



Bike / Pedestrian Improvements

Waterville Valley, New Hampshire

Prepared for:

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Bike and Pedestrian Accommodations

1.1 Introduction

Prior to developing potential bike and pedestrian enhancement recommendations it was first necessary to understand the bike and pedestrian needs within the Town. This included documenting deficiencies in the existing infrastructure and identifying existing and future needs and opportunities. The study team conducted data gathering in the form of field-based observations and measurements, discussions with Waterville Valley staff, merchants and residents, and evaluation of survey results.

Observations from the data collection efforts combined with applied design principles and input from public meetings, workshops and surveys helped shape the development of design solutions that address the bike and pedestrian needs and opportunities within the Town. This chapter describes conceptual design solutions that are proposed to address the Town's existing and future bike and pedestrian needs.

1.2 Improvement Alternatives

Town-Wide Improvements

There are several improvements that should be made Town-wide to improve bike and pedestrian accommodations. The improvements will address existing deficiencies, needs and/or enhancement opportunities. These Town-wide improvements are generally low cost and easily implementable and could be made near term as part of standalone efforts or integrated with regularly scheduled maintenance. The improvements are discussed as follows.

Bike Racks

There is a general lack of secure public or private bike parking around Town. As a result, cyclists tend to lock their bikes to trees, light poles, signs, or they don't lock

them at all. This may seem like a minor inconvenience to some but it may actually deter some cyclists from stopping or shopping at attractions within the Town, especially if they have expensive bicycles. Bike racks will also make it more attractive for business employees to bike to work, and bike racks generally help support cycling as a viable alternative to motor vehicle use. Perhaps as important, adding ample bike parking helps create an impression that the Town is accommodating and welcoming to cyclists.

Recommendation: Add secure bike parking at key destinations. This would include destinations such as Town Square, the schools and recreation center, tennis courts, Osceola Library, Snows Mountain and BBTS. Bike parking should be encouraged at existing private establishments and lodges, and the Town may wish to consider requiring bike parking at future developments. Bike racks should also be added to transit system busses if possible.

Roadway Crossings

There are numerous existing and planned pedestrian crossings on Town roadways and there is a great opportunity to improve these crossings to make them more visible to motorists and accommodating to users of all abilities.

Pedestrian Ramps:

Few if any of the existing pedestrian crossings have Americans with Disabilities Act (ADA) compliant pedestrian ramps. Deficiencies include excessive longitudinal or cross slopes on the ramps, lack of visual contrast between the ramps, the sidewalk and the road, and lack of Detectable Warning Surfaces (DWS) in the pedestrian ramps. There are even locations where there are crosswalks but no sidewalks or pedestrian ramps to receive pedestrians, and in at least one crosswalk location there is no break in the full height vertical granite curb, making that crossing completely inaccessible to people in wheelchairs.



Crosswalks:

The majority of the existing crosswalks consist of parallel white painted stripes, which is a perfectly acceptable configuration. A few crosswalks include green infill painting. That infill paint is distinctive, however the Federal Highway Administration has gone on record stating that it does not contribute to lower crash or injury rates since it does not contribute to visual detection of the crossing by motorists. The crosswalk style that has been found to be most visible to motorists is the “ladder” style of white markings. Most of the crosswalks in Town are aligned perpendicular to the roadways, but a few are skewed, which is less desirable.

Signs:

Few, if any, of the crosswalks currently have crossing warning signs associated with them. On low volume low speed roads this is less problematic, but on higher speed higher volume roads signs would help motorists identify the crossing location well in advance.

Lighting:

Most crosswalks are at roadway intersections and some of the intersections do have street lighting. The lack of lighting and reflective signs at crosswalks obviously reduces motorist awareness of the crossings.

Recommendations:

Pedestrian Ramps:

Make all pedestrian ramps Americans with Disabilities Act (ADA) compliant. This means improving the geometry and materials at the deficient ramps. It also means installing Detectable Warning Surfaces (DWS) in the pedestrian ramps for the benefit of vision impaired pedestrians. This includes locations where multi-use paths cross roadways.

Crosswalks:

Consider Town-wide adoption of the ladder style reflectorized crosswalk pavement markings for new and rejuvenated crosswalks.



Adjust existing and proposed skewed crosswalks to be perpendicular wherever possible. An example is the existing skewed crosswalk across Valley Road at Packard Road opposite the athletic center.

Crossing Signs and Traffic Controls:

Install reflectorized crossing signs at mid-block crossings as well as at crosswalks on a main road at intersections where the main road is not stop controlled.



Typical pedestrian crossing signs at a mid-block crosswalk.

Note the street light near the crosswalk and the ladder style crosswalk markings.

There are additional technological improvements that can be made to enhance pedestrian crossings. In descending order of control and cost they are:

1. The highest order of installation would be a full pedestrian signal that would stop traffic upon pedestrian actuation of the signals. This type of installation requires that specific pedestrian traffic based signal warrants are met and it is highly unlikely that any location in Town would meet those warrants.
2. The next level of improvement would be Pedestrian Hybrid Beacons (PHB's), which are similar to full pedestrian signals except they remain in the off state until pedestrians push the crossing buttons. PHB's may still be difficult to warrant in Town since they require relatively high pedestrian counts. Based on current or anticipated conditions we do not see a need for PHB's.
3. The third level of improvement would be provided by Rectangular Rapid Flashing Beacons (RRFB's) attached to crossing signs. RRFB's consist of pedestrian actuated flashing strobe lights attached to the crossing signs located on both sides of the crossing. These are intended to catch the attention of motorists when there are pedestrians crossing or waiting to cross. They do not stop traffic like the above two options so pedestrians must still judge when it is safe to cross. RRFB's are appropriate on roadways with speeds under 40 MPH, and there are no pedestrian volume warrants to be met. RRFB's are relatively low cost and can be solar powered.



Our recommendation is to consider RRFB's at pedestrian crossings on primary roads and where there is known pedestrian activity. We advise against overuse of RRFB's throughout the Town since it can dilute their effectiveness. Likely candidate locations for RRFB's are crosswalks on Valley Road at Tecumseh, Packard's, Village and Boulder Path Roads. The mid-block crossings on Boulder Path Road may also be appropriate locations for RRFB's. An added side benefit to adding RRFB's on Valley Road is that they will provide yet another visual key that pedestrian accommodations are important in Town.

Lighting:

The addition of attractive pedestrian scale street lighting along key roadways such as Valley Road, Village Road and Snows Brook Road would enhance pedestrian travel within the community. It would also promote the image that pedestrian accommodations are important within the Town. Beginning the lighting on Valley Road at the gateway to Town near Tripoli Road would immediately signal the transition to a pedestrian friendly environment when people come to Town.

Wayfinding:

There is a great opportunity and need to develop a comprehensive and consistent wayfinding system for the bike and pedestrian ways. This applies to the routes that are associated with roadways, and described herein, and it also applies to locations where the existing trail system crosses the roadway system. Informal trails should be identified as well as formal trails. There are already excellent trail signs on the cross country trails but there is a disconnect between those trails and the bike and pedestrian ways.

Sidewalks and Multi-use Paths

This section evaluates the bike and pedestrian needs and opportunities within the community. Existing conditions and potential improvement options are discussed for each roadway.

Valley Road

Existing Conditions:

Valley Road, which is also NH Route 49, is the only road into Town and secondary roads branch off of it as it circles counterclockwise around the center of Town, ending at Snows Brook Road. Valley Road is signed for 30 MPH, however it still has the feel of a minor State route since there are ample setbacks, smooth geometry and no stop signs. The expectation is that vehicle speeds much higher than 30 MPH would be the norm if it were not for police enforcement and the radar actuated speed display sign at the entrance to Town.

There is an existing Town maintained sidewalk that begins just north of the Tripoli Road intersection and continues the entire length of Valley Road to where it

becomes Snows Brook Road. The sidewalk extends along the east side of Valley Road as it leads northward and it crosses to the west side of Valley Road at Packard's Road. The majority of the sidewalk abuts vertical granite curb along the edge of Valley Road. The width is approximately 5 feet along the east side, including the curb, and as much as 10 feet along the west side, including the curb. The width of the west side sidewalk necks down to approximately 5 feet at the bridges that pass over ski trails and Snows Brook as it flows into Corcoran's Pond.

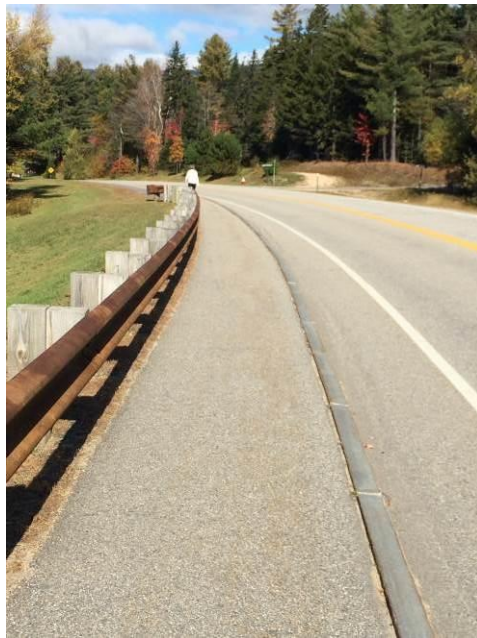


Left:
5' wide sidewalk along the east side of Valley Road in the vicinity of Tecumseh Road



Left:
10' wide sidewalk along the west side of Valley Road in the vicinity of the approach to Village Road (note that dark pavement is where sidewalk was widened)

Below (Left & Right):
5' wide sidewalks along the west side of Valley Road in the vicinity of the bridges over the ski trail (left) and Snows Brook (right)



Pedestrians:

The existing sidewalks on Valley Road provide the bare essential accommodations for pedestrians. The Town maintained sidewalk is continuous, but it only serves one side of the road, or the other, at a time. The 5 foot wide curbed sections are substandard by current guidelines which state that the width of the curb does not count toward the minimum 5 foot sidewalk width. This is a minor deficiency since pedestrian volumes are perceived to be low. It is recommended that any new or rehabilitated sidewalks meet the minimum 5 foot paved width.

Bicyclists:

Traffic volumes and speeds are normally low on Valley Road and there is no on-street parking. Truck volumes are low, sight lines are good, and driveways and side streets are well dispersed. These factors contribute to a relatively low stress environment for experienced on-road cyclists. Those cyclists will find that Valley Road has approximately 3-foot striped paved shoulders and 11-foot travel lanes. By most guidelines shoulders this narrow are not considered adequate for bike use, especially adjacent to vertical curbing, but most experienced cyclists are accustomed to sharing 14 feet of pavement with motor vehicles on low speed and volume roadways such as Valley Road.

Inexperienced cyclists, including children and in many cases tourists, may find Valley Road intimidating to ride on due to the narrow shoulders, especially on the side of the road that is curbed. Inexperienced cyclists are therefore observed riding on the sidewalks along Valley Road. This results in cyclists mixing with pedestrians on the sidewalks. The narrow sidewalks do not accommodate both users safely, and the wide sidewalks should not be considered multi-use facilities because they are separated from the roadway with vertical granite curb which is considered a potential fall hazard. In addition, the 10-foot wide sidewalk sections are interrupted by 5-foot wide sections across the bridges.

Based on the above observations it is reasonable to state that the average cyclist is not well accommodated on Village Road. This represents a concern and a missed opportunity since Village Road is effectively a primary collector route for cyclists from any of the adjoining residential developments or side roads. There are also destinations on Village Road, such as the athletic center, elementary school and recreation center that should be accessible by bike.

With certain improvements, the Valley Road corridor could provide valuable alternative transportation and recreation functions. Valley Road is the entrance to Waterville Valley so bike and pedestrian improvements would also help project an image of active lifestyles to visitors immediately upon their arrival.

Potential Improvements:

Wider shoulders or bike lanes on Valley Road could be considered for accommodating on-road cycling. The American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities (the AASHTO Guide) indicates that striped shoulders and bike lanes should be a minimum of 4 feet wide without curb and 5 feet wide with curb. The reasoning is that the preferred operating width for cyclists is 5 feet. To accommodate these widths within the existing Valley Road pavement the travel lanes would need to be reduced to 10 feet on the uncurbed side and 9 feet on the curbed side. Changes of this nature are often considered when roadways are resurfaced since they also need to be restriped at that time. 10 foot travel lanes may be possible, but 9 foot lanes are not recommended. For reference purposes, NHDOT has only approved 10 foot travel lanes on one state maintained route in New Hampshire in a historic district.

Our recommendation is to consider 10 foot lanes with 4 foot shoulders at the time of resurfacing. The narrower travel lanes may also provide a traffic calming benefit. We recommend against designating the shoulders bike lanes since the shoulders on the curbed side of the road would still be narrower than the recommended 5 foot minimum width.

If 11 foot travel lanes must be maintained it may be possible to widen the roadway a total of 3 feet to achieve the desired 11 foot travel lanes with 4 and 5 foot shoulders. In that case it may be desirable to sign and stripe them as bike lanes. The pavement widening would be done on the side opposite the curbed sidewalks, and this would result in a crown shift of 2 feet. The crown shift would best be accomplished as part of a resurfacing project.

If it is possible to provide wider paved shoulders or bike lanes in the roadway there will still be a need to accommodate inexperienced cyclists outside of the roadway. The ideal way to do this is by constructing a two-way multi-use path off one side of the road. The path would be 8 to 10 feet wide and would be separated from the road by a minimum of 3 feet for safety. A wider landscaped buffer would be constructed where possible. Refer to Section #1 of the Streetscape Sections figure

provided elsewhere in this document for a graphical representation of the improvements. The path would serve pedestrians and cyclists, and pedestrian scale lighting could be installed to enhance personal security and year round use. The multi-use path would alleviate the need to provide the on-road improvements discussed in the previous paragraphs.

The multi-use path would be constructed from Tripoli Road to Boulder Path Road. To accomplish this there will be right-of-way impacts due to added width and the required slope work. One of the benefits would be that the path would provide a connection from Valley Road to the existing trail system that does not exist today. One of the primary challenges will be the Snows Brook crossing. That crossing would likely require a prefabricated pedestrian bridge with a span of at least 100 feet due to the floodplain and wetlands in the area. The relatively high cost of these improvements may warrant phasing the implementation of the path.

Tecumseh Road

Existing Conditions:

There are currently no sidewalks on Tecumseh Road, yet there are numerous residential units that are served off of Tecumseh Road. It also serves as a convenient link to Valley Road.



Left:
Tecumseh Road as seen
from Valley Road



Left:
Curved section of
Tecumseh Road midway
between Valley Road and
Snows Brook Road



Left:
Tecumseh Road approach
to Snows Brook Road (left)
and Packard's Road (right)

Tecumseh Road is approximately 22 feet wide and there are no shoulder or edge line stripes. Traffic volumes and speeds are low. Public input supports the addition of pedestrian accommodations on Tecumseh Road.

Pedestrians:

Based on field observations the topography lends itself to building a sidewalk on the inside of the curve, which is the east side of Tecumseh Road. The sidewalk could either be separated from the roadway with a landscaped strip or constructed adjacent to the road with curbing. This determination would likely be influenced by the availability of right-of-way, utility conflicts, public input and cost. If the sidewalk is curbed a closed drainage system would be required to collect stormwater that the curb would contain in the roadway. If the sidewalk is not curbed a shallow swale would be required between the road and the sidewalk. A 6 foot wide sidewalk is proposed. Refer to Section #4 of the Streetscape Sections figure provided elsewhere in this document for a graphical representation of the improvements.

Bicyclists:

Tecumseh Road is not wide enough for bike lanes and widening for that purpose is not proposed or warranted. Tecumseh Road is local roadway with low volumes and speeds and the expectation is that cyclists will share the road with motor vehicles. We recommend the installation of shared use arrows (also referred to as "sharrows") and "Share the Road" signs. This will alert motorists to expect cyclists in the road. This is proposed with the understanding that children and other inexperienced cyclists may still ride on the sidewalk. The Town may wish to expand the sidewalk to be an 8 foot wide path if this is strong concern.

Intersections:

The Tecumseh Road sidewalk would need to connect to the existing sidewalk on the north side of the Tecumseh Road / Snows Brook Road / Packard's Road Intersection.

It appears that the best location for a crosswalk would be right at the apex of the curve since there would be optimal sight distance and since a pedestrian ramp could be built in the existing sidewalk on the north side between two private driveways.

There are good sight lines for a new crosswalk on Valley Road at the Tecumseh Road / Valley Road intersection. Our recommendation is to consider the installation of Rectangular Rapid Flashing Beacon enhanced crossing signs with the new crosswalk at that intersection, especially since it would be the first crosswalk that motorists will encounter when approaching from the south.

Snows Brook Road

Existing Conditions:

Snows Brook Road has a continuous sidewalk from Tecumseh Road to Boulder Path Road, but the sidewalk appears to be on private property and is not maintained between Village Road and Gorwood Way. That segment is only 4 feet wide and is separated from the road by dense woods in sections. The sidewalk segments between Tecumseh Road and Village Road, and between Gorwood Way and Boulder Path Road are 5 to 6 feet wide and separated from the road by a grass strip.



Left:
Sidewalk along the east
side of Snows Brook Road



Left:
4' wide sidewalk along the
east side of Snows Brook
Road; not Town
maintained.



Left:
4' wide sidewalk along the east side of Snows Brook Road; not Town maintained.

Pedestrians:

The existing 4 foot wide sidewalk that is not town maintained in the winter is the primary concern on this roadway since it represents a discontinuity in the winter and it is of substandard width in the summer. The fact that it is so close to the residential units leads us to believe it is not within a Town right-of-way. Widening the sidewalk to a 6 foot width closer to the road to make winter maintenance by the Town possible should be explored. Refer to Section #4 of the Streetscape Sections figure provided elsewhere in this document for a graphical representation of the improvements.

Bicyclists:

Similar to Tecumseh Road, we recommend shared use of the road by bikes. The enhancements would include shared lane arrows and "Share the Road" signs.

Also similar to Tecumseh Road, children and other inexperienced cyclists may still ride on the sidewalk. The Snows Brook Road may be a candidate for an 8 foot wide path if this is strong concern.



Boulder Path Road

Existing Conditions:

Boulder Path Road has an approximately 8 foot wide paved path along the golf course that appears to function well for all users. The path is well separated from the road and there are even benches for people to rest along the way. When the

path reaches Snows Mountain Road and the tennis courts it transitions back to sidewalk of only 4 to 5 feet wide.

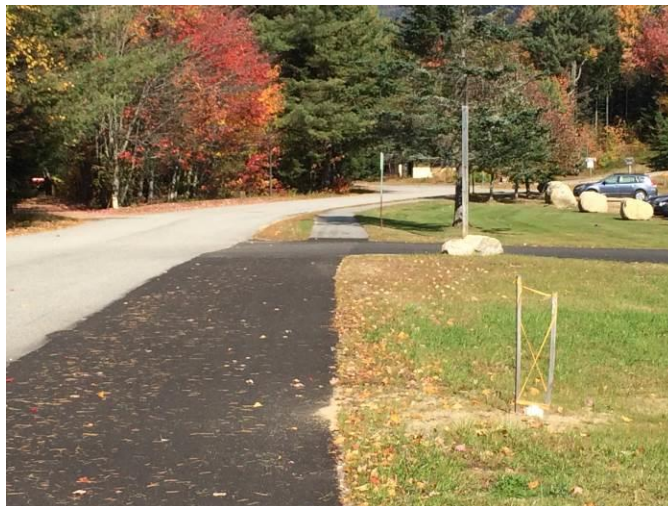


Left:
8' wide path along Boulder Path Road and the golf course

Once the path reaches the Waterville Valley Academy it becomes a wide paved walkway that is only separated from the roadway by a white stripe. Past the Academy it is again separated from the road until it ends at Cascade Ridge Road.



Left:
4' wide sidewalk at the tennis courts. Note the lack of ADA compliant ramp and position behind the stop line.



Left:
8' wide sidewalk along the east side of Boulder Path Road at the Academy, which transitions into a 5' walkway to Cascade Ridge Road.

Pedestrians:

Pedestrians are well accommodated along this roadway on the wide path segments. The only section of concern is the narrow section by the tennis courts. There are also ADA concerns in that area due to the steep sidewalk slope at the Snows Mountain Road intersection. We recommend reconstructing the sidewalk in the area of the tennis courts to match the width of the path by the golf course. In addition, the crosswalk across Snows Mountain Road should be realigned to cross in front of the stop line. The existing crossing is aligned behind the stop line, which is prohibited. The existing path has two mid-block crossings of Boulder Path Road. The northern crossing is skewed and we recommend reconfiguring it to a perpendicular crossing with the appropriate crossing signs.

Bicyclists:

There is a great opportunity to complete a multi-use path along the entire length of Boulder Path Road. This path would connect to the path that is proposed on Valley Road and the one that may be proposed on Snows Brook Road. Snows Mountain is a destination for some mountain bikers and there are hiking trails that emanate from the vicinity of Cascade Ridge Road at the end of the proposed path. Refer to Section #5 of the Streetscape Sections figure provided elsewhere in this document for a graphical representation of the improvements.

Village Road

Existing Conditions:

Village Road passes through the core of the existing and future development area. There is a sidewalk along the southeast side of Village Road from Valley Road to the Town Square development. From Town Square to Snows Brook Road sidewalk is generally lacking.

Pedestrians:

Town square is a high pedestrian activity area and that is likely to only increase with further development. The current vision is for there to be on street parking from Town Square to Snows Brook Road with curbing and sidewalk on both sides. This is a typical village center cross section. From Town Center to Valley Road there is an opportunity to build a multi-use path that would tie into the planned multi-use path on Valley Road.

At the four-way intersection of Valley Road, Village Road and Lost Pass Road there are currently deficient pedestrian crossings accommodations. There are two crosswalks across Valley Road, one north and one south of the intersection. Neither of the crosswalks connect to sidewalks on the Lost Pass Road side of the intersection. We recommended that in the near term a short sidewalk be constructed from the northern crosswalk to the golf course parking lots since it is a likely destination and since pedestrians can access Lost Pass Road from there.



Left:
Crosswalk across Valley Road from Village Road to vicinity of Golf Course with no connecting sidewalk. Also note typical lack of ADA compliant pedestrian ramps.

Bicyclists:

Bikes would share the road within the village center typical section. The expectation is that traffic volumes would be very slow through this segment. Cyclists would be very well accommodated by the planned multi-use path between Town Square and Valley Road. Inexperienced cyclists would be encouraged by signing to walk their bikes on the sidewalks through the village section. Refer to Sections #2 and #2A of the Streetscape Sections figure provided elsewhere in this document for a graphical representation of the improvements.

Packard's Road

Existing Conditions:

Packard's Road has a continuous sidewalk along the north side from Tecumseh Road to Valley Road. The sidewalk abuts the road with granite curbing. Packard's Road is a low volume and low speed internal roadway that has residential development on the south side and commercial development on the north side.

Pedestrians:

Pedestrians are currently well served by the sidewalk on the north side of Packard's Road, but a formal crossing from the development on the south side should be considered. In addition, there is an informal woods trail that passes north-south near the Golden Eagle Inn. There is an opportunity to create a formal connection to that trail from the pedestrian way on Packard's Road, including wayfinding and a trailhead. The informal trails could be celebrated instead of hidden.

Bicyclists:

Bikes would be accommodated on road similar to other internal roadways.

Snows Brook Trail

One of the trails that passes through the heart of the existing development is the trail that passes along the south side of Snows Brook from Corcoran's Pond to Snows Brook Road, which it passes under on its way toward the National Forest.

There is also a walking trail that follows the east side of Snows Brook to where it once crossed the brook. The former crossing was a footbridge that was destroyed by flooding.

There is an opportunity to bridge the stream again at the former bridge location. That bridge would provide a north-south connection between the developments on the north side, including the Snowy Owl Inn, to the developments on the south side. The bridge would also complete an interesting short walking loop that would be available to a great number of visitors. In addition to a bridge, it may be possible to create a resting node at that location so visitors could stop and enjoy the river in a natural setting only a stone's throw from Town Square. The actual bridge could take many forms, including a prefabricated timber structure or potentially a suspension bridge.



Left:
The site of the Snows
Brook bridge that was
destroyed by flooding.

Range of Costs

2.1 Summary

At this early stage of planning it is impossible to provide detailed costs, however it is possible to group improvement strategies into low, moderate and high cost categories as follows and in ascending order.

Low Cost / Near Term Improvements (\$2,000 – \$100,000)

- Install share the road signs and shared lane markings on a roadway
- Update crosswalks and new ADA compliant pedestrian ramps in an intersection
- Install Rectangular Rapid Flashing Beacons at a Crosswalk
- Construct a paved sidewalk without curb along a roadway

Moderate Cost / Mid term Improvements (\$100,000 – 500,000)

- Construct a curbed sidewalk and required drainage along a roadway
- Install ornamental pedestrian scale lighting and landscaping along a roadway
- Construct a multi-use path off the side of a roadway

High Cost / Long Term Improvements (\$500,000 – 1,000,000+)

- Construct a multi-use path including a river crossing pedestrian bridge, including permits and right-of-way impacts (Example: Valley Road path)

The federal Transportation Alternatives Program (TAP) grants may be suitable for funding some of the proposed Waterville Valley bike and pedestrian improvements. An example would be the proposed multi-use path along Valley Road which would provide alternative transportation, recreation, safety and economic development benefits. TAP grants require a minimum 20% local match and are obtained through a very competitive application process. The current maximum federal share of TAP grants is \$640,000.