

# Pedestrian / Bicycle Trail Linking Lebanon, NH and Hartford, VT via Railroad Bridge over Connecticut River



submitted to  
Upper Valley Trails Alliance  
Norwich, Vermont



submitted by  
*Vanasse Hangen Brustlin, Inc.*  
Bedford, New Hampshire

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## Project Background

The Upper Valley Trails Alliance (UVTA) is a nonprofit coalition of local trail groups, landowners and trail users that seeks to connect people and places along the Connecticut River through a regional trail network. For years, the UVTA has wanted to create an Upper Valley Bike Loop, which would connect Hartford and Norwich on the Vermont side of the river with the towns of Hanover and Lebanon on the New Hampshire side. The only legal crossing of the Connecticut River for pedestrians and bicyclists available in the Hartford/Lebanon area is the US 4 bridge and it is a substandard option. The UVTA engaged Vanasse Hangen Brustlin, Inc. (VHB) to evaluate the feasibility of linking White River Junction, VT and West Lebanon, NH with a bike and pedestrian path across an existing railroad bridge spanning the Connecticut River. (See Figure 1 for Bridge Location Map.) Using the existing railroad bridge has been proposed because it is close to destinations on both sides of the river including downtown White River Junction and the planned redevelopment of the Westboro Rail Yard and Riverfront in West Lebanon. The railroad bridge is owned by the State of New Hampshire and formerly carried two tracks. It is still in active use, with on average one train crossing it every other day on the one remaining track.

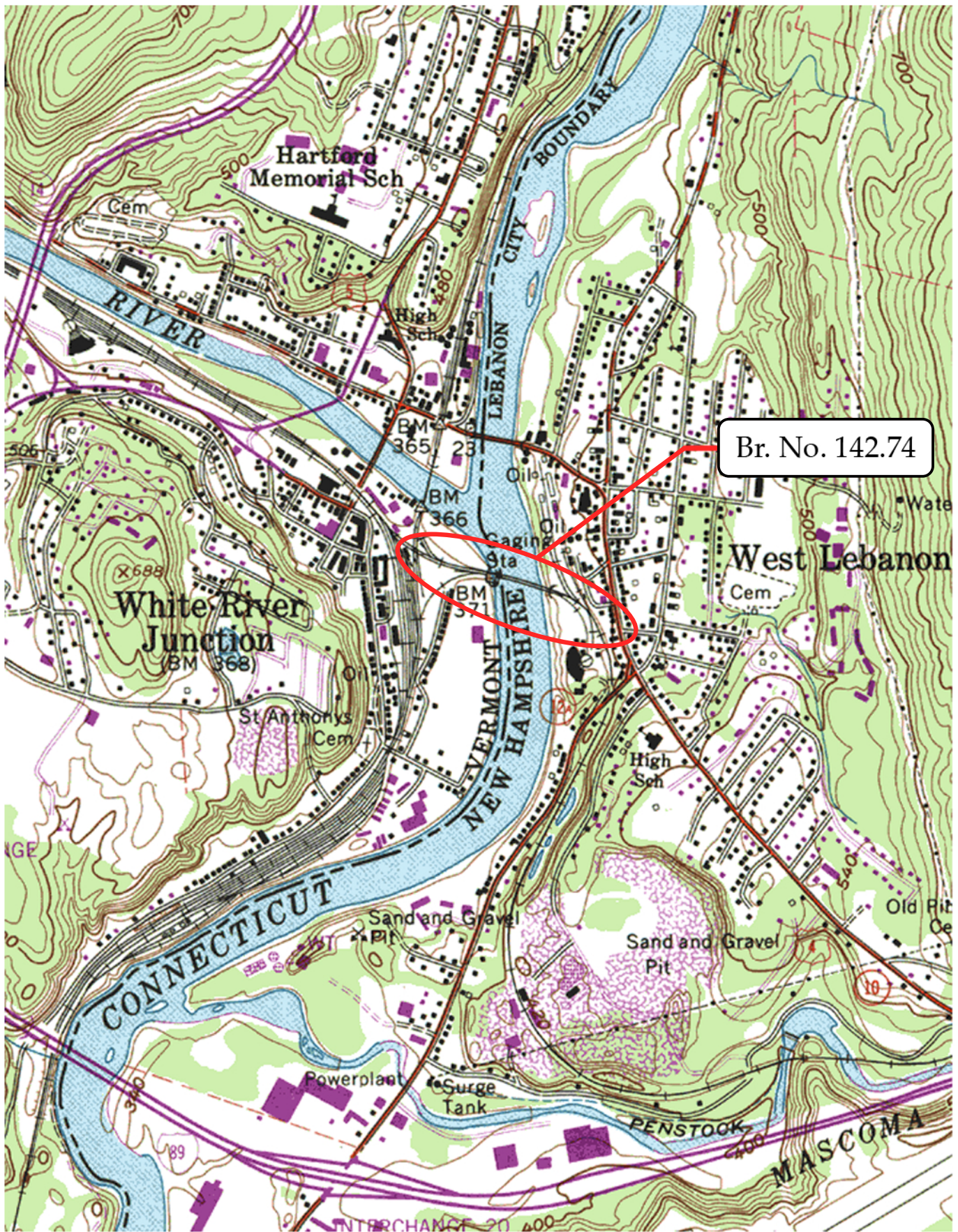
The feasibility study of this proposed "rails-with-trail" project is funded through a challenge cost-share grant from the National Park Service's Rivers, Trails and Conservation Assistance Program. This report summarizes the results of the feasibility study. Identification and evaluation of other possible bicycle/pedestrian links across the Connecticut River, such as improvements to the existing US 4 bridge or construction of an entirely new crossing in a new location, was not within the scope of this feasibility study.

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## Existing Bridge Information

Bridge No. 142.74 carries one set of tracks over the Connecticut River, connecting Lebanon, New Hampshire and Hartford, Vermont. The bridge formerly carried two sets of tracks, but only the track on the north side of the bridge remains. The railroad bridge is owned by the State of New Hampshire and is currently being leased to the Claremont Concord Railroad. The Green Mountain Railroad on the Vermont side uses the bridge to turn its engines around.





Location Map



Figure 1  
 Feasibility Study Report for Pedestrian/Bicycle Trail  
 Linking Lebanon, NH and Hartford, VT  
 via Railroad Bridge over Connecticut River

The four-span bridge is approximately 520 feet long and has a 33 foot wide ballasted butted timber deck. There are 3'-6" wide timber plank safety walks with timber railings along both sides of the bridge. The safety walk deck planks and the railings are deteriorated. The New Hampshire Department of Transportation (NH DOT) opened bids on May 3, 2007 for a rehabilitation project for this bridge. The rehabilitation project includes repairs to the superstructure steel framing, steel bearings, and substructure concrete repairs. According to NH DOT a second project is planned that will rehabilitate the bridge's timber deck. That project will require complete removal and reinstallation of the existing railroad track. It may be possible as part of that project to reinstall the track on the south side of the bridge so that the proposed bicycle/pedestrian trail could be located on the north side of the bridge.

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## Rails-With-Trails Projects

"Rails-with-trails" projects create multi-use trails that are placed alongside active rail lines. While these are not as common as rails-to-trails projects, in which inactive rail lines are converted to multi-use trails, there are currently more than sixty rails-with-trails projects in the United States. An example of a nearby successful rails-with-trails project is the Burlington Waterfront Bikeway, shown in the photo to the right.



One of the largest concerns with all rails-with-trails projects is separation of the trail and active track. Seventy percent of the existing rails-with-trails projects in the United States have a barrier separating the trail from the tracks. In a November 2000 study (performed by the Rails-to-Trails Conservancy) of 61 existing rails-with-trails projects, it was shown that trails adjacent to active rail corridors have been very safe, and almost without incident.



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## Trail Design Guidelines

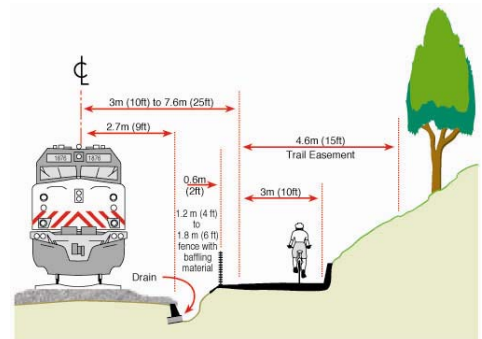
The New Hampshire Department of Transportation (NH DOT) and Vermont Agency of Transportation (VTTrans) have guidelines for the design of shared-use trails. The NH DOT guidelines are described in the New Hampshire State Trails Plan, dated May 20, 2005. The VTTrans guidelines are described in the Pedestrian and Bicycle Facility Planning and Design Manual, dated December 2002. Both documents emphasize that each project must be evaluated individually and the design adjusted as necessary to accommodate the particular constraints of the railroad and trail geometry for that project.

The NHDOT and VTrans design guidelines are more similar than different as shown in the following table. In areas where the guidelines do not agree, it is likely that a reasonable compromise can be reached between the two agencies during design of the project in order to achieve a uniform trail on both the NH and VT sides of the Connecticut River.

**Shared-use Trail Design Guidelines**

<u>Feature</u>	<u>NHDOT</u>	<u>VTrans</u>
Preferred Trail Width	10 feet	10 feet
Preferred Vertical Clearance	12 feet	12 feet
Preferred Trail Width over Bridge	8-10 feet	8-10 feet
Preferred Separation from CL Track (Unconstrained)	34 feet	27.5 feet
Preferred Separation from CL Track (Constrained)	20 feet	13.5 feet
Preferred Unpaved Trail Surface	4" Min. Stone Dust/ Crushed Stone	4" Min. Fine Graded Crushed Gravel

Additional sources of design guidance include the August 2002 Rails-with-Trails: Lessons Learned report prepared for the Federal Highway Administration, the Federal Railroad Administration, the National Highway Traffic Safety Administration and the Federal Transit Administration. A figure from that report showing the minimum recommended separation of trails from active rail lines in constrained sections is shown to the right.



**Meetings With Stakeholders & The Public**

**Initial Coordination Meeting**

An initial coordination meeting with most of the project stakeholders was held at the site on March 14, 2007. Representatives of the UVTA, National Park Service (NPS), Town of Hartford, City of Lebanon, NHDOT and other interested stakeholders met to discuss the scope of the project as well as the status of current projects adjacent to the site. Some of the items discussed at that meeting include:

- Land Transfer in Westboro Yard near Bridge Street: The City of Lebanon is actively pursuing transfer of the property near Bridge Street along the Connecticut River from NHDOT to the City. This is approximately a 2-acre parcel where a City shared-use path Trailhead and Gateway Kiosk could be located. An appraisal is currently being conducted on the parcel as part of the

transfer. An independent committee is reviewing issues concerning the parcel and their goal is to obtain approval of the transfer in the near future.

- Proposed Boat Launch near Bridge Street: NH Fish & Game have indicated they would assist the City of Lebanon with the installation of a new boat ramp and launch area from the Gateway Kiosk down to the Connecticut River once the land transfer is finalized.
- Land Transfer near Westboro Historic Roundhouse: Once an agreement is reached on the 2-acre parcel, the City would also like to also pursue a transfer of additional land from the first parcel southward and out to NH Route 12-A. This is about an additional four acres. This would include taking ownership of the historic Westboro Roundhouse, Bunkhouse, and Sandhouse for potential future restoration and potential incorporation into a Riverfront Trail and Park. Access to the southern parcel off NH Route 12-A was identified as much more problematic over the Bridge Street/Route 4 access due to steep slopes and drainage challenges near the existing NH Route 12-A bridge over the active railroad tracks.
- Westboro Groundwater Contamination: As a stipulation of the draft land transfer agreement, NHDOT will be responsible for cleanup of the site prior to the City of Lebanon taking ownership of the property.
- Community Trails Forum March 2006: Public interest was raised often in linking the two states across the bridge. NHDOT is generally on board with the idea of evaluating this potential link.
- NH Trail Link Notes: It's assumed that any options for the trail link across the bridge and over NHDOT property to connect to future City-owned property would require approval by not only NHDOT but also the operating railroad in the Westboro yard (currently Concord Claremont Railroad).
- VT Trail Link Notes: The Town of Hartford is working on a draft Memorandum of Understanding (MOU) with VTrans and the Washington County Railroad for a proposed parking area and at-grade crossing that would lead to the courthouse parking lot area and Railroad Row. None of the other Railroad properties in the White River Junction yard would be impacted by the proposal to add a parking area and grade crossing.

The crossing would be at the same location as the existing informal gravel crossing adjacent to the train station. The new grade crossing would be for vehicles and pedestrians to Railroad ROW and would be signalized and gated.

The parking area would be located in the triangle-shaped area formed by the active railroad tracks curving from the north and south tracks in VT to the Connecticut River Bridge. There are currently about 75 parking spaces planned in the new lot



with probably room for another 40-50 more in the future. The parking area would be fenced in as part of the agreement.

At the southern edge of the potential parking area the Town has recently constructed an emergency-only at-grade crossing that connects the courthouse parking area to Latham Works Road via the informal gravel crossing behind the train station.

- Hartford Bike/Ped. Master Plan: The Town is currently developing a new bicycle/pedestrian master plan. One of the goals of the Town is to have a pedestrian friendly access to Railroad ROW, the downtown area, and to Sykes Avenue. The Town would also like to connect ped/bike access routes to Ratcliffe Park off Latham Works Road where multiple baseball and soccer fields are located. The route could potentially continue down South Main and up Mountain Avenue to Sykes Avenue and Route 5.
- Hartford One-Mile Loop: There is a 1 mile loop in Wilder out to the Dothan School Area that does not connect to the downtown area. There are little to no shoulders currently on Route 5 from Route 14 to Wilder. The ongoing Tafts Flat construction project will be providing bike lanes and sidewalks from Route 14 up Route 5 that will terminate at the I-91 connector road (Bugbee Street).
- NHDOT Approval of Trail Concepts: NHDOT has indicated they will not approve alternatives for the trail until written approval is provided by stakeholders on the VT side of the bridge, including VTrans and the operating Railroads.

### **VTrans Coordination Meeting**

A coordination meeting with VTrans was held at the project site on June 15, 2007. At the meeting the trail alternatives under consideration at that time were discussed. The VTrans representative provided initial comments on the alternatives and the project in general, including some comments received during discussions about the project the Agency had with the Washington County Railroad.

### **Public Informational Meeting**

The preliminary results of the feasibility study were presented at a public informational meeting on Wednesday July 11, 2007 in Hartford, VT. At the meeting VHB presented the various alternatives being considered up to that time and encouraged the members of the public in attendance to ask questions and provide input. Input received at that meeting and after from attendees lead to consideration of additional factors when comparing alternatives and inclusion of additional alternatives in the feasibility study.



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## Trail Alternatives

In order to evaluate the feasibility of a bicycle/ pedestrian link between Lebanon, NH and White River Junction, VT across the existing railroad bridge, VHB developed several trail configurations and alignments. The proposed multi-use trail was divided into three sections for development and evaluation of alternatives: the first was the trail across the bridge itself, the second was the trail at the Westboro end of the bridge, and the third was the trail at the White River Junction End of the bridge. After development of the alternatives for all three sections, VHB developed a scoping-level construction cost estimate based on the major elements of work and a list of pros and cons for each alternative.

This section of the report contains a brief description of each alternative, followed by a list summarizing the major elements of the alternative, its estimated construction cost, and its major advantages and disadvantages. The breakdown of the construction cost estimates is included in the Appendix. All costs are in 2007 dollars and include an additional 10% for mobilization and an additional 25% for miscellaneous items and contingency. No survey or topographic data was available at either end of the bridge. The cross sections that were developed to estimate quantities of excavation and fill for the trail alternatives in these areas were based on limited field measurements. Unit prices used in the estimates are based on VTrans and NHDOT weighted average bid prices, and recent bid prices for specific projects.

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### Trail on Bridge

#### Description

One of the most important design considerations for the trail on the existing bridge is the separation between the railroad track and the trail. A continuous six foot high chain link fence is recommended to ensure that trail users do not encroach on the track. The fence posts will be mounted on the existing timber bridge deck. The location of the fence will have to be coordinated with the railroad to ensure that clearance acceptable to them for their railroad operations is provided between the track and the fence, while maximizing the trail width. Two alternatives were considered for the trail across the bridge and they are both located on the south side. One alternative provides a reduced separation between the track and the trail while minimizing repairs/modifications to the bridge. The other alternative provides a larger separation between the track and the trail but requires additional repairs/modifications to the bridge. The minimum 8' trail width or the preferred 10' trail width could be used with both of the alternatives.



The first alternative remains entirely on the existing bridge deck and does not incorporate the existing safety walk. (See Figure 2 for Trail Typical Section Sketch on Bridge, Using the Deck Only.) With the preferred 10' trail width shown, this configuration results in the edge of the proposed trail being approximately 9' from the center of track. This is approximately the same as the existing dimension between the north safety walk rail and the center of track. It is the minimum separation distance between the track and trail that VHB recommends considering. The photo to the right includes stakes and survey tape showing the width of a 10' wide trail that does not include the safety walk. Using the minimum 8' trail width instead of the preferred 10', this alternative would provide approximately 11' between the edge of trail and center of track. The deteriorated safety walk would not be rehabilitated in this alternative so an additional fence or railing would be required to keep trail users off it.



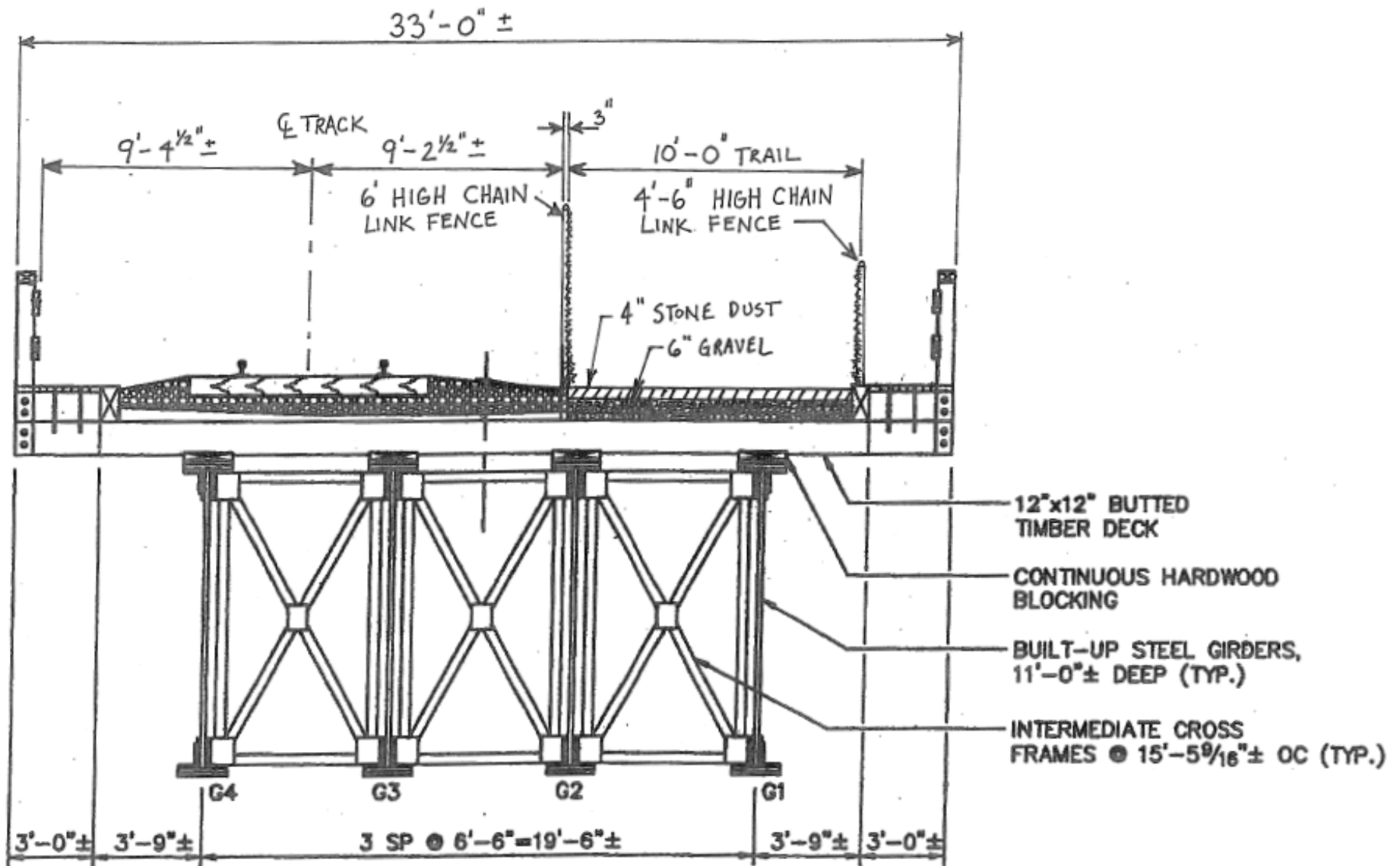
The second alternative incorporates the existing safety walk into the trail in order to locate the separation fence as far from the track as possible without widening the bridge. (See Figure 3 for Trail Typical Section Sketch on Bridge, Using the Deck & Safety Walk.) With the minimum 8' trail width shown, this configuration results in the edge of the proposed trail being approximately 14.5' from the center of the track. If the preferred 10' trail width is used, this alternative would provide approximately 12.5' between the edge of trail and center of track. Incorporating the safety walk into the trail would require that the deteriorated timber deck planks be replaced and the deteriorated timber railing be repaired or replaced. For the purposes of this feasibility study, replacement of the railing with chain link fence has been assumed. Other railing types that may allow trails users to see through them more easily can be considered in later phases of design.

Widening the bridge beyond the south safety walk to allow an even larger separation between the track and the trail is possible. However, it was eliminated from consideration because it would cost significantly more to construct than the alternatives that remain within the limits of the existing bridge.

Construction of the trail itself on the bridge includes removal of the existing stone ballast, placement of a 6" subbase of gravel, and placement of a 4" stone dust wearing surface.

## Alternatives Summary

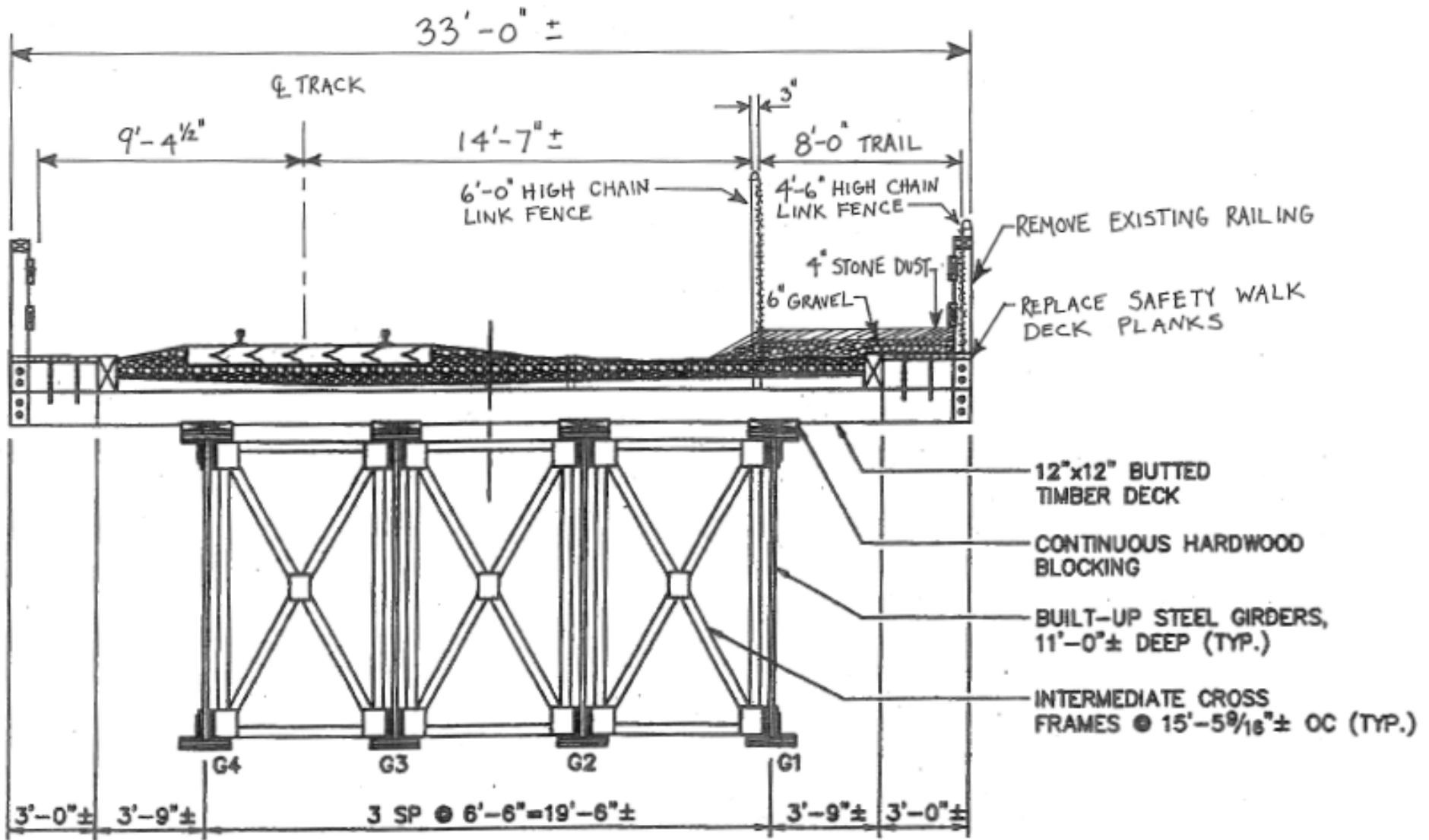
A summary of the two trail alternatives considered on the bridge follows, including a construction cost estimate and the major advantages and disadvantages of each. See Sheet 2 in the Appendix for a breakdown of the construction cost estimates for these two alternatives.



Trail Typical Section Sketch on Bridge, Using the Deck Only

Figure 2  
 Feasibility Study Report for Pedestrian/Bicycle Trail  
 Linking Lebanon, NH and Hartford, VT  
 via Railroad Bridge over Connecticut River





Trail Typical Section Sketch on Bridge, Using the Deck & Safety Walk

Figure 3  
 Feasibility Study Report for Pedestrian/Bicycle Trail  
 Linking Lebanon, NH and Hartford, VT  
 via Railroad Bridge over Connecticut River



### Trail on Bridge – Not Using Safety Walk (10' Wide Trail)

- Construction cost estimate = \$75,000.
- Trail located on south side of bridge, on deck only.
- 6' high chain link fence separates trail from track.
- 4'-6" high chain link fence separates trail from the existing deteriorated sidewalk.
- Provides approximately 9'-2" between center of track and fence at edge of preferred 10' wide trail. (Provides 11'-2" with minimum 8' wide trail.)
- No repairs to south safety walk required.
- Shorter construction duration.
- Lowest cost alternative.

### Trail on Bridge – Using Safety Walk (8' Wide Trail)

- Construction cost estimate = \$135,000.
- Trail located on south side of bridge, on deck and safety walk.
- 6' high chain link fence separates trail from track.
- 4'-6" high chain link fence replaces existing deteriorated safety walk railing.
- Provides approximately 14'-7" between center of track and fence at edge of minimum 8' wide trail. (Provides 12'-7" with preferred 10' wide trail.)
- Replacement of timber deck planks in south safety walk required.
- Longer construction duration.
- Highest cost alternative.

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## Trail at Westboro End of Bridge

### Description

Only one trail alignment alternative was considered at the Westboro End of the bridge. The Westboro Riverfront Park Design Study prepared for the City of Lebanon, NH in March 2004 proposed a switchback connection from the riverfront trail that passes under the bridge up to the Westboro end of the bridge. (See Figure 4 for Trail Alignment Sketch Plan at Westboro End.) VHB recommends this proposed trail alignment at the Westboro end of the bridge because it does not require crossing the railroad track and because it quickly connects trail users with the riverfront trail. The riverfront trail will provide users with access to Bridge Street to the north and potentially Route 12A to the south.





Image Courtesy of The Westboro Riverfront Park Design Study by ORW Landscape Architects and Planners

## Trail Alignment Sketch Plan at Westboro End

**Figure 4**  
Feasibility Study Report for Pedestrian/Bicycle Trail  
Linking Lebanon, NH and Hartford, VT  
via Railroad Bridge over Connecticut River



In this alternative, the six foot high chain link fence on the bridge between the track and the trail continues off the bridge to ensure that trail users do not encroach on the track. The fence continues from the end of the bridge for approximately 300', to the point where the switchback trail side slope becomes an effective barrier itself. Starting at approximately 50' from the end of the bridge, the profile grade of the switchback connection trail slopes down at approximately 5% to the riverfront trail.

The proposed trail is 10' wide with 3' shoulders. (See Figure 5 for Trail Typical Section Sketch at Westboro and White River Junction Ends.) Construction of this section of trail includes some clearing and grubbing, excavation, placement of a 12" subbase of gravel, and placement of a 4" stone dust wearing surface.

If the railroad track was relocated to the south half of the bridge, a similar switchback trail could be used to connect to the riverfront trail. The length and construction cost for a switchback connection north of the bridge would be approximately equal to the one south of the bridge that is described above.

At the Public Informational Meeting a representative from the Lebanon City Council noted that the connection of the proposed riverfront trail to the trail across the bridge is a natural extension of the riverfront trail project. Consequently it may be possible to include the Westboro end of the trail in the Westboro Riverfront Park Project.

### **Alternative Summary**

A summary of the trail alternative considered at the Westboro end of the bridge follows, including the construction cost estimate. See Sheet 3 in the Appendix for a breakdown on the construction cost estimate.

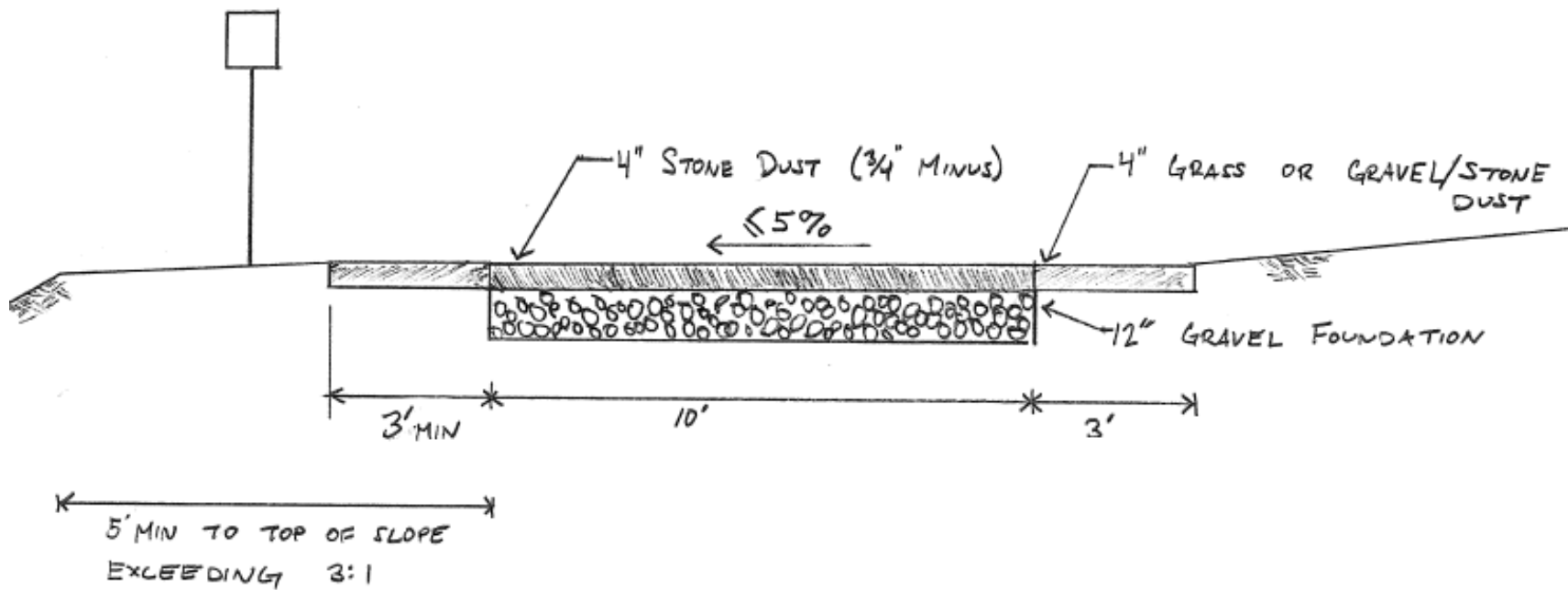
#### **Trail at Westboro End**

- Construction cost estimate = \$135,000
- Trail is approximately 520' long and connects to the proposed Westboro Riverfront Trail.
- Trail is on south side of railroad track and does not cross the track.
- Trail typical section is 10' wide with 3' shoulders on each side.
- 6' high chain link fence separates trail from track.

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#### **Trail at White River Junction End of Bridge**

Five major and two minor trail alignment alternatives were considered for the White River Junction end of the bridge. (See Figure 6 for Trail Alignment Alternatives Sketch Plan at White River Junction End.) Alternatives A, B1, B2, C and D all remain to the south of the railroad track as they exit the bridge.

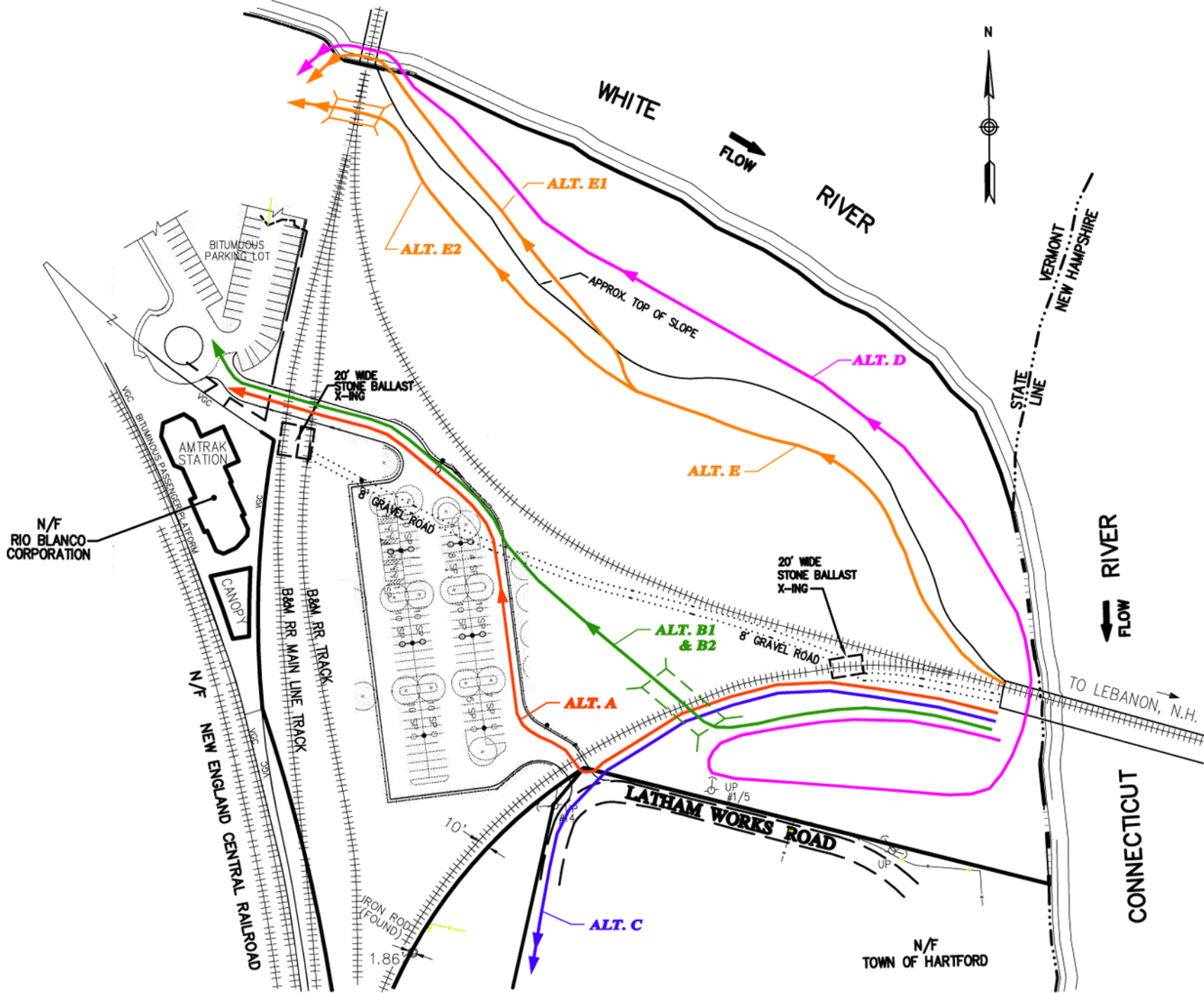


Trail Typical Section Sketch at Westboro and White River Junction Ends

Figure 5  
 Feasibility Study Report for Pedestrian/Bicycle Trail  
 Linking Lebanon, NH and Hartford, VT  
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Trail Alignment Alternatives Sketch Plan at White River Junction End

Figure 6  
 Feasibility Study Report for Pedestrian/Bicycle Trail  
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Alternatives E1 and E2 are north of the railroad track which has been assumed to have been relocated to the south half of the bridge during the NHDOT's proposed timber deck rehabilitation project. For all alternatives, the six foot high chain link fence will continue off the bridge to ensure safe separation of the trail and rail. All of the alternatives ultimately connect to downtown White River Junction.



The proposed trail is 10' wide with 3' shoulders. (See Figure 4 for Trail Typical Section Sketch at Westboro and White River Junction Ends.) Construction of this section of trail includes some clearing and grubbing, excavation, placement of a 12" subbase of gravel, and placement of a 4" stone dust wearing surface.

### Alternative A

Alternative A runs along the south side of the railroad track to the existing emergency at-grade crossing then crosses the track into the proposed parking area in the wye. The trail continues along the perimeter of the proposed parking lot, to the grade crossing near the Amtrak Station. To ensure trail user safety, railroad crossing gates and signals must be installed at the emergency at-grade rail crossing at Latham Works Road.



### Alternatives B1 and B2

Alternatives B1 and B2 run down the slope on the south side of the railroad track at an approximately 5% grade for about 300 feet and then cross under the tracks into the existing low area in the wye. The trail then climbs up at an approximately 7% grade to the edge of the proposed parking lot in the wye. The trail then continues along the perimeter of the proposed parking lot, to the grade crossing near the Amtrak Station, similar to alternative A. Two options were considered for crossing under the tracks; a 16 wide x 12' high concrete box culvert (B1) and a 45' span bridge (B2). The bridge would somewhat reduce the feeling of being in a tunnel while crossing under the track. The longer span of the bridge may also improve safety for users because the area under the bridge will be more visible from further away. However, the bridge would be more costly than a culvert.



The Town of Hartford has had problems in the past with homeless people building shanties and fires in the wye. Either the culvert or the bridge option must be well lit to ensure the safety of trail users. Other solutions to safety concerns caused by the underpass not being visible enough could be considered, such as more frequent

monitoring by law enforcement or installation of closed circuit television cameras. Construction of either the culvert or the bridge would require temporarily removing the track, but neither option would have a permanent impact on the railroad.

### Alternative C

Alternative C runs along the south side of the railroad track near the existing emergency at-grade crossing then turns onto Latham Works Road. The trail then follows Latham Works Road to Nutt Lane and an existing grade crossing to South Main Street. Latham Works Road is narrow and does not have sidewalks so it is not ideal for a designated bicycle/pedestrian path. While this creates a less direct route to downtown White River Junction and requires a section of the trail be shared with motor vehicles, this trail alignment requires no new rail crossing or disruption to the railroad and is also the lowest cost alternative.



### Alternative D

Alternative D is a switchback trail alignment that carries the trail down to the river at an approximately 5% grade, passes under the railroad bridge, continues along the river bank, passes under the railroad bridge spanning the White River and comes up into Veterans Memorial Park near Railroad ROW. This alternative creates a riverfront trail along the Connecticut and White Rivers and does not cross any railroad tracks. This trail alignment requires that platforms to support the trail be constructed at the abutments of both railroad bridges. The cost of these platforms is conservatively estimated to be as much as \$200,000. It may be more difficult to obtain the required permits for the construction of the trail along the river bank than for the other alternatives, because it is within the flood plain and within 100' of the river top of bank. The Town's protection of surface waters zoning regulations do not prohibit development within 100' of the river but they do require a Conditional Use Permit from the Zoning Board of Adjustment.



### Alternatives E1 and E2

Alternatives E1 and E2 start at the railroad bridge on the north side of the railroad track. The trail runs northeast along the top of slope towards railroad Bridge No. 123.27 spanning the White River. Two options were considered for the trail alignment as it approaches Bridge No. 123.27. Alternative E1 travels down the slope toward the river at an approximately 5% grade, then passes under the bridge similar to alternative D. This alternative requires construction of a platform to support the

trail at the face of the abutment. Like Alternative D it may be more difficult, compared to Alternatives A-C, to obtain the required permits for the construction of the portion of the trail along the river bank because it is within the flood plain and within 100' of the river top of bank. Alternative E2 remains at the top of slope and crosses over the tracks near the west end of Bridge 123.27. This alternative requires construction of a bicycle/pedestrian bridge over the railroad tracks. The cost of the overpass bridge is conservatively estimated to be as much as \$200,000.



### **Alternatives Summary**

A summary of the five major and two minor trail alternatives considered at the White River Junction end of the bridge follows including the construction cost estimate and the major advantages and disadvantages of each. See Sheets 4-11 in the Appendix for a breakdown of the construction cost estimates for these alternatives.

#### **Alternative A (Approximately 450')**

- Construction cost estimate = \$445,000.
- Trail located south of track, crosses track at existing emergency grade crossing into wye, then runs along edge of proposed parking lot in wye.
- 6' high chain link fence separates trail from track.
- Very direct route to downtown.
- High initial cost and ongoing maintenance costs for crossing gates and signals at the emergency grade crossing at Latham Works Road.
- At an on-site meeting on June 15 the VTrans Rail Program Manager noted that this alternative is not preferred by VTrans or the Railroad because it crosses an active track at the Latham Works Road emergency crossing and has a permanent impact on railroad operations.
- Even with crossing gates and signals at the Latham Works Road emergency crossing this alternative is less safe for pedestrians and bicyclists because they have to cross an active track.
- Second lowest cost alternative.
- Environmental permitting should be very straightforward.

#### **Alternative B1 (Approximately 650')**

- Construction cost estimate = \$450,000.
- Trail located south of track, crosses under track through 16' x 12' concrete box culvert, then runs along edge of proposed parking lot in wye.

- Requires construction of costly box culvert.
- 6' high chain link fence separates trail from track.
- Very direct route to downtown.
- Requires temporary removal of track to install culvert.
- Preferred by VTrans and Railroad because it does not cross a railroad track and has no permanent impact on railroad operations.
- Possible safety concerns because trail users are out of sight while in underpass, so lighting and other methods of increasing safety will be required.
- Third lowest cost alternative.
- Environmental permitting should be very straightforward.

#### Alternative B2 (Approximately 650')

- Construction cost estimate = \$790,000.
- Trail located south of track, crosses under track through 45' span bridge, then runs along edge of proposed parking lot in wye.
- Requires construction of costly underpass bridge.
- 6' high chain link fence separates trail from track.
- Very direct route to downtown.
- Requires temporary removal of track to install bridge.
- Preferred by VTrans and Railroad because it does not cross a railroad track and has no permanent impact on railroad operations.
- Possible safety concerns because trail users are out of sight while in underpass, so lighting and other methods of increasing safety will be required. However, more open and visible than culvert in Alternative B1 so fewer safety concerns.
- Significantly more costly than Alternative B1 and highest cost of all alternatives.
- Environmental permitting should be very straightforward.

#### Alternative C (Approximately 450')

- Construction cost estimate = \$105,000.
- Trail located south of track, runs onto Latham Works Road near the existing emergency grade crossing.
- 6' high chain link fence separates trail from track.
- Least direct route to downtown of all alternatives considered. May not attract many users, especially the current trespassers who tend to cross the wye to go directly downtown after crossing the railroad bridge.

- Latham Works Road is narrow and has no sidewalks so it is not a desirable bicycle/pedestrian route. Users will share the road with vehicles.
- Preferred by VTrans and railroad because it does not cross a railroad track and has no permanent impact on railroad operations.
- Lowest cost alternative.
- Environmental permitting should be very straightforward.

#### Alternative D (Approximately 2100')

- Construction cost estimate = \$750,000.
- Switchback trail south of track, runs down to the river, passes under the railroad bridge, continues along the river bank, passes under the railroad bridge over the White River and comes up into the park at Bridge Street.
- Requires construction of a platform to support the trail at the face of abutment at each bridge.
- 6' high chain link fence separates trail from track.
- Not a very direct route to downtown.
- Preferred by VTrans and railroad because it does not cross a railroad track and has no permanent impact on railroad operations.
- Possible safety concerns because trail users are out of sight while passing under the railroad bridges and traveling along the river bank, so lighting and other methods of increasing safety will be required.
- Creates a scenic riverfront trail that mirrors the Westboro Riverfront Trail on the Lebanon, NH side of the Connecticut River.
- Must obtain a Conditional Use Permit from the Town's Zoning Board of adjustment to construct the portion of the path on the riverbank.
- Second highest cost alternative.

#### Alternative E1 (Approximately 950')

- Construction cost estimate = \$350,000.
- Trail starts north of track and runs northeast along the top of slope towards railroad the railroad bridge over the White River, travels down the slope toward the river, then passes under the bridge similar to alternative D.
- Requires track to be permanently relocated from north to south side of bridge as part of future NHDOT bridge deck rehabilitation project.
- Requires construction of a platform to support the trail at the face of the White River railroad bridge abutment.
- 6' high chain link fence separates trail from track.

- Not a very direct route to downtown.
- Preferred by VTrans and railroad because it does not cross a railroad track and has no permanent impact on railroad operations.
- Possible safety concerns because trail users are out of sight while passing under the railroad bridges and traveling along the river bank, so lighting and other methods of increasing safety will be required.
- Must obtain a Conditional Use Permit from the Town's Zoning Board of adjustment to construct the portion of the path on the riverbank.
- Lowest cost alternative.

#### Alternative E2 (Approximately 950')

- Construction cost estimate = \$525,000.
- Trail starts north of track and runs northeast along the top of slope towards railroad the railroad bridge over the White River, then crosses the railroad track on a new bicycle/pedestrian overpass bridge.
- Requires track to be permanently relocated from north to south side of bridge as part of future NHDOT bridge deck rehabilitation project.
- Requires construction of a costly overpass bridge.
- 6' high chain link fence separates trail from track.
- Not a very direct route to downtown.
- Possibly not preferred by VTrans and railroad because it crosses over the railroad track, although it has no permanent impact on railroad operations.
- Significantly more costly than Alternative E1.
- Environmental permitting should be very straightforward.

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### Right-of-Way Impacts

The Westboro Rail Yard at the east end of the railroad bridge and the railroad bridge itself are owned by the State of New Hampshire and managed by the NHDOT. The Claremont Concord Railroad Corporation currently has a lease agreement for use of the rail line, bridge and rail yard. The City of Lebanon is actively pursuing transfer of the property near Bridge Street along the Connecticut River from NHDOT to the City. This is approximately a 2-acre parcel where the Westboro Riverfront Park shared-use path Trailhead and Gateway Kiosk would be located. Once an agreement is reached on the 2-acre parcel, the City plans to also pursue a transfer of additional land from the first parcel southward and out to NH Route 12-A. This is about an additional four acres. This would include taking ownership of the historic Westboro Roundhouse, Bunkhouse, and Sandhouse for potential future restoration and incorporation into the Riverfront Trail and Park. The trail alternatives considered on

the bridge and at the Westboro end of the bridge are within the current State of NH Right-of-Way, some of which may be obtained by the City of Lebanon in the near future.

At the White River Junction end of the bridge all of the trail alternatives considered are within existing State of Vermont and Town of Hartford Right-of-Way.

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## Environmental & Cultural Resource Impacts

The environmental resources present within the project area related primarily to the river and its associated wetlands, floodplain, and habitat. The flood insurance study and flood insurance maps show a 100-year and 500-year floodplain within the project area. For Alternatives D and E1 at the White River Junction end of the bridge it may be difficult to obtain the required permits for the construction of the portions of the trail along the river bank because they are within the flood plain and within 100' of the river top of bank. The Town of Hartford has regulations governing development within 100' of the river bank. The Town's protection of surface waters zoning regulations do not prohibit development within 100' of the river but they do require a Conditional Use Permit from the Zoning Board of Adjustment. The other alternatives considered at the White River Junction end of the bridge have minimal environmental impacts.

There do not appear to be any historic structures that would be affected by the trail alignment alternatives considered for this feasibility study. Downstream and upstream areas adjacent to the river may contain archaeologically sensitive areas. An evaluation of impacts will be required for the trail alternatives that are located on the river banks.



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## Conclusions

Based on VHB's evaluation of several trail configuration and alignment alternatives, linking Lebanon and Hartford with a multi-use trail over the existing railroad bridge appears feasible, provided sufficient funding is available. Selection of the combination of alternatives to recommend for further design and eventual construction depends on which of the evaluation criteria are considered most important to the project stakeholders. The relative weighting of cost, user safety, recreational value, transportation effectiveness, temporary and permanent impacts to the railroad, and difficulty of permitting affects the alternative selection. Consequently VHB has included three recommendations for the White River Junction end of the trail. The first considers all the criteria and weights meeting the transportation needs of the users more heavily. The second gives added weight to project cost/availability of funding, and the third gives added weight to recreational value.

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## Recommended Alternatives

For each of the three recommended alternatives at the White River Junction end of the trail, the trail configurations recommended on the bridge and at the Westboro end are the same. On the bridge the alternative that does not use the existing safety walk is recommended. This alternative is the lowest cost of the two alternatives considered and has a shorter construction duration because repairs to the existing deteriorated safety walk are not required. The location of the fence will have to be coordinated with the railroad to ensure that acceptable clearance is provided between the track and the fence. For the purposes of this feasibility study the preferred 10' trail width is assumed. At the Westboro end the switchback trail alignment that connects to the proposed Westboro Riverfront Trail is recommended.

Three major factors will need to be considered by stakeholders before a final preferred alternative can be selected for the White River Junction end of the trail. Following is a summary of the three recommended alternatives considering, in turn, each of the following factors most important: transportation needs, cost and funding constraints, and recreational use.

### Considering Transportation Needs Most Important

Based on observations of pedestrians who cross the bridge now, the direct route to downtown White River Junction provided by Alternatives A, B1, or B2 would be more desirable for many trail users. These routes allow the most direct access to downtown businesses and services and most directly meet the transportation needs of the trail users. Of these alternatives, VHB recommends Alternative B1, which crosses under the track and into the wye through a precast concrete box culvert. The underpass eliminates the at-grade crossing of the track required by Alternative A at

the Latham Works Road emergency crossing making Alternative B1 safer for users in that respect. This alternative has an estimated construction cost approximately equal to Alternative A but does not require ongoing maintenance costs for the crossing gates and signals at the Latham Works Road emergency crossing that Alternative A does.

Alternative B1 is preferred over B2 because it is estimated to cost significantly less. The safety concerns for users of the trail while “out-of-sight” in the underpass can be addressed by a combination of additional lighting, more frequent patrols by law enforcement, or closed circuit television cameras. If it is determined that ongoing additional law enforcement would definitely be required with Alternative B1, those costs should be quantified and considered in the final alternatives selection. With its significantly higher cost, Alternative B2 is not recommended over B1 even though B2 arguably could be safer for users due to increased visibility from the longer span of the bridge. The total estimated project cost for this combination of alternatives, including survey, design engineering, permitting, construction, and construction engineering is \$830,000. See Sheet 1 in the Appendix for a breakdown of this cost estimate.

### **Considering Cost and Funding Constraints Most Important**

If project funding is limited, VHB recommends Alternative C because it is the least cost alternative. Alternative C connects to the existing Latham Works Road and does not cross the railroad track. Alternative C does not serve the transportation needs of the potential trail users well because it does not provide a direct route to downtown. This alternative would not likely eliminate trespassers cutting across the tracks and through the wye. However, a combination of additional fencing from the proposed parking lot project and this project may be successful in deterring this pedestrian traffic. This alternative also does not provide a very desirable trail for recreational users because Latham Works Road is narrow and arguably not very scenic. It also may not be favored by the residents of Latham Works Road because it would increase pedestrian and bicycle traffic through their neighborhood. However it is the easiest alternative to permit and construct and it does not preclude construction of one of the other alternatives at a later date when additional funding is available. This option does provide direct access to Ratcliffe Park. Once the trail is open using Alternative C, the more direct connection to downtown of Alternative B1 or the more scenic route of Alternative D could be implemented in another phase of the project. The total estimated project cost for this combination of alternatives, including survey, design engineering, permitting, construction, and construction engineering is \$430,000. See Sheet 1 in the Appendix for a breakdown of this cost estimate.

### **Considering Recreational Use Most Important**

Giving added weight to the recreational value of the trail alternatives, VHB recommends Alternative D because it is the longest and most scenic trail alternative. Alternative D is the switchback trail alignment that carries the trail down to the river, passes under the railroad bridge, continues along the river bank, passes under the

railroad bridge over the White River and comes up into the park at Bridge Street. This alternative creates a riverfront trail along the Connecticut River and White River that mirrors the proposed Westboro Riverfront Trail in Lebanon. Two disadvantages of this alternative are that it is the highest cost alternative considered and it may be difficult to obtain the required permits for the construction of the trail along the river bank because it is within the flood plain and within 100' of the top of river bank. The total estimated project cost for this combination of alternatives, including survey, design engineering, permitting, construction, and construction engineering is \$1,200,000. See Sheet 1 in the Appendix for a breakdown of this cost estimate.

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Location:	Hartford, VT	Sheet:	<b>1 of 11</b>
Calculated by:	GME	Date:	9/5/2007
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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Grand Total Project Cost Estimates for Recommended Trail Configurations

#### Considering Transportation Needs Most Important

Description	Total
<b>Construction Cost Estimates for Recommended Trail Alternatives:</b>	
Trail on Bridge - Not Using Safety Walk (10 Foot Wide Trail)	\$ 75,000
Trail at Lebanon (Westboro) End of Bridge	\$ 135,000
Trail at Hartford (White River Junction) End of Bridge - Alternative B1	\$ 450,000

**Construction Cost Estimate = \$ 660,000**  
**Survey, Design Engineering & Permitting Cost Estimate = \$ 100,000**  
**Construction Engineering Cost Estimate = \$ 66,000**  
**Project Grand Total = \$ 830,000**

#### Considering Cost and Funding Constraints Most Important

Description	Total
<b>Construction Cost Estimates for Recommended Trail Alternatives:</b>	
Trail on Bridge - Not Using Safety Walk (10 Foot Wide Trail)	\$ 75,000
Trail at Lebanon (Westboro) End of Bridge	\$ 135,000
Trail at Hartford (White River Junction) End of Bridge - Alternative C	\$ 105,000

**Construction Cost Estimate = \$ 315,000**  
**Survey, Design Engineering & Permitting Cost Estimate = \$ 80,000**  
**Construction Engineering Cost Estimate = \$ 32,000**  
**Project Grand Total = \$ 430,000**

#### Considering Recreational Use Most Important

Description	Total
<b>Construction Cost Estimates for Recommended Trail Alternatives:</b>	
Trail on Bridge - Not Using Safety Walk (10 Foot Wide Trail)	\$ 75,000
Trail at Lebanon (Westboro) End of Bridge	\$ 135,000
Trail at Hartford (White River Junction) End of Bridge - Alternative D	\$ 750,000

**Construction Cost Estimate = \$ 960,000**  
**Survey, Design Engineering & Permitting Cost Estimate = \$ 140,000**  
**Construction Engineering Cost Estimate = \$ 96,000**  
**Project Grand Total = \$ 1,200,000**

Note: Reference Sheets 2-11 for breakdowns of the construction cost estimates shown above.

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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimates for Trail Alternatives on Bridge

#### Trail on Bridge - Not Using Safety Walk (10 Foot Wide Trail)

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Trail Construction</b>				
Excavation	CY	\$ 25	178	\$ 5,000
Stone Dust	CY	\$ 30	71	\$ 3,000
Gravel	CY	\$ 25	107	\$ 3,000
6' Vinyl Coated Chain Link Fence	LF	\$ 40	520	\$ 21,000
4' Vinyl Coated Chain Link Fence	LF	\$ 40	520	\$ 21,000
<b>Subtotal =</b>				<b>\$ 53,000</b>
Major Items Subtotal =				<b>\$ 53,000</b>
10% Mobilization =				\$ 6,000
25% Minor Items and Contingency =				\$ 14,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 75,000</b>

#### Trail on Bridge - Using Safety Walk (8 Foot Wide Trail)

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	59	\$ 2,000
Gravel	CY	\$ 25	67	\$ 2,000
6' Vinyl Coated Chain Link Fence	LF	\$ 40	520	\$ 21,000
4' Vinyl Coated Chain Link Fence	LF	\$ 40	520	\$ 21,000
<b>Subtotal =</b>				<b>\$ 46,000</b>
<b>Minor Structural Improvements</b>				
Removal of Existing Safety Railing	LF	\$ 10	520	\$ 6,000
Removal of Existing Safety Walk	CY	\$ 200	24	\$ 5,000
Installation of New Structural Timber	MFBM	\$ 5,000	8	\$ 40,000
<b>Subtotal =</b>				<b>\$ 51,000</b>
Major Items Subtotal =				<b>\$ 97,000</b>
10% Mobilization =				\$ 10,000
25% Minor Items and Contingency =				\$ 25,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 135,000</b>

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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimate for Trail at Westboro End of Bridge

#### Trail at Westboro End of Bridge - Approximately 520 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	295	\$ 6,000
Granular Backfill	CY	\$ 26	2,768	\$ 72,000
Clearing and Grubbing	A	\$ 8,500	0.85	\$ 8,000
<b>Subtotal =</b>				<b>\$ 86,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	64	\$ 2,000
Gravel	CY	\$ 25	231	\$ 6,000
Vinyl Coated Chain Link Fence	LF	\$ 20	300	\$ 6,000
<b>Subtotal =</b>				<b>\$ 14,000</b>
				<b>Major Items Subtotal = \$ 100,000</b>
				10% Mobilization = \$ 10,000
				25% Minor Items and Contingency = \$ 25,000
				<b>Construction Cost Estimate Total = \$ 135,000</b>

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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimates for Trail Alternatives at White River Junction End of Bridge

#### Summary of Alternatives at White River Junction End of Bridge

Description	Total
<b>Alternative A - Approximately 450 LF</b>	
Major Items Sub-Total =	\$ 327,000
10% Mobilization =	\$ 33,000
25% Minor Items and Contingency =	\$ 82,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 445,000</b>
<b>Alternative B1 - Approximately 650 LF</b>	
Major Items Sub-Total =	\$ 332,000
10% Mobilization =	\$ 34,000
25% Minor Items and Contingency =	\$ 83,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 450,000</b>
<b>Alternative B2 - Approximately 650 LF</b>	
Major Items Sub-Total =	\$ 582,000
10% Mobilization =	\$ 59,000
25% Minor Items and Contingency =	\$ 146,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 790,000</b>
<b>Alternative C - Approximately 450 LF</b>	
Major Items Sub-Total =	\$ 77,000
10% Mobilization =	\$ 8,000
25% Minor Items and Contingency =	\$ 20,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 105,000</b>
<b>Alternative D - Approximately 2,100 LF</b>	
Major Items Sub-Total =	\$ 553,000
10% Mobilization =	\$ 56,000
25% Minor Items and Contingency =	\$ 139,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 750,000</b>
<b>Alternative E1 - Approximately 950 LF</b>	
Major Items Sub-Total =	\$ 256,000
10% Mobilization =	\$ 26,000
25% Minor Items and Contingency =	\$ 64,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 350,000</b>
<b>Alternative E2 - Approximately 950 LF</b>	
Major Items Sub-Total =	\$ 387,000
10% Mobilization =	\$ 39,000
25% Minor Items and Contingency =	\$ 97,000
<b>Construction Cost Estimate Total =</b>	<b>\$ 525,000</b>

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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimate for Trail Alternative A at White River Junction End of Bridge

#### Alternative A - Approximately 450 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	255	\$ 6,000
Granular Backfill	CY	\$ 26	1,707	\$ 45,000
Clearing and Grubbing	A	\$ 8,500	0.83	\$ 8,000
<b>Subtotal =</b>				<b>\$ 59,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	55	\$ 2,000
Gravel	CY	\$ 25	200	\$ 5,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	450	\$ 9,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	100	\$ 2,000
<b>Subtotal =</b>				<b>\$ 18,000</b>
<b>Signalized Railroad Crossing</b>				
Signalized Railroad Crossing	EA	\$ 250,000	1	\$ 250,000
<b>Subtotal =</b>				<b>\$ 250,000</b>
Major Items Subtotal =				<b>\$ 327,000</b>
10% Mobilization =				\$ 33,000
25% Minor Items and Contingency =				\$ 82,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 445,000</b>



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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimate for Trail Alternative B1 at White River Junction End of Bridge

#### Alternative B1 - Approximately 650 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	368	\$ 8,000
Granular Backfill	CY	\$ 26	1,619	\$ 43,000
Clearing and Grubbing	A	\$ 8,500	0.96	\$ 9,000
<b>Subtotal =</b>				<b>\$ 60,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	79	\$ 3,000
Gravel	CY	\$ 25	289	\$ 8,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	450	\$ 9,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	100	\$ 2,000
<b>Subtotal =</b>				<b>\$ 22,000</b>
<b>Culvert Under Railroad</b>				
Culvert Under Railroad	EA	\$ 250,000	1	\$ 250,000
<b>Subtotal =</b>				<b>\$ 250,000</b>
Major Items Subtotal =				<b>\$ 332,000</b>
10% Mobilization =				\$ 34,000
25% Minor Items and Contingency =				\$ 83,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 450,000</b>

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Title:	<b>Feasibility Study Construction Cost Estimate</b>		

### Construction Cost Estimate for Trail Alternative B2 at White River Junction End of Bridge

#### Alternative B2 - Approximately 650 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	368	\$ 8,000
Granular Backfill	CY	\$ 26	1,619	\$ 43,000
Clearing and Grubbing	A	\$ 8,500	0.96	\$ 9,000
<b>Subtotal =</b>				<b>\$ 60,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	79	\$ 3,000
Gravel	CY	\$ 25	289	\$ 8,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	450	\$ 9,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	100	\$ 2,000
<b>Subtotal =</b>				<b>\$ 22,000</b>
<b>Bridge</b>				
Bridge Cost	LS	\$ 500,000	1	\$ 500,000
<b>Subtotal =</b>				<b>\$ 500,000</b>
Major Items Subtotal =				<b>\$ 582,000</b>
10% Mobilization =				\$ 59,000
25% Minor Items and Contingency =				\$ 146,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 790,000</b>

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### Construction Cost Estimate for Trail Alternative C at White River Junction End of Bridge

#### Alternative C - Approximately 450 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	255	\$ 6,000
Granular Backfill	CY	\$ 26	1,707	\$ 45,000
Clearing and Grubbing	A	\$ 8,500	0.83	\$ 8,000
<b>Subtotal =</b>				<b>\$ 59,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	55	\$ 2,000
Gravel	CY	\$ 25	200	\$ 5,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	450	\$ 9,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	100	\$ 2,000
<b>Subtotal =</b>				<b>\$ 18,000</b>
Major Items Subtotal =				<b>\$ 77,000</b>
10% Mobilization =				\$ 8,000
25% Minor Items and Contingency =				\$ 20,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 105,000</b>

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 Title:                                 **Feasibility Study Construction Cost Estimate**

### Construction Cost Estimate for Trail Alternative D at White River Junction End of Bridge

#### Alternative D - Approximately 2,100 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	1,193	\$ 24,000
Granular Backfill	CY	\$ 26	2,768	\$ 72,000
Clearing and Grubbing	A	\$ 8,500	1.61	\$ 14,000
<b>Subtotal =</b>				<b>\$ 110,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	257	\$ 8,000
Gravel	CY	\$ 25	936	\$ 24,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	450	\$ 9,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	100	\$ 2,000
<b>Subtotal =</b>				<b>\$ 43,000</b>
<b>Bridge Work</b>				
Trail Platform Under CT River Bridge	EA	\$ 200,000	1	\$ 200,000
Trail Platform Under White River Bridge	EA	\$ 200,000	1	\$ 200,000
<b>Subtotal =</b>				<b>\$ 400,000</b>
Major Items Subtotal =				<b>\$ 553,000</b>
10% Mobilization =				\$ 56,000
25% Minor Items and Contingency =				\$ 139,000
<b>Construction Cost Estimate Total =</b>				<b>\$ 750,000</b>

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### Construction Cost Estimate for Trail Alternative E1 at White River Junction End of Bridge

#### Alternative E1 - Approximately 950 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	1,020	\$ 21,000
Clearing and Grubbing	A	\$ 8,500	0.55	\$ 5,000
<b>Subtotal =</b>				<b>\$ 26,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	116	\$ 4,000
Gravel	CY	\$ 25	422	\$ 11,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	600	\$ 12,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	150	\$ 3,000
<b>Subtotal =</b>				<b>\$ 30,000</b>
<b>Bridge Work</b>				
Trail Platform Under White River Bridge	EA	\$ 200,000	1	\$ 200,000
<b>Subtotal =</b>				<b>\$ 200,000</b>
				Major Items Subtotal = \$ <b>256,000</b>
				10% Mobilization = \$ 26,000
				25% Minor Items and Contingency = \$ 64,000
				<b>Construction Cost Estimate Total = \$ 350,000</b>

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### Construction Cost Estimate for Trail Alternative E2 at White River Junction End of Bridge

#### Alternative E2 - Approximately 950 LF

Major Item Descriptions	Unit	Unit Price	Quantity	Total
<b>Earthwork</b>				
Excavation	CY	\$ 20	538	\$ 11,000
Clearing and Grubbing	A	\$ 8,500	0.55	\$ 5,000
<b>Subtotal =</b>				<b>\$ 16,000</b>
<b>Trail Construction</b>				
Stone Dust	CY	\$ 30	116	\$ 4,000
Gravel	CY	\$ 25	422	\$ 11,000
6' Vinyl Coated Chain Link Fence	LF	\$ 20	150	\$ 3,000
4' Vinyl Coated Chain Link Fence	LF	\$ 20	150	\$ 3,000
<b>Subtotal =</b>				<b>\$ 21,000</b>
<b>Bridge Over Railroad</b>				
Bridge Cost	EA	\$ 350,000	1	\$ 350,000
<b>Subtotal =</b>				<b>\$ 350,000</b>
				Major Items Subtotal = \$ <b>387,000</b>
				10% Mobilization = \$ 39,000
				25% Minor Items and Contingency = \$ 97,000
				<b>Construction Cost Estimate Total = \$ 525,000</b>

