2** shows what an ideal cross section of the path would look like, both the existing trail when upgraded and new sections of path, although the relationship of the path to existing grade could change.

**Illustration B-2: Ideal Cross Section of the Off-Road Alternatives**



The western end of the existing Sugarbush Resort trail would be extended so that it clearly brings walkers and bicyclists to the intersection, where they could use the crosswalks to access the Resort. The eastern end of the existing trail would be extended as well to bring users to Sugarbush Access Road.



The trees, for the most part, along the Sugarbush Road right-of-way east of the existing path are located further from the road. The path would head east in the right-of-way to Bridges Circle. There would be some tree clearing for this section; trees that would need to be removed can be seen on the right side of the photo to the left. The path would cross Rice Brook via a new prefabricated bridge or extension of the existing culvert.

At Bridges Circle, the path would head away from Sugarbush Access Road, following the south side of Bridges Circle, with a path just off the edge of the pavement. The steep slope along that side of the road would require either a boardwalk or the placement of a culvert parallel to the road for the existing drainage way with fill over it to create room for the path. The path would also need to have at least one level area because the rise would be about eight percent and over 200 feet in length. The path would cross Bridges Circle at the top of the hill at the intersection with the road into the first cluster of units on the south side of the road. Alternately, bicyclists and walkers could use the road itself as they head up the hill, which would avoid disturbing the forest and slopes adjacent to the road. This option would require walkers and bicyclists to cross Bridges Circle either at the bottom or the top of the hill to travel on the proper side of the road in relation to the auto traffic.

After crossing Bridges Circle at the top of the hill, the path would head east going behind the existing Sugarbush Resort offices. From there, the path would loop around the southeast side of the self-storage facility, staying on The Bridges property, if possible, to avoid the need for an additional easement. At The Maples property east of The Bridges, the path would weave around the buildings, balancing the separation from buildings with the need to maintain ADA accessible grades, the desire to leave as many trees as possible, and the need to separate the path from the wetlands near Sugarbush Access Road. The Maples property has granted a path easement to the Town, with the specific location of the path to be determined.

The path would cross Golf Course Road approximately 225 feet south of the intersection with Sugarbush Access Road. A Rectangular Rapid Flashing Beacon might be used at the crossing; the decision would be made after more detailed traffic counts are made on Golf Course Road as part of the design process. Northeast of Golf Course Road, the path would continue to head northeast behind the small cottages and the Sugar Lodge at Sugarbush parcels. It would enter the Club Sugarbush property and ideally pass between the two westernmost condos to reach Club Sugarbush Road. The path would use the road itself for bicycling and walking to its eastern intersection with Sugarbush Access Road.

Once back in the Sugarbush Access Road, the path would head east at the outer edge of the right-of-way. It would continue south to Sterling Ridge Road. Just west of the road, the path would cross Sugarbush Access Road via a crosswalk. This crossing would include a Rectangular Rapid Flashing Beacon to assist those using the crosswalk. The crossing is placed at this location to provide adequate sight distances for motorists coming from the east. On the north side of the road, the path would follow the alignment of the Alternative A: North Side Shared Use Path for the short distance south to Eurich Pond Road.

c. Alternative Segment A-1: North Side Path

Alternative Segment A-1 would create an alternate alignment for the path on both sides of German Flats Road. This alternative Segment would avoid being close to the road on the slope west of the German Flats Road and the impacts to the historic house, tree, and fence along Sugarbush Access Road. **Figure B-3** shows the alignment of this segment. **Illustration B-2** on page 7 provides a typical cross section of Segment A-1 path.

The Segment would start as an on-road path, using the Class 4 portion of Club Sugarbush North Road. At the end of the public road, the path would turn east, to use the alignment of an existing path passing by the north side of the small pond on the east side of the road. It would continue to follow the alignment of the path as it heads east to the German Flats Road intersection with Sugarbush Access Road.

The path would cross German Flats Road at the intersection, using the existing STOP sign as a means of safely interacting with motor vehicles. On the Sugarbush Inn parcel, the path would pass south of the main building and north of the auxiliary building along Sugarbush Access Road, adjacent to the parking area, as shown on the sketch to the right. The path would most likely go along the bottom the small rise at the south end of the parking area. The path would cross the Inn driveway where it begins to widen into the parking area.



On the east side of the Sugarbush Inn driveway, the Alternative Segment A-1 path would angle across the slope down to the lower area. The grade for the path as traverses the slope would be approximately seven to eight percent. At the bottom of the hill, the path would follow the alignment of the existing mowed grass path; the existing bridges would be adequate for some time into the future, until the wood needs to be replaced. At that point in time, the Town could update the bridges with new wood, or replace them with more permanent prefabricated bridges.

The path would end by diverging from mowed path to curve around the open lawn west of Eurich Pond Road. This would avoid the slight rise and fall needed to follow the existing mowed grass path up to its end at Eurich Pond Road and then down the road towards the stream. The path would cross the stream draining from the pond to the west via a new prefabricated bridge. The path would end at Sugarbush Access Road.

d. Alternative Segment A-2: Historic House Bypass

This alternative segment would create a short bypass that goes behind the historic house, fence, and tree east of the Sugarbush Inn driveway. Figure B-3 shows the alignment of this segment alternative. **Illustration B-2** on Page 7 shows a typical cross section of this alternative when it is located on level ground. Retaining walls would be included in the cross section where the path crosses steep slopes.

The segment would move away from Sugarbush Access Road on the east side of the Sugarbush Inn drive. At approximately the location where the drive enters the parking area, the path would turn east, running behind the historic house on the Sugarbush Inn property. The path would traverse the slope on a level area created by cutting into the upper bank and filling on the low side, using a retaining wall to keep the fill from extending far down the slope towards the stream. The grade of the path along the steep slope would remain roughly level. The path would run parallel to the stream, crossing over the northeast corner of the parcel with the historic House, eventually returning to the Sugarbush Access Road ROW.

e. Alternative Segment A-3: North Side Trails

This Segment would create trails along the north side of Sugarbush Access Road north of the ROW. These would narrower footpaths and not full ten-foot wide shared use paths. **Figure B-3** shows the alignment of this alternative.

At the driveway heading north just east of the Sugar Lodge at Sugarbush on the opposite side of the road, the path would head up the driveway to the northern edge of the parcel to the east, which has also granted a path easement to the Town. The path would run along the northern edge of this parcel until it reaches the Club Sugarbush parcel.

The path would continue east along the northern edge of the Club Sugarbush parcel, eventually following an existing path towards Club Sugarbush Road North. It would cross the road at the intersection with Club Sugarbush Extension, and join with Alternative Segment A-1 alignment.

f. Alternative Segment B-1: Sugarbush Administration & Paradise Deli Route

This Segment would shift the alignment of Alternative B near Paradise Deli. **Figure B-3** shows the alignment of Segment B-1; **Illustration B-2** on Page 7 shows a typical cross section of this segment. It would begin at the top of the rise of Bridges Circle as it enters the property, where it would head away from the road directly east towards the Sugarbush Resort Office property. It would run through the center of the parking lot of the Resort Administrative buildings and then cross the driveway to the storage units. It would pass onto the Paradise Deli property on the building side of the existing fence. It would cross the parking area close to the road, requiring the

removal of at least two parking spaces. North of the Paradise Deli parking, the path could either connect with the crosswalk proposed as part of Alternative A, or move onto the Maples property to rejoin the rest of the alignment of Alternative B.

g. Alternative Segment B-2: Golf Course Road Path

Segment B-2 would create a link along Golf Course Road from the west side of the road crossing of Alternate B to the intersection with Sugarbush Access Road. The path would lie at the outer edges of the Golf Course Road ROW. A crosswalk on the west side of the intersection would bring path users to the northern side of the road to link with the alignment of Alternative A. **Figure B-3** shows the alignment of Segment B-2 and **Illustration B-2** on Page 7 shows a typical cross section.

d. Intersection Alternatives

i. Overview

Modifying the intersections to make them easier for walkers and bicyclists to navigate requires studying how the modifications will also affect traffic movements through the intersections, especially in the winter during periods of high traffic volume. Existing traffic studies for this intersection should initially be reexamined with this additional viewpoint, to see if any modifications can be easily made based on traffic data currently available. If insufficient data exists, new traffic counts that include bicycle and pedestrians movements should be done. These counts can then be used to update or redo an intersection study to see what types of modifications would benefit all users that will travel through the intersection.

ii. Alternative IN1: Sugarbush Access Road/Inferno Road/Village Road Intersection Upgrade

This alternative would modify the intersection to add a clear route for bicyclists, a noticeable crosswalk for pedestrians and easily understood movements for motorists. At a minimum, this would include adding a stop sign for the western movement of Sugarbush Access Road into the intersection, at least during the summer months. At a maximum, it could involve adding a center median on the eastern approach, which would create a refuge island for pedestrians crossing Sugarbush Access Road as well as change the alignment of the western bound lane and the eastbound left turn lanes, so that driving directly west into the parking lot would no longer be the easy movement for motor vehicles that it is now.

### 3. SUGARBUSH ACCESS ROAD ALTERNATIVES - EURICH POND ROAD TO ROUTE 100

#### a. Overview

Due to the steepness of the side slopes of Sugarbush Access Road east of Eurich Pond Road, it would be almost impossible to create a continuous shared use path within the ROW south of the pavement. Consequently, all but one of the initial full length alternatives for a shared use path within the Sugarbush Access Road corridor between Eurich Pond Road and Route 100 were considered to be infeasible due to grades and slopes. This left only one option for a full length alternative in this piece of the path, Alternative A East, the North Side Shared Use Path in the ROW. It is described along with the one viable segment alternative east of Eurich Pond Road. **Figures B-3** and **B-4** show the alignment of the alternatives.

#### b. Alternative A East: North Side Shared Use Path in ROW

The eastern portion of Alternative A would start at Eurich Pond Road. The path would cross Eurich Pond Road close to the intersection with Sugarbush Access Road. The Southface sign would need to be relocated outside of the right-of-way. South of the road crossing, the path would remain relatively close to the road until after the crossing of the Alpine Options driveway. South of the driveway, the path would be benched into the slope leading down to the stream crossing. The lone old maple tree on the slope would be removed.



As the path moves into the curve in the road, it would shift away and slightly up from the road, lying close to the edge of the trees at the outer edge of the right-of-way. As it begins to descend the hill, the edge of the forest moves closer to the road, as the photo on the left shows. To create enough room for the path and maintain the required clear zone between the road and the

path, the edge of the forest would need to be moved back approximately ten to twelve feet. As the road, straightens, the edge of the forest again recedes from the road, creating an open area for the path on the outside edge of the right-of-way. The utility poles would be located between the path and the road.

At the intersection with Collins Road, shown in the photo to the right, the path would lie on the outside of the drainage ditch. The single tree on the north side of the road would need to be removed. The path would require a redesign of the rip rap drainage way leading towards the stream crossing to keep the path within the right-of-way. Alternately, the path could go outside of the right-of-way along the edge of the rip rap. The redesign, completed as part of this project, could include the extension of the culvert downhill and the addition of a small constructed wetland area to receive and treat the runoff prior to discharge into the stream. The stream itself would be crossed via a boardwalk adjacent to the roadway in the right-of-way. On the east side of the stream, the path would move uphill still relatively close to the edge of pavement, with the drainage swale and utility poles on the outside, close to the outer edges of the right-of-way. At the top of the hill near Fortna Road, the old red maple tree would need to be removed and the fire hydrant relocated.



East of Fortna Road, the path would remain close to the road. As it reaches the temporarily located barn and historic house, several options could be considered since they, and several historic maple trees, lie close to the road, as the two photos below show.

- The path could shift the barn out of the right of way and cut into the slope and remove the old maple trees;
- The path could remain in front of the barn and at the bottom of the slope at a minimum of six feet wide, the road would narrow and shift as far as possible to the south without disturbing the steep banks, and a guard rail would separate the road from the path;
- The path could run behind the barn and historic house through the woods; or
- The path could narrow to a four foot section in front of



the barn and the house and a guardrail would separate the path and the roadway.

No matter which option is considered for the house, the path would continue close to the edge of the pavement around the next curve, beyond the next residential driveway to the south. After the driveway, the path would move away from the road



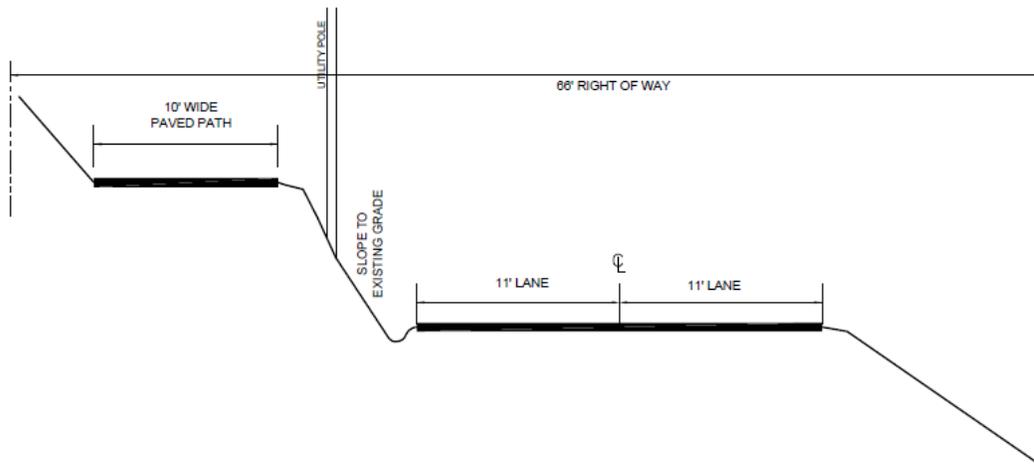
and onto a small terrace initially only a few feet above the road, which can be seen in the photo to the left. The path would be at the outside edge of the right-of-way with the utility poles between it and the road. The path would continue to be located above the roadway by 10 to 20 feet at the outside edge of the right-of-way. It would remain in this position as it travels east

downhill to approximately across from the Terra Rossa parking lot entrance, where it would once more come down to the level of the roadway. The push braces for the utility poles along the elevated section may need to be reconfigured to allow the path to pass between the actual utility pole and the outside edge of the right-of-way.

**Illustration B-3** on the next page shows a typical section of the trail located above the roadway

The path would lie just inside the right-of-way for the remainder of the route down the hill, close to or possibly in the edge of the trees along the side of the road. The path would end at the intersection of Sugarbush Access Road with Route 100.

**Illustration B-3: Typical Cross Section of Alternative A above the Road**



c. Alternative Segment A-4: Water Line Route

Alternative Segment A-4 would create a new path adjacent to Upper Pines Road and then over the alignment of the snow making water line heading northeast and downhill to the snow making pond. The path would extend southward to the nearby Mad River Path parking area. **Figure B-4** shows the alignment of this alternative.

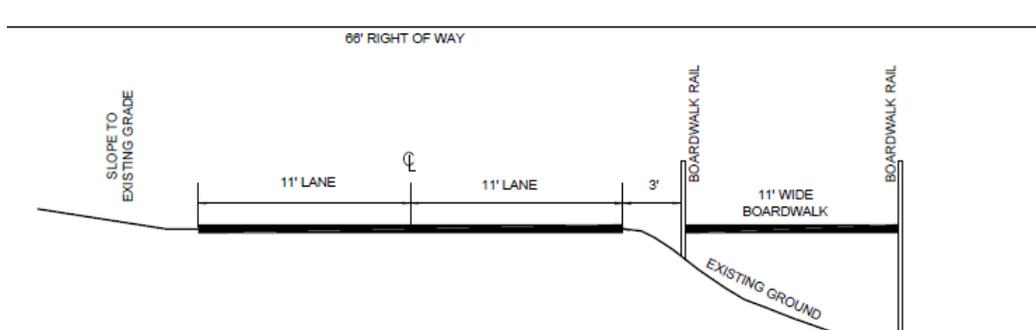
This path would stay within the existing cleared space over and near the existing opening over the water line. The grades along the line would exceed those allowed by ADA, so this section alternative would need to be considered a trail that would not meet ADA standard.

4. SUGARBUSH ACCESS ROAD ALTERNATIVE ISSUES

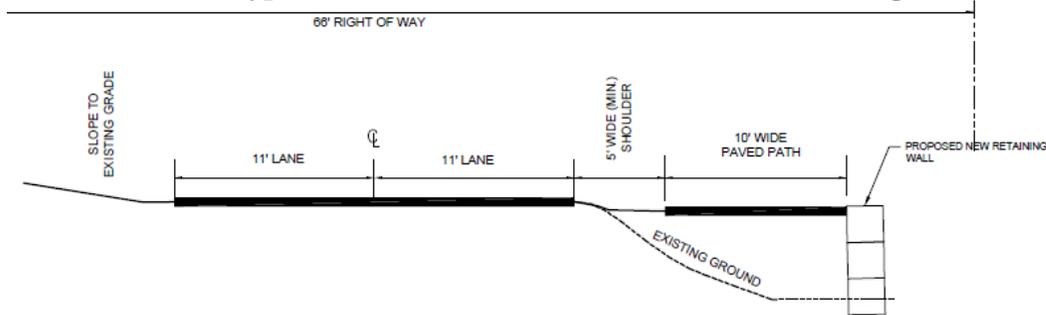
a. Grading

There are portions of the route where there are steep slopes near or at the edges of the Sugarbush Access Road pavement, some going up and some going down. For those areas where the slope goes up, a shallow road-side ditch would be created between the road and the path, and then either a retaining wall would be constructed on the outside of the path, or the bank would be sloped back at a 2:1 slope (2 feet horizontal to 1 foot vertical). For those portions where the ground drops away from the road, such as near the intersection with Club Sugarbush Road North, the path would either be supported by a retaining wall, or constructed on a boardwalk or steel structure. **Illustrations B-4** and **B-5** show typical cross sections of both of these situations.

**Illustration B-4: Typical Cross Section of the Path on a Boardwalk**



### Illustration B-5: Typical Cross Section of the Path with a Retaining Wall



#### b. ADA Compliance

Compliance with ADA requirements is a significant consideration for this project. Ultimately, the goal is the creation of an ADA accessible shared use path that is at least eight feet wide. This would include a surface treatment that meets ADA standards for firmness and suitability for wheelchairs and other walking aids. The initial facility, however, might only be a trail that might only be four or feet wide without an ADA surface.

The analysis done on these alternatives focuses on meeting the maximum running grade requirements of the ADA regulations, even if only for a four-foot wide trail. The maximum running grade requirements stipulate how steep a trail can be. Focusing on meeting this requirement would allow the eventual upgrading of the trail to a shared use path over time without the need to realign the path.

A significant provision of the ADA maximum running grade allows construction of a new facility adjacent to an existing roadway to follow the grade of the existing roadway, even if the existing roadway exceeds the allowable running grade. In all cases, the ADA mandated cross-slope of the new facility must be met. Any other new facility constructed must meet the running grade requirements of ADA.

#### c. New Crosswalks

No matter which alternative(s) are selected for future implementation, walking and bicycling across Sugarbush Access Road would be necessary. The 40 MPH speed limit along the Sugarbush Access Road requires a stopping sight distance of approximately 250 feet.

The Town should consider the use of a Rectangular Rapid Flashing Beacon at the some or all of the crosswalks on Sugarbush Access Road, due to the traffic levels, speed, and curves in the road. The Town can decide on whether these features would be beneficial during the design phase of the project, after updated traffic and speed counts are completed.

## C. INFERNO ROAD ALTERNATIVES

### 1 OVERVIEW

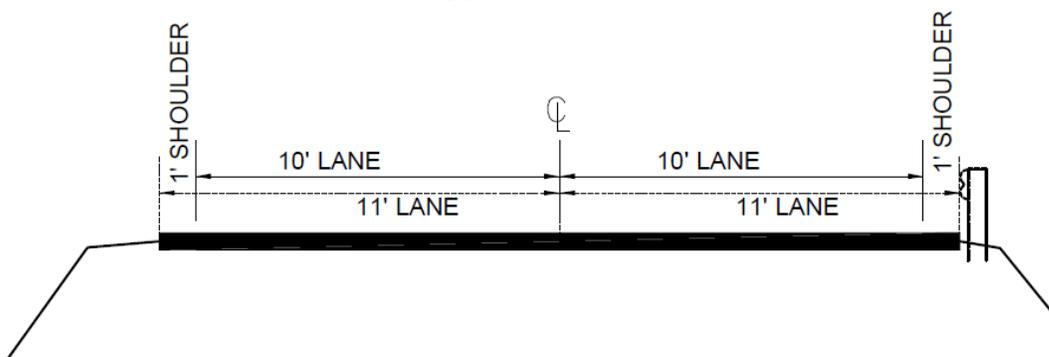
The Inferno Road alternatives include both on-road and off-road improvements. As **Table B-3** shows, the on-road improvements would provide some benefit, but would not create a walking or bicycling environment that is welcoming to users of all ages and abilities. The off-road improvements would create better walking and bicycling conditions for all users. **Figure B-6** shows the alignment of these alternatives.

### 2. ALTERNATIVE I-1: ROAD RESTRIPING

Alternative I-1 would keep the existing road as it is but would add striping along the sides to create two ten foot lanes, a center strip, and paved shoulder along each side of the road that would be at least one foot wide and possible wider where the existing width of the road is greater than 22 feet. **Illustration B-6** shows a cross section of what the restriped road would look like.

A “Watch for Pedestrians” sign would be added to either end of Inferno Road. The Town could also add flashing lights to the signs. Additional signs would be added as determined by the Town, some as recommended in the recent Safety Study completed by VTrans. A Rectangular Rapid Flashing Beacon might also be installed where users would be crossing the road to access the paved shoulder or other destination on the other side of the road, especially at the intersection of Inferno Road and Snow Creek Road.

#### Illustration B-6: Alternative I-1 Typical Cross Section



### 3. ALTERNATIVE I-2: SHARED USE PATH IN ROW

**Figure B-6** shows the alignment of Alternative I-2. **Illustration B-1** on Page 4 shows a cross section that would be typical for Alternative I-2. The shared use path in the Inferno Road right-of-way would start at the northern end of the road at the

intersection with Sugarbush Access Road. The path would start at grade at the outer edge of the 66-foot wide right-of-way. As the path moved up hill, it would need to be benched into the slope or built as a boardwalk. If constructed as a boardwalk, it would be anchored on the east, uphill side at grade and extend west over the slope. There would be a railing along the west side. Trees would need to be removed with either the bench into the slope or the boardwalk, but the boardwalk would remove fewer trees.

After crossing Snow Creek Road, the path would continue on the outer edge of the right-of-way, with the drainage ditch and utility poles between the path and the road pavement. There is a level area just beyond the drainage ditch along the outer edge of the right-of-way that can accommodate the path from Snow Creek Drive to the southern end of the grassed area on the South Village property. The path would need to address slight changes in existing grade caused by rock outcrops on either side of South Village Boulevard.

The path would continue along the outer, western edge of the Inferno Road right-of-way to approximately 200 feet north of the intersection of Rumble Road, prior to reaching a small wetland on the west side of the road. At that point, it would cross the road with the assistance of a Rectangular Rapid Flashing Beacon, activated by users.

On the east side of the road, the path would continue south at the outer edge of the right-of-way. There is a level area adjacent to the road on the east side of the right-of-way in this area. The level area generally continues all the way to the intersection with West Hill Road; the path would also stay at the outer edge of the right-of-way, ending as it reaches West Hill Road.

#### 4. ALTERNATIVE I-3: NORTH SIDE TRAIL

Alternative I-3 would create a trail that makes use of the numerous private roads on the west side of Inferno Road to put walkers and bicyclists on roads less traveled by fast moving motor vehicles. Narrow foot trails would link the different private roads. **Figure B-6** shows the alignment of Alternative I-3. Even though this alternative is currently envisioned as a trail, the alignment has been created so that it should be possible to improve it to a full shared use path, if it should ever become desirable. The notes on ADA access on Figure B-3 might not need to be implemented until such upgrade might happen.

The trail would start as a sidewalk heading west from the southwest corner of the intersection of Sugarbush Access Road, Inferno Road, Village Road, and Gate House Lane. It would link with the existing sidewalk further west along the south side of Gate House Lane. Bicyclist would use the road, traveling on a protected bicycle lanes created on the south side of the road with a slight widening of the existing pavement.

West of the split in Gate House Lane, the trail would use the existing pavement of Gate House Lane for both walkers and bicyclists. Users would turn off Gate House Lane onto the existing mountain bike trail heading south

The trail would turn east away from the mountain bike trail to intersect with Snow Creek Road, using the road itself after intersecting it, for walking and bicycling along the outer edges. Near the east end of Snow Creek Lane, a crosswalk would carry users to Upper Snow Creek Road. At the top of the curve in the road, a second section of trail would link Upper Snow Creek Road with either Spring Fling Road or The Cliffs Road in South Village. Path users would then use the roads in South Village - Spring Fling Road and South Boulevard.

A third section of trail would head south from South Village Boulevard to connect with Boulder Pass Road close to the switchback curve. Users would then travel downhill on Boulder Pass Road to intersect with Inferno Road. A crosswalk at the intersection of Boulder Pass Road, Inferno Road, and Coleman Road would provide access to a shared use path on the east side of the road that would continue south as described for Alternative I-2.

#### 5. ALTERNATIVE I-4: SOUTH SIDE TRAIL

Alternative I-4 would create a harrow foot trail outside of the right of way on the east side of Inferno Road, partially by using existing private drives and roads. **Figure B-6** shows the alignment of the trail. Even though this alternative is currently envisioned as a trail, the alignment has been created so that it should be possible to improve it to a full shared use path, if it should ever become desirable. The notes on ADA access on **Figure B-6** might not need to be implemented until such upgrade might happen. The trail would start similarly to Inferno Alternative I-3. The trail would continue on Snow Creek Road to the intersection with Inferno Road, where the path would cross the road via a crosswalk with a Rectangular Rapid Flashing Beacon.

On the east side of Inferno Road The trail would go along the south side of the formal and informal parking lots until it reached the portion of the South Village property used for septic treatment. The trail would wind around the western and southern portions of the treatment area. It would turn onto the access road for the septic area heading south; where the road turns west, the trail would continue south. It would crossover one of the properties on Rumble Road to reach the road itself, which it would follow to its intersection with Inferno Road. Once in the Inferno Road right-of-way, the trail would head south along the outer edges of the right-of-way to East Hill Road.

6. INFERNO ROAD ALTERNATIVE ISSUES

a. Center Lines

Centerlines on a road provide security for drivers, inducing them to drive faster. One way of slowing traffic on rural roads is to remove the center line. The road stays at its current width, so there is no difference in the amount of space allocated to automobiles traveling in either direction.

Deleting the center line striping would help slow motor vehicles on the road. Shoulder stripes should be added along the edge of the pavement instead, to serve as guidance for motorists when it is dark, foggy, or snowy. The road would need to be maintained just the same as shoulder stripes would be, so that the shoulder stripes would be visible during most weather conditions in which a center stripe would be visible.

This option could be used on Inferno Road to create a slower condition for bicyclists or walkers. If Alternative I-1 is selected, the center strip should be added initially, to allow regular motorists to get used to the change. The center line could be left to fade and not replaced, once motorists have a better feel for the narrower travel lanes. As the centerline fades, new motorists on the road would not have a memory of the previous conditions and would therefore not need a period of adjustment to the new condition.

b. Rain Gardens

To compensate for the additional paving and resultant stormwater runoff, rain gardens are suggested as additions to the existing swales along the sides of the road. The rain gardens would help to slow, reduce, and cleanse stormwater runoff in the swales.

The rain gardens would be constructed as widening of the existing swales or depressed areas adjacent and connected to the swale. They would be designed to hold water until full; additional water would overflow out of the garden back into the swale. The gardens would be planted with water-tolerant plants. The subsoil in the garden would be modified to be porous, allowing some of the water to seep into the ground.

The rain gardens would ideally be located at least at each of the new or existing culverts associated with the preferred alternative. The specific locations of the rain gardens would need to be examined further to see if there would be bedrock issues that might limit the construction of adequate seepage capacity.

**Table B-1 Initial Alternatives**

Initial Alternative Designation	Description	Disposition	Final Alternative Designation
<b>FULL LENGTH ALTERNATIVES</b>			
Alternative 1	Wider Shoulders - Add wider paved shoulders to either side of Sugarbush Access Road to create room for walkers and bicyclist.	<b>Deleted</b> - Did not provide facilities that would be usable by many walkers and bicyclists.	
Alternative 2	South Side Shared Use Path in Right of Way 1 - Create a shared use path at the outer edge of the south side of the existing Sugarbush Access Road right-of-way.	<b>Deleted</b> - had significant grading issues and forest impacts and a crosswalk on Sugarbush Access Road at the eastern end of the existing trail does not make this alignment a prerequisite of using the existing trail.	
Alternative 3	South Side Shared Use Path in Right of Way 2 - Create a shared use path adjacent to the road at the outer edge of the south side of the existing Sugarbush Access Road right-of-way.	<b>Deleted</b> - had significant grading issues and forest impacts and a crosswalk on Sugarbush Access Road at the eastern end of the existing trail does not make this alignment a prerequisite of using the existing trail.	
Alternative 4	South Side Shared Use Path outside Right-of-Way - Create a shared use path outside of but close to the south side of the existing Sugarbush Access Road right-of-way.	<b>Deleted</b> - Required the acquisition of numerous easements or rights-of-ways and faced grading challenges in meeting ADA compliance.	
Alternative 5	North Side Shared Use Path in Right of Way 1 - Create a shared use path at the outer edge on the north side of the existing Sugarbush Access Road right-of-way.	Combined with Alternative 6 and kept as a single alternative that lies as far away from the road as viable.	Alternative A - Figure B-3 & Figure B-4
Alternative 6	North Side Shared Use Path in Right of Way 2 - Create a shared use path next to the road on the north side of the existing Sugarbush Access Road right-of-way.	Combined with Alternative 5 and kept as a single alternative that lies as far away from the road as viable.	Alternative A - Figure B-3 & Figure B-4
Alternative 7	North Side Shared Use Path outside Right-of-Way - Create a shared use path outside of but close to the north side of the existing Sugarbush Access Road right-of-way.	<b>Deleted</b> - Required the acquisition of numerous easements or rights-of-ways and faced grading challenges in meeting ADA compliance.	
<b>SECTION ALTERNATIVES</b>			
Alternative Sa	Shift Existing Trail Access - Move eastern access point of the existing Sugarbush trail so that it links directly with the Sugarbush Access Road rather than the driveway into the Sugarbush Resort parking area.	Kept as alternative but combined with Alternative Sg to make Alternative B	Alternative B - Figure B-3
Alternative Sb	South Side Shared Use Path Cross Country - Create a shared use path across the parcels on the south side of the Sugarbush Access Road.	<b>Deleted</b> - Did not provide access to numerous businesses along the road; required the acquisition of numerous easements or rights-of-ways; and faced grading challenges in meeting ADA compliance.	
Alternative Sc	Use the roads within the Bridges and other condominiums to create a path off a portion of Sugarbush Access Road.	Kept as an alternative but slightly modified and combined Alternative Sg and small portions of Alternative 2.	Alternative B - Figure B-3
Alternative Sd	Use the existing informal path from the north side of the Sugarbush Access Road to the eastern end of Sports Center Drive and then create a new path westward to the northeast corner of the Sugarbush Resort Parking Lot.	Kept as alternative but combined with Alternative Sc to create Alternative C	Alternative A - Figure B-3
Alternative Se	Create a path along Upper Pines Road and over the alignment of the snow making water line to the snow making pond and the nearby Mad River Path parking area.	Kept as alternative	Alternative A-4 - Figure B-4
Alternative Sf	North Side Shared Use Path Cross Country - Create a shared use path across the parcels on the north side of the Sugarbush Access Road from Eurich Pond Road to Suagertree Bed & Breakfast.	Kept as alternative but split between Alternative Segments A-1 and A-4	Alternative Segments A-1 and A-3 - Figure B-3
Alternative Sg	Existing Sugarbush Trail - Use the existing trail to the south of Sugarbush Access Road east of Inferno Road as the route of the larger path.	Kept as alternative but combined with Alternatives Sa and Sg to create Alternative B	Alternative B - Figure B-3
<b>INTERSECTION ALTERNATIVES</b>			
Alternative IN1	Sugarbush Access Road/Inferno Road/Village Road Intersection Upgrade - Modify the intersection to add a clear route for bicyclists, a noticeable crosswalk for pedestrians and easily understood movements for motorists.	Kept as alternative	Alternative IN-1 Figure B-3
Alternative IN2	Village Road/Resort Access Drive Intersection Upgrade - Modify the intersection to add a clear route for bicyclists, a noticeable crosswalk for pedestrians and easily understood movements for motorists.	<b>Deleted</b> - Intersection could work well with just the addition of a crosswalk, which is included in Alternative Sd/S1	
<b>INFERNO ROAD ALTERNATIVES</b>			
Inferno Alternative A	Restripe the existing road to create ten-foot travel lanes and paved shoulders at least one-foot wide.	Kept as alternative	Alternative I-1 - Figure B-6
Inferno Alternative B	Pave existing gravel shoulders and restripe the road to create ten-foot travel lanes and paved shoulders at least two feet wide.	<b>Deleted</b> - Impacts to the trees and rural nature of the road would be to great.	
Inferno Alternative C	Widen the road enough to create four-foot wide paved shoulders	<b>Deleted</b> - The number of potential users does not justify the high cost of widening; the visual impact of the widening would be significant	
Inferno Alternative D	Create a shared use path along the east side of the road within the right-of-way	Kept partially as an alternative; the southern portion of the alignment has been combined with Inferno Alternative E	Alternative I-2 - Figure B-6
Inferno Alternative E	Create a shared use path along the west side of the road within the right-of-way	Kept partially as an alternative; the northern portion of the alignment has been combined with Inferno Alternative D	Alternative I-2 - Figure B-6
Inferno Alternative F	Create a path by using private roads on the west side of Inferno Road, linked with short sections of shared use path	Kept as alternative	Alternative I-3 - Figure B-6
Inferno Alternative G	Create a path by using the South Village access drive to the pool and septic area	<b>Deleted</b> - The grades on the existing roads are very steep for long sections	
Inferno Alternative H	Create a path by using the South Village access drive to the pool and septic area, linked by shared use path with Rumble Road	Kept as an alternative	Alternative I-4

**Table B-1 Initial Alternatives**  
 The Town of Warren, Vermont  
 Sugarbush Access Road Path Scoping Study  
 September 20, 2016



TABLE B-3: Inferno Road Alternatives Analysis

Town of Warren

Sugarbush Access Road Path Scoping Study

October 4, 2016

	No Action	Inferno Road - Sugarbush Access Road to West Hill Road			
	No Action	Alternative I-1 Road Restriping	Alternative I-2 Shared Use Path in ROW	Alternative I-3 North Side Trail	Alternative I-4 South Side Trail
<b>Project Description</b>					
Path or Trail Length (in feet)	5,150	5,150	5,150	3,000	2,900
Length of Sidewalk (in feet)	0	0	0	200	0
Length of Shared Use Path	0	0	5,150	0	0
Length of Paved Shoulder	0	5,150	0	0	0
Width of Paved Shoulder	0	1 to 2	0	0	0
Length of Shared Roadway	0	0	0	3,700	1,875
Residential Driveway/Road Intersections or Crossings	0	0	5	6	3
Commercial Driveway Intersections	0	0	0	0	0
Culvert Extensions/Bridges	No	0	0	0	0
Private Property Permanent Easements	No	0	0	9	3
Private Property Construction Easements	No	0	15	9	3
Approximate Steepest Grade	10%	10%	14%	16%	9%
Regrading/Retaining Walls	No	No	Possibly	No	No
Significant Physical Constraints	None	Closeness of guardrail to edge of pavement	Rock outcrops; drainage ditches along roads; mature trees; steep slopes at north end, stream crossing	Narrowness and gravel surface of private roads; steep slopes; drainage ditches	Steepness of existing parking area; existing trees; residential structures
<b>Environmental/Cultural Constraints</b>					
Tree Disturbance	No	No	Yes See Figure B-6	Possibly	Possibly
Wetland Disturbance	No	No	No	No	No
Watercourse Impacts	No	No	No, if bridge or Boardwalk Used for Brook Crossing & Stormwater Mitigation Added	No, Stormwater Mitigation Added	No, Stormwater Mitigation Added
Steep Slope Disturbance	No	No	Yes See Figure B-6	Yes See Figure B-6	Yes See Figure B-6
Habitat Impacts	No	No	No	No	No
Land Use Impacts	No	No	No	No	Yes Proximity to residential Structures
Historic / Archeological Resources Impacts	No	No	No	No	No
Above Ground Utility Disturbance	No	No	No	No	No
Below Ground Utility Disturbance	No	No	No	No	No
Drainage Ditch & Storm Water Structure Disturbance	No	No	Yes. New Culverts Added	Yes. New Culverts Added	No
<b>Project Attributes</b>					
Meets Purpose and Need Statement by Itself	No	No	Yes	No	No
Types of Users Served	Advance and Some Basic Bicyclists; Active and Some	Advance and Some Basic Bicyclists; Active and Some	Walkers & Bicyclists of All Ages and Abilities	Active & Basic Walkers	Active & Basic Walkers
Avoids High Crash Areas	Yes	Yes	Yes	Yes	Yes
Separates Motorized and Non-Motorized Users	No	No	Yes	No	No
Provides Access to Trails	No	No	No	Yes	No
Maintenance Considerations	No change	Additional maintenance of re-applying stripes, possibly on a yearly basis	Consideration of winter maintenance; Crosswalk repainting, possibly on an annual basis; Upgraded stormwater facility maintenance, some possibly on private property	Trail maintenance; Maintenance agreement must be included in easement agreements; Coordination between public and private summer and winter maintenance on private roads; Upgraded stormwater facility maintenance	Trail maintenance; Maintenance agreement must be included in easement agreements; RRFB maintenance; Coordination between public and private summer and winter maintenance on private roads;
Order of Magnitude Cost	\$0	\$2,000	\$1,400,000	\$65,000	\$140,000
Positive Considerations					
Negative Considerations					
Neutral					





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