

# NINJA PATH

## SCOPING STUDY



DRAFT 5.26.15





# PROJECT BACKGROUND

For many years, Bennington residents have sought alternative walking and biking routes to the Northside Drive commercial area and North Bennington.

In response to this need, the Town of Bennington secured a VTrans Bicycle & Pedestrian Grant for a scoping study to assess the feasibility of a shared-use path linking Bennington, the Northside Drive area, Bennington College, and North Bennington. This report details the work of that scoping study.

The project was managed by the Bennington County Regional Commission. MSK Engineering provided engineering consultation.

# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b>	<b>3</b>	<b>APPENDIX</b>	<b>35</b>
<b>EXECUTIVE SUMMARY</b>	<b>4</b>	A. Conceptual Design Plans	
<b>PROJECT PURPOSE AND NEED</b>	<b>5</b>	B. Cost Estimate	
NO-BUILD ALTERNATIVE	5	C. Right of Way Status Map	
<b>PROJECT BENEFITS</b>	<b>6</b>	D. Natural Resources Map	
TRANSPORTATION BENEFITS	6	E. Technical Memorandum Re: Furnace Brook hydraulic analysis for proposed pedestrian bridge	
RECREATIONAL BENEFITS	7	F. Floodway “No-Rise/No Impact” Certification	
PUBLIC HEALTH BENEFITS	7	G. Agency of Natural Resources— Comments on conceptual layout of Ninja Path	
<b>CONCEPTUAL PLAN</b>	<b>8</b>	H. VTrans Highway Safety Improvement Program—Location Review of VT67A/Silk Rd./Matteson Rd./College Dr. Intersection	
BENNINGTON TRAIL NETWORK	10	I. Speed Study of VT67A at College Drive	
ALIGNMENT OVERVIEW	11	J. Sight Distance Diagram	
TYPICAL CROSS-SECTION	11	K. Memorandum: Justification of Proposed Ninja Path Alignment—Route 67A	
SECTION 1	12		
SECTION 2	14		
SECTION 3	16		
SECTION 4	18		
SECTION 5	20		
SECTION 6	22		
SECTION 7	24		
SECTION 8	27		
<b>PROJECT DETAILS</b>	<b>30</b>		
COST ESTIMATE	30		
COMPATIBILITY WITH PLANS	31		
PATH MAINTENANCE	32		
UTILITY IMPACTS	32		
PATH OWNERSHIP	32		
PUBLIC INVOLVEMENT	32		
PROJECT TIMELINE & SCHEDULE	33		
VIABILITY	34		

# EXECUTIVE SUMMARY

The commercial area surrounding Northside Drive (Route 67A), in the northwest urban area of downtown Bennington, does not provide adequate pedestrian and cyclist facilities.

These inadequate and unsafe conditions pose a significant challenge to people trying to access commercial amenities or travel between downtown Bennington and the northwest area of town (which includes the Village of North Bennington and Bennington College.) This scoping study includes a conceptual proposal for a path that would create a safe and appealing walking, biking, running, and cross-country skiing alternative to Route 67A.

Named for the groups of people who have already begun clearing and using alternative paths in the area, the “Ninja Path” design proposal is explored in detail in the following pages. There are nine distinct sections within the path, determined by a variety of different contexts and conditions, each of which is articulated in detail in this scoping study.

Within the appendix of this study, there are several additional documents and various supporting materials which discuss existing conditions within the project area and explore the implications that the conceptual design would have on its context.



Volunteers roughed-in a section of the Ninja Path that connects Hicks Avenue to Price Chopper and Walmart. The section is short, but it is heavily used because it makes the trip by foot or bike convenient.

# I. PROJECT PURPOSE AND NEED

## PROJECT PURPOSE

The project’s purpose is to create a 2.12-mile shared-use path, so people can safely and comfortably walk and bike between downtown Bennington and the Village of North Bennington, and to important destinations in between, including Bennington College, residential neighborhoods, grocery stores and businesses on Northside Drive/VT67A.

## PROJECT NEED

There is no safe or inviting walking or bicycling route between downtown Bennington and North Bennington, or to the many important destinations between. The sole connecting road, Northside Drive/VT67A, is a congested commercial strip with many parking lot entrances, turning vehicles, and busy intersections. The mile-long western end of the road is particularly dangerous and uninviting. It is a four-lane highway with typical traffic speeds of 40–50 mph and just two short sections of disconnected sidewalk.



**Image: Facing southeast along Route 67**

*Informal pathways along the side of 67A demonstrate the need for pedestrian facilities. These paths are unsafe and inconvenient for walking, but there is currently no other option.*

## NO-BUILD ALTERNATIVE

***The No-Build Alternative must be considered for all projects funded by the Federal Highway Administrative Act to comply with the National Environmental Policy Act (NEPA).***

The no-build, or “do nothing,” alternative would not satisfy the Project Purpose & Need Statement. The need for a safe walking and bicycling route between Bennington and North Bennington would remain.

Not creating pedestrian and cyclist facilities in this critical area would perpetuate the significant risk to public health and safety in the Bennington community.

# II. PROJECT BENEFITS

## TRANSPORTATION BENEFITS

- Creates a safe and appealing walking, bicycling, running, and cross-country skiing route between Bennington and North Bennington
- Improves mobility for children in an area that lacks a local street network
- Gives Bennington residents safe bicycle and pedestrian access to jobs, services and grocery stores along Northside Drive
- Gives Bennington College students safe pedestrian access to grocery stores and other amenities on Northside Drive, and safe bicycle access to downtown Bennington
- Leverages other path projects in the area including the Kocher Drive Shared-use Path, the Bennington Rail Trail, The Applegate to Willowbrook Path, and Bennington College campus's path network



*The Intersection of Routes 67 and 7A, facing NW: The lack of pedestrian and bicycle facilities creates extremely unsafe conditions along a vehicular corridor that contains many of the area's commercial amenities, including all three of Bennington's supermarkets.*

## RECREATIONAL BENEFITS

- Provides public access to the scenic Walloomsac River
- Establishes over 2 miles of new trail accessible from critical neighborhoods in the Bennington Community, including several low-income neighborhoods
- Creates handicapped accessible fishing areas

## PUBLIC HEALTH BENEFITS

- Encourages active transportation in a health district with extremely high rates of lifestyle-influenced disease—especially for lower income populations (*See graphics below*)
- Gives residents of two adjacent census tracts (which the USDA considers to be a **food desert**) access to local Supermarkets

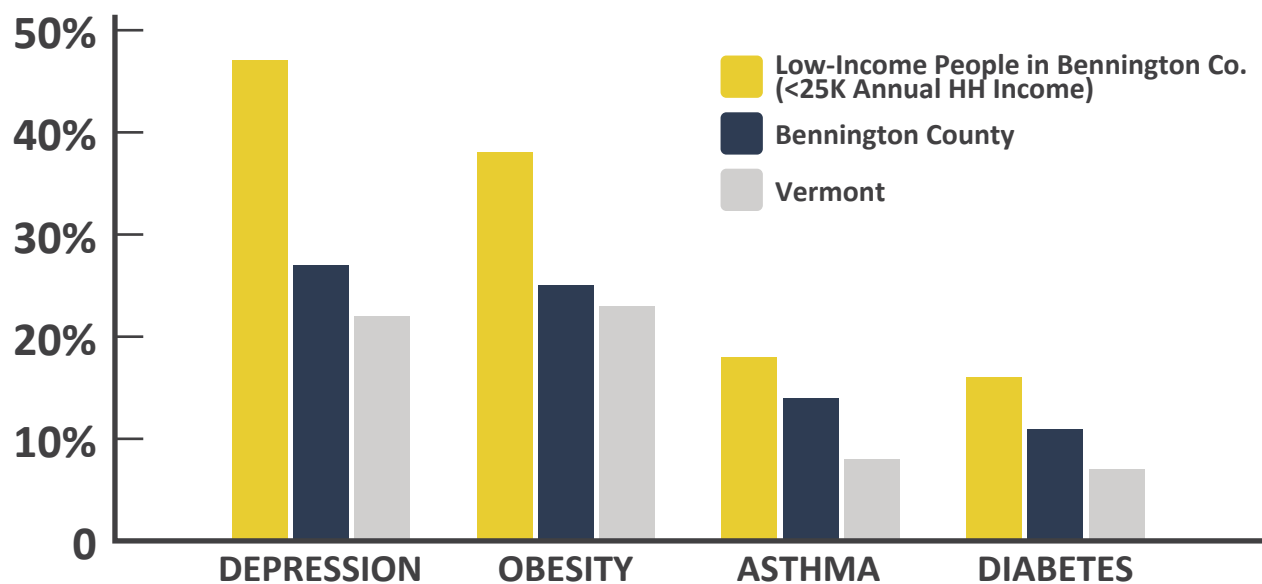
---

## PUBLIC HEALTH ISSUES IN BENNINGTON

Bennington County suffers from significantly higher rates of nearly every lifestyle-influenced disease than the remainder of Vermont. Worse still, the low-income population of the county (more than half of whom reside in and around the project area of the Ninja Trail) suffers at rates nearly double that of the state average for many such diseases. The graph below, which is based on data gathered by a national health survey, demonstrates a few of the diseases that public trail projects in the area could help to decrease.

---

## GRAPH: DISEASE RATES IN BENNINGTON COUNTY



*Source:* The data above is based on the 2012 Behavior Risk Factor Surveillance Survey, which is administered and analyzed by the Vermont Department of Health in collaboration with the Centers for Disease Control and Prevention (CDC). <http://healthvermont.gov/research/brfss/brfss.aspx>

# III. CONCEPTUAL PLAN

The Ninja path will create critically lacking pedestrian/cyclist connections along the Northside Drive commercial corridor, between downtown Bennington and Bennington College.





## CONCEPTUAL PLAN SECTIONS

The sections below are each described in more detail throughout the following pages.



1

### SECTION 1: PEDESTRIAN BRIDGE TO HARMON ROAD | PAGE 10

The Ninja Path begins at the existing bicycle/pedestrian bridge connecting Hunt Street and Hicks Avenue. The path runs along the north bank of the Walloomsac River to Harmon Road. Two spur paths connect to Wal-Mart Plaza.

2

### SECTION 2: HARMON ROAD ACCESS | PAGE 12

Harmon Road is an access point and parking area for the path. Amenities there will include a picnic area, an accessible fishing location, and a rock ford.

3

### SECTION 3: HARMON ROAD TO FURNACE BROOK | PAGE 14

From Harmon Road, the path continues along the back edge of industrial properties along Morse Road.

4

### SECTION 4: FURNACE BROOK BRIDGE | PAGE 16

The path will cross Furnace Brook on a new bridge near the Bennington Self-storage facility.

5

### SECTION 5: UNDER ROUTE VT279 | PAGE 18

From Furnace Brook, the path will cross state-owned land and under a Route VT279 overpass.

6

### SECTION 6: HANNAFORD SQUARE | PAGE 20

From Route VT279, the path skirts the back of Hannaford Square before linking up to Route VT67A.

7

### SECTION 7: ROUTE VT67A | PAGE 22

The path runs along Route VT67A, separated from traffic by a green strip, for 0.1 miles.

8

### SECTION 8: INTERSECTION OF VT67A/COLLEGE DR/ET AL. | PAGE 24

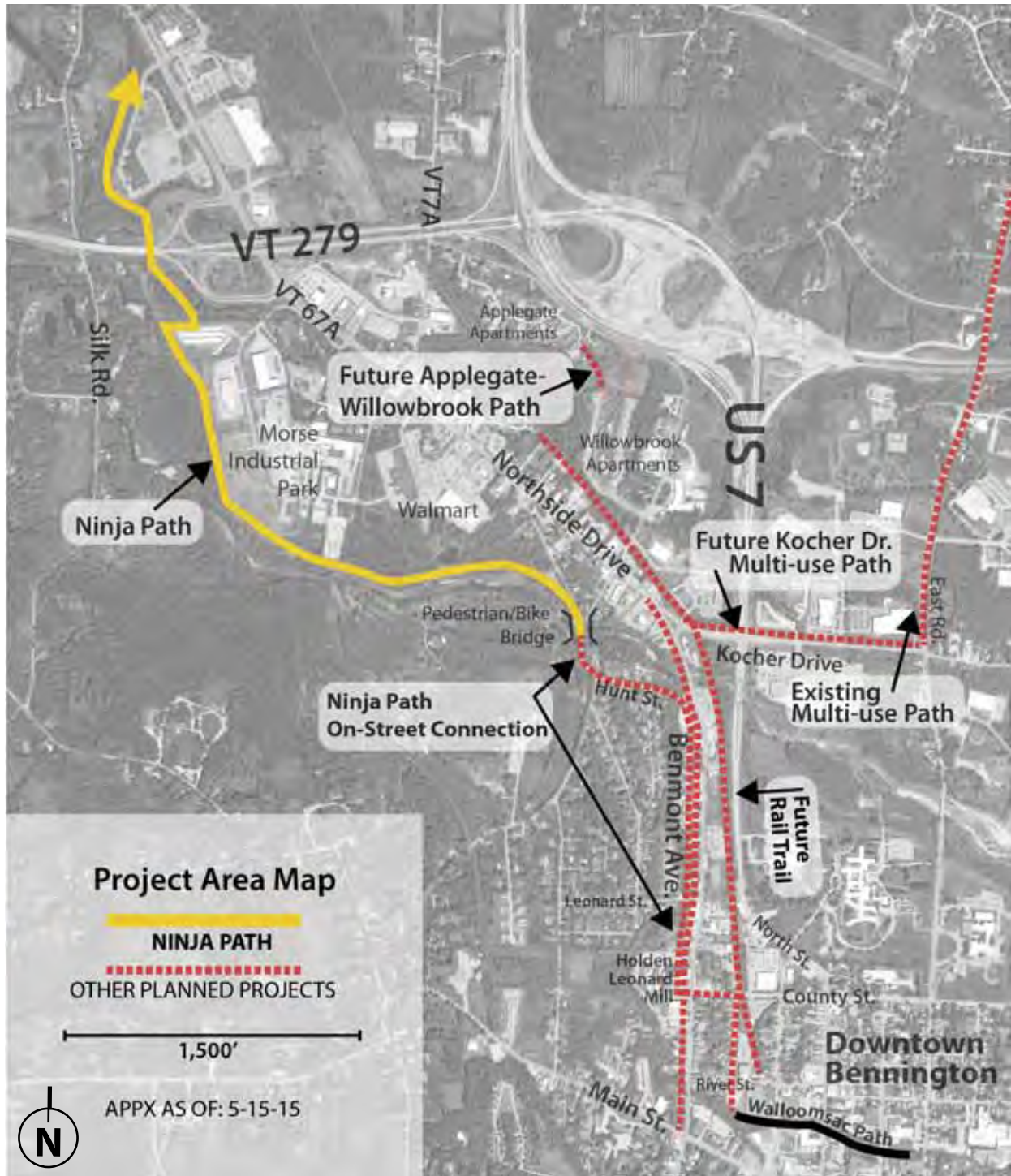
The path crosses Silk Road about 200 feet south of the VT67A/Silk Road intersection and then crosses VT67A opposite College Drive.

## BENNINGTON TRAIL NETWORK

The Ninja Trail is being planned in conjunction with several other nearby and adjacent pedestrian/cyclist facilities. These facilities will provide access in the areas of most critical need. They will also be designed to connect strategically with one another.

A separate plan for an on-street bike/pedestrian path on Benmont Avenue would connect the Ninja Path directly to downtown Bennington. That plan can be viewed at:

<http://www.bcrct.org/Programs/Transportation>



## ALIGNMENT OVERVIEW

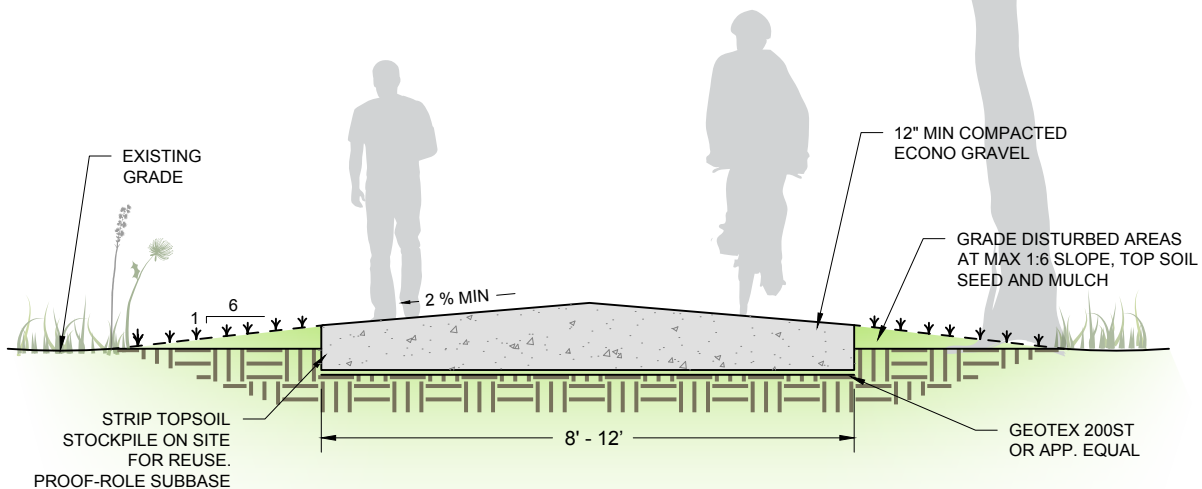
The path is 11,235 feet long (2.12 miles). It begins on Hicks Avenue at the existing pedestrian bridge and ends at the intersection of VT Route 67A/College Drive/Silk Road/Matteson Road. From there, pedestrians and cyclists can reach the Village of North Bennington via Bennington College's paths and low-speed roads.

The path varies between wooded areas, open fields, and roadside facilities. It crosses streams (Sections 1 and 4), goes under an overpass (Section 5), and crosses a highway (Section 8).

## TYPICAL CROSS-SECTION

The typical cross-section of the path is up to twelve feet wide, with a depth of 12" of coarse graded crushed gravel over a geotextile fabric, and a 22' foot clear zone (11' on each side) from vegetation or other obstructions. This is shown in the cross-section below.

An enhanced alternative (*not shown below*) would be paved with a 3" layer of Type III Bituminous Concrete Pavement.



# SECTION 1

## HICKS AVENUE PEDESTRIAN BRIDGE TO HARMON ROAD

### ZONING DISTRICT

- Planned Commercial
- Urban to Rural Transect
- C-3 Suburban Zone

### PEDESTRIAN AND CYCLING GENERATORS

- Wal-Mart
- Price Chopper
- Other businesses along Northside Drive

### SECTION PATH LENGTH

2,700 Linear Feet (including a short spur to the Wal-Mart Pathway)

### ALIGNMENT

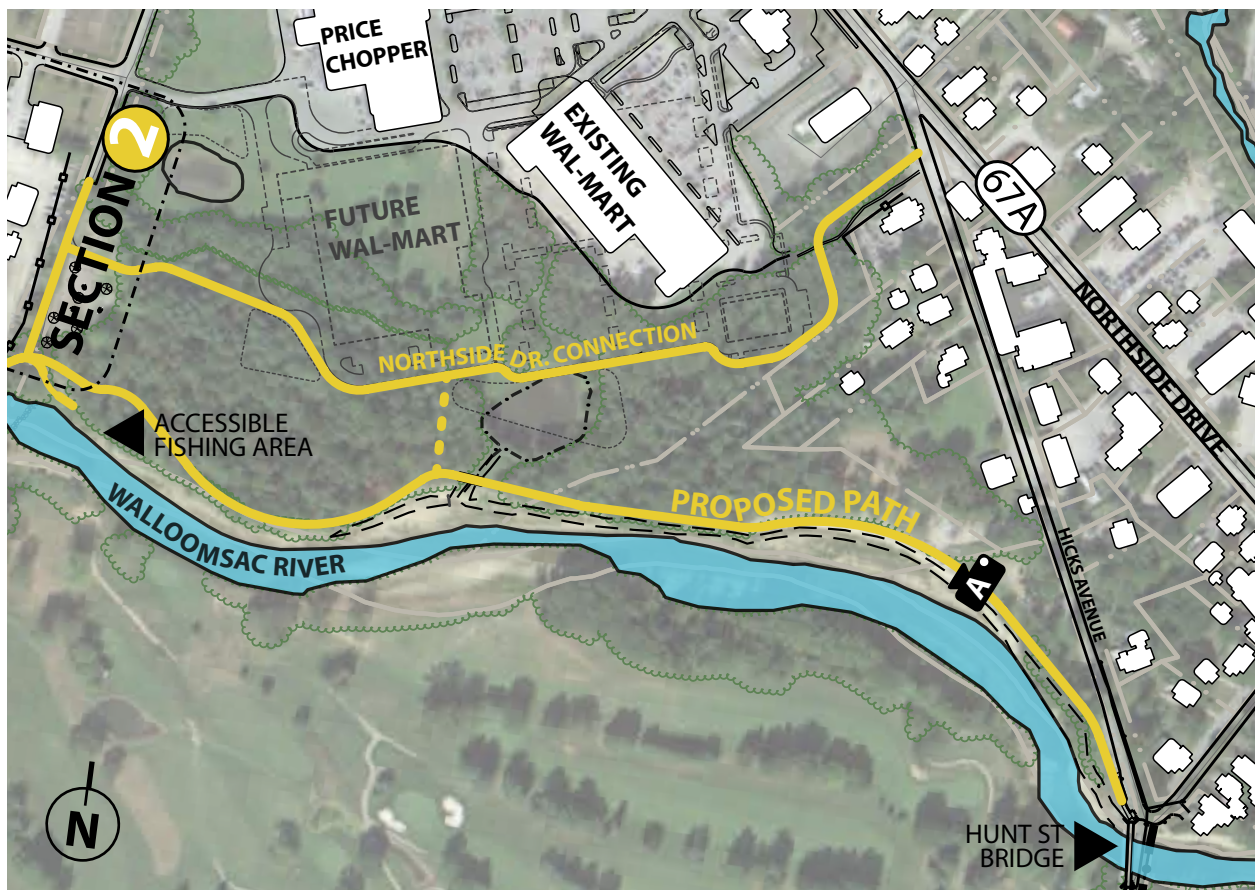
The path begins at the recently replaced pedestrian bridge over the Walloomsac River connecting Hunt Street and Hicks Ave. The path travels along the embankment to Harmon Road. A spur path will connect to Wal-Mart and Price Chopper.

### EXISTING CONDITIONS

Wal-Mart plans to construct a new, larger store and parking area in the next several years.

The new building footprint and future storm water retaining ponds are shown on the base map.

This section of the Walloomsac is a beautiful natural environment close to the center of town. Stone steps will lead from the path to the beach and a rock ford.



## RIGHT OF WAY

This section of path crosses parcels owned by three different property owners.

- Easements for the Wal-Mart/Price Chopper property are not necessary because permit conditions mandate the path.
- Dwyer: The project team met with Mr. Dwyer. He is undecided about allowing the path on his property.
- Jerome: The project team met with Mr. Jerome. He is supportive of the project but hopes to develop the property and may want the alignment changed to align with the western edge of the property boundary. He indicated he might be willing to sell the property to the Town as a gateway park for the path.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources (see Appendix, Resource Map)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- Act 250 Amendment for the portion of the path that crosses the Monument Plaza Parcel
- FEH Zone Permit from the Town of Bennington
- Construction General Permit from VT Agency of Natural Resources
- Storm Water Management Permit from VT Agency of Natural Resources



Section 1 of the path features beautiful river views as it travels along the north bank of the Walloomsac, opposite the river from Mount Anthony Country Club.

# SECTION 2

## HARMON ROAD ACCESS

**SECTION PATH LENGTH**  
580 Linear Feet

.....

### ZONING DISTRICT

- Planned Commercial (east of Harmon Road)
- Industrial (west of Harmon Road)
- Urban to Rural Transect
- C-3 Suburban Zone

### PEDESTRIAN AND CYCLING GENERATORS

Industrial businesses along Morse Road

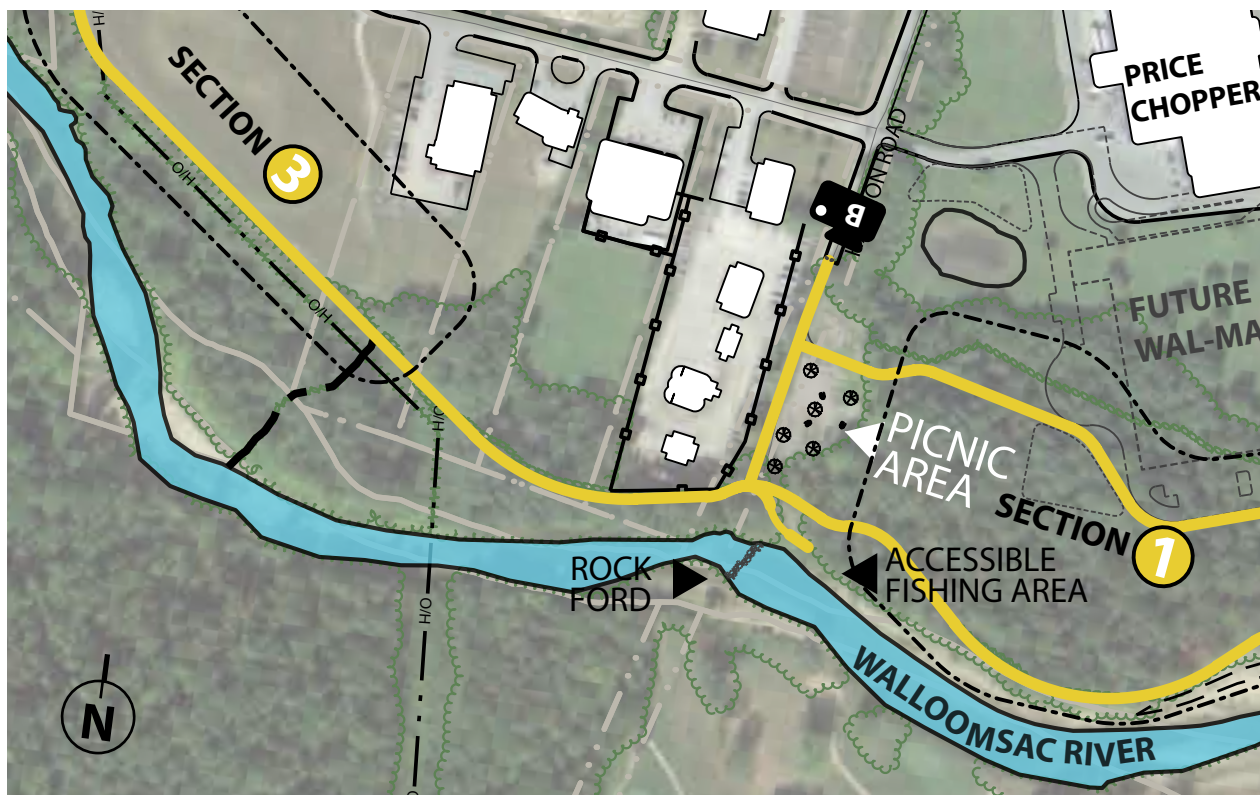
### ALIGNMENT

Harmon Road will be a node, access point, and recreation area for the path. Amenities will include a short path down to the river, a rock ford across the river, a picnic area, a handicapped accessible fishing area, a grassy picnic area with picnic tables, and a gravel parking area.

### EXISTING CONDITIONS

Harmon Road now ends just north of the river. The bridge washed out in a flood before WWII. After Tropical Storm Irene, woody debris from the river was chipped and deposited at the end of the road.

This is a beautiful spot. Across the river there are views of the golf course and the Bennington Monument.



## RIGHT OF WAY

- Harmon Road is a Town Highway (#32). The traveled road ends just short of the proposed picnic area location, but the road's public ROW extends to the river and beyond.
- Permit conditions allow the path behind Suburban Propane.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources (see Appendix, Resource Map)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- FEH Zone permit from the Town of Bennington
- Construction General Permit from the VT Agency of Natural Resources
- Storm Water Management Permit from the VT Agency of Natural Resources

## MAINTENANCE CHALLENGES

The recreational amenities (picnic area, picnic tables, parking area, rock ford) will need to be maintained.



**Harmon Road:** These boulders mark the end of the traveled portion of Harmon Road. The Town right of way extends beyond. The area will be an access to the path, and will have amenities including picnic tables, an accessible fishing area, and a rock ford.

# SECTION 3

## HARMON ROAD TO FURNACE BROOK

.....

### ZONING DISTRICT

- Industrial
- Urban to Rural Transect
- Suburban Zone

### PEDESTRIAN AND CYCLING GENERATORS

- Businesses and homes along Northside Drive
- Industrial businesses along Morse Road

### SECTION PATH LENGTH

4,240 Linear Feet inclusive of the spur to Morse Road

### ALIGNMENT & EXISTING CONDITIONS

This section features a compelling contrast of natural beauty and industrial landscape.

The path alignment is along the rear edge of nine industrial properties with frontages along Morse Road. The alignment roughly follows power lines that run along the back of the properties.

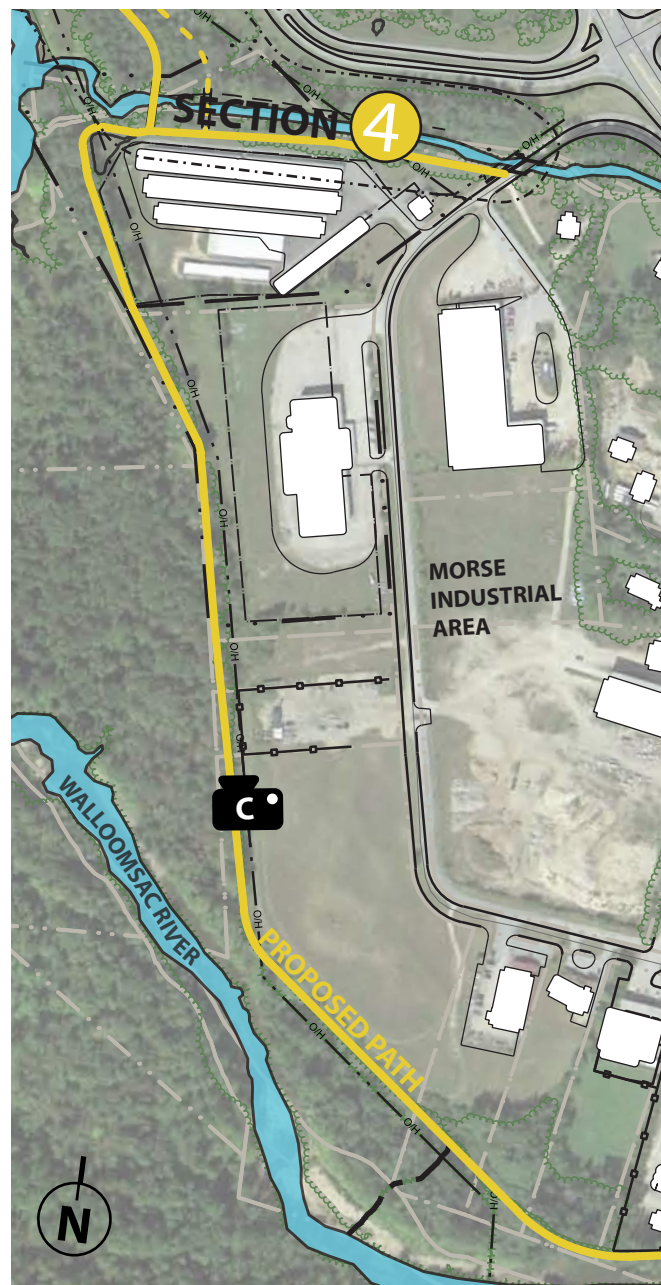
### ALTERNATIVE ALIGNMENT

Morse Road could be used as an alternative in this section. Its disadvantage is trucks use it to make deliveries to Wal-Mart, Price-Chopper, and Suburban Propane, which could be dangerous for cyclists. Also, there are no sidewalks so pedestrians would have to walk in the shoulder.

### RIGHT OF WAY

Easements for some of the commercial properties along Morse Road are not necessary because permit conditions mandate the path. (See Appendix, ROW Status Map.)

The Bennington Chamber of Commerce contacted property owners in this section to ask for informal permission to construct the path. None objected. However, no easements or other formal approvals have been secured.





## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources. (See Appendix, Resource Map.)

Most of the alignment is on previously disturbed ground.

There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- Act 250 Amendments for the affected Morse Industrial Park Owners
- Construction General Permit from the VT Agency of Natural Resources
- Storm Water Management Permit from the VT Agency of Natural Resources
- FEH Zone Permit from the Town of Bennington

## MAINTENANCE CHALLENGES IN THIS SECTION

- There are two culverts in this section that will need to be maintained.
- Knotweed has crowded out other plant species in several places. Efforts should be made to avoid spreading the knotweed during path construction or maintenance.
- The path should be protected from ATVs.



**Morse Road:** The path travels along the back of the industrial parcels along Morse Road.

# SECTION 4

## FURNACE BROOK BRIDGE

.....

### ZONING DISTRICT

Industrial  
Urban to Rural Transect  
C-3 Suburban Zone

### SECTION PATH LENGTH

105 Linear Feet

### ALIGNMENT

This is where the path crosses Furnace Brook. The path hooks around the back of the Bennington Self-Storage property and crosses the river on a new 105-foot bridge onto state land buffering Route VT279. A short access spur connects Morse Road and does not cross the river.

### EXISTING CONDITIONS

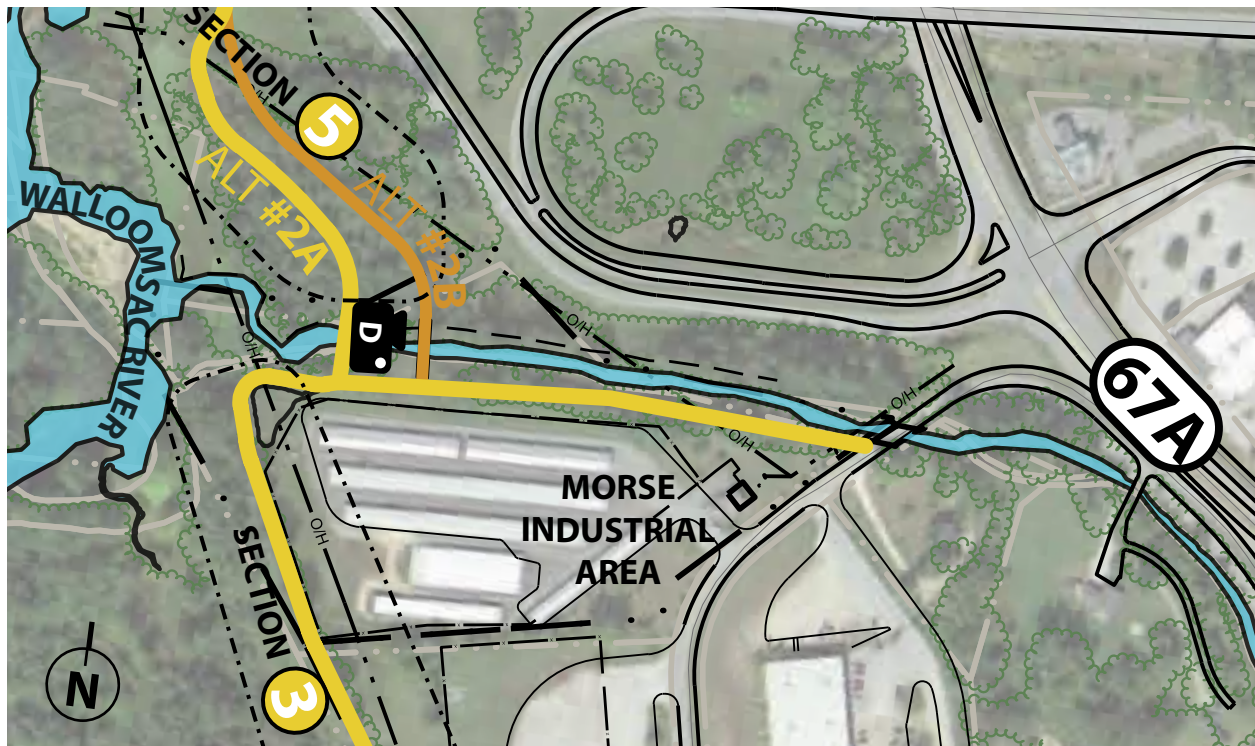
This wooded area is located near the confluence of the Walloomsac River and Furnace Brook. The river is confined in this area by berms installed through past river dredging. There is also an old, recently collapsed beaver dam in this area.

### STREAM CROSSING ALTERNATIVE #2A

This is the preferred alternative because it is the most direct route through the flood plain and will not cause a rise in the base flood plain elevation. This is due to the fact that the backwater condition from the Walloomsac River controls the hydraulics at the proposed pedestrian bridge location.

### STREAM CROSSING ALTERNATIVE #2B

This alternative is slightly less direct and an analysis shows could cause a 0.1 foot rise in the peak water elevation during 100- and 500-year floods because the floodplain is more confined in the area, and the proposed impact takes up a greater percentage of the area.



## RIGHT OF WAY

Bennington Self-Storage granted verbal permission to construct the path on their land.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources. (See Appendix, Resource Map.)

## PERMITS NEEDED IN THIS SECTION

- Act 250 Permit Amendment
- Storm Water Construction General Permit from the VT Agency of Natural Resources

- Storm Water Management Permit from the VT Agency of Natural Resources
- Stream Alteration Permit from the VT Agency of Natural Resources
- FEMA No Rise Certification (complete)

## MAINTENANCE CHALLENGES IN THIS SECTION

The bridge will require maintenance throughout its design life.



*From Bridge:* The view east over the river from the proposed location of the Bridge in Alternative #2A.

# SECTION 5

## UNDER ROUTE VT2790

.....

### ZONING DISTRICT

- Industrial (south of VT279)
- Planned Commercial (north of VT279)
- Urban to Rural Transect
- C-3 Suburban Zone

### SECTION PATH LENGTH

1250 Linear Feet

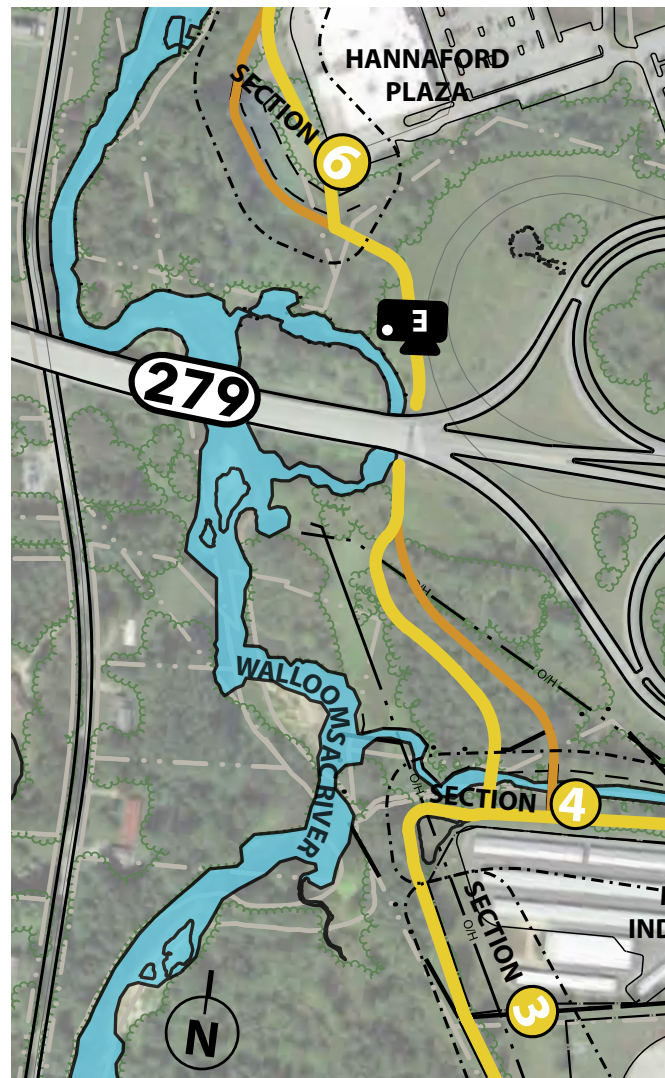
### ALIGNMENT & EXISTING CONDITIONS

The northern end of the new bridge across Furnace Brooke touches down on land owned by the State of Vermont buffering VT Route 279. The path passes through a wooded section before emerging into a field near the highway, then crosses under the highway overpass on a shelf next to a tributary of the Walloomsac River. The overpass and shelf were designed to accommodate a path.

The path emerges from under VT Route 279 and crosses a field before entering the Hannaford Square property

### RIGHT OF WAY

The land in this section is owned by the state. Formal approval from VTrans is needed to construct the path here. A representative from the VTrans ROW Section, Theresa Gilman, conducted a site visit with the project consultant and Town and BCRC staff.



## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources. (See Appendix, Resource Map.)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- Storm Water Construction General Permit from the VT Agency of Natural Resources

- Storm Water Management Permit from the VT Agency of Natural Resources
- Section 1111 Permit from the VT Agency of Transportation
- Categorical Exclusion (CE) Determination
- FEH Zone Permit from the Town of Bennington

## MAINTENANCE CHALLENGES

VTrans requires a maintenance agreement for this section as a condition of the Section 1111 Permit.



**VT Route 279 Crossing:** The path will cross under the Route 279 overpass west of the Bennington Visitors' Center and the Route 279/ Route 67A interchange.

# SECTION 6

## HANNAFORD PLAZA

.....

### ZONING DISTRICT

Planned Commercial  
Urban to Rural Transect  
C-3 Suburban Zone

### PEDESTRIAN AND CYCLING GENERATORS

- Hannaford (supermarket)
- Home Depot
- Hampton Inn
- Restaurants and other businesses

### SECTION PATH LENGTH

2015 Linear Feet

### ALIGNMENT & EXISTING CONDITIONS—ALTERNATIVE #3A

In Alternative #3A, the path crosses a drainage swale at the southwest corner of Hannaford Square, where there will be an access path to the plaza. The main path follows the outer perimeter of Hannaford Square, through a wooded area between the access road and the Walloomsac River.

### FOOT BRIDGE ALTERNATIVE #3B

This alternative alignment stays on the outside of the drainage swale, crossing the swale further north. This alignment may be more appealing to users because it is more buffered from the rear of Hannaford Square’s loading docks and dumpsters, and has more attractive natural features. The disadvantage of this alignment is that it is located within the regulatory floodway and the installation of the footbridge will require a no rise certificate for its construction.



## RIGHT OF WAY

The path will cross four of the parcels that comprise the Hannaford Square shopping plaza. Town permit conditions reserve the Town's right to construct the path.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources. (See Appendix, Resource Map.)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- Act 250 Permit Amendment
- Storm Water Construction General Permit from the VT Agency of Natural Resources
- Storm Water Management Permit from the VT Agency of Natural Resources
- Possibly FEMA No Rise Certificate (for Footbridge Alternative 3B)
- FEH Zone Permit from the Town of Bennington



**Behind Hannaford Plaza:** The path will continue to the west of Hannaford and the Hampton Inn, before connection back with Route 67A.

# SECTION 7

ROUTE VT 67A

.....

## ZONING DISTRICT

Rural Residential

Urban to Rural Transect

C-3 Suburban Zone

## PEDESTRIAN AND CYCLING GENERATORS

- Bennington College
- Home Depot
- Hannaford Square

## SECTION PATH LENGTH

1030 Linear Feet

## TRAFFIC VOLUME

2012 AADT = 6,900 (estimated)

## SPEED LIMIT

40 mph

## EXISTING CONDITIONS

Route 67A narrows from four lanes to two lanes just west of where the path joins the road. The road curves to the west at mile marker 0.9. At the curve, the land-use changes from large, strip-style commercial development to mixed-rural residential.

There are no sidewalks on the along this stretch of 67A, and students from Bennington College now walk in the shoulder and across the lawn of a private residence (the Harwoods) on their way to shop at Hannaford and other stores on Northside Drive.





## ALIGNMENT

This is a short section of path that runs along VT Route 67A for approximately 0.1 miles. The path emerges from the wooded strip between the Hannaford Square access road and the river and runs along VT67A within the right of way separated from the road with a wide green strip.

Where VT67A curves to the west, there is a house (owned by the Harwoods) close to the road. This is a pinch-point for the path and it will narrow from 12-feet to 8 feet. Sensitive design is needed to physically separate the path from traffic so it is safe and comfortable for users while preserving access to the Harwood property. The path is an opportunity to address safety and runoff issues now affecting the property.

Two large box culverts, which straddle the property, will need to be extended to accommodate the path.

## RIGHT OF WAY

The public ROW is 4 rods (66 feet) east of Mile Marker 0.89, and 3 rods (49.5 feet) west of that point beginning around the Harwood property.

The path will be in state ROW, but temporary construction easements will be needed from the Harwood's to construct the path and to extend the culverts. The Harwood's are supportive of the path and have indicated they are disposed to sign the necessary temporary easements, which have been prepared and are being reviewed by VTrans. VTrans District 1 does not have special easements to service the culverts.



**Adjacent to 67A:** The path will travel along 67A with a 10-15' grass buffer from the highway.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources (see Appendix, Resource Map)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

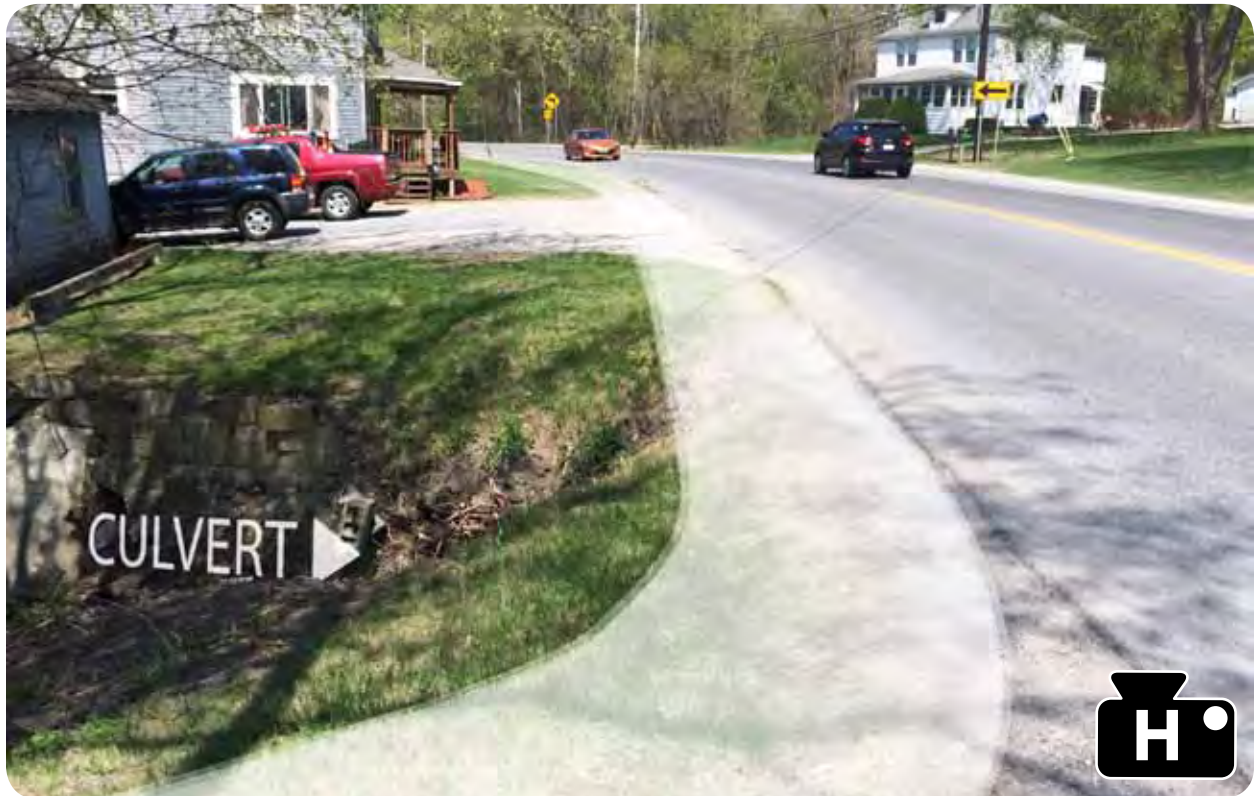
- Act 250 Permit Amendment
- Storm Water Management Permit from the VT Agency of Natural Resources
- Storm Water Construction General Permit from the VT Agency of Natural Resources

- Section 1111 Permit from VTrans to construct the path in the state ROW
- Temporary easement from the Harwood's to construct the path adjacent to their property

## MAINTENANCE CHALLENGES

This section of path will be an important pedestrian connector between Bennington College and Hannaford, and should be plowed in the winter.

See *Appendix K: Justification of Proposed Ninja Path Alignment—Route 67A* for more information.



**Around the curve:** The path will then move directly adjacent to the road in order to cross over an existing culvert and move past a private residence. The final design will be physically separated to insure the safety of pedestrians and cyclists in this area.

# SECTION 8

## INTERSECTION OF VT67A/SILK ROAD/ COLLEGE ROAD/MATTISON ROAD

### ZONING DISTRICT

Rural Residential  
Urban to Rural Transect  
C-3 Suburban Zone

### PEDESTRIAN AND CYCLING GENERATORS

- Bennington College

### SECTION PATH LENGTH

590 Linear Feet

### EXISTING CONDITIONS

#### SPEEDING

Speeding is a problem at the intersection. BCRC conducted a speed study that found 95.6% of vehicles exceeded the 30 mph advisory speed and 18.2% exceeded the 40 mph speed limit. Northbound vehicles had a slightly higher speeding rate than southbound vehicles. (See Appendix for complete speed study.)

#### CRASH HISTORY

The intersection is listed as a VTrans High Crash Location. There were 17 crashes from 2008-2012 that resulted in 9 injuries. Seven of the crashes involved vehicles exiting Silk Road to Matteson Road/Rice Lane being hit by vehicles coming from the west. [See Appendix, VTrans Highway Safety Improvement Program (HSIP) Location Review.]

### LOCATION HISTORY

A scoping report from 2000 recommended the installation of a roundabout, but the project was not constructed due to District 1 maintenance concerns.

In 2008 the speed limit was increased from 30 to 40 mph.

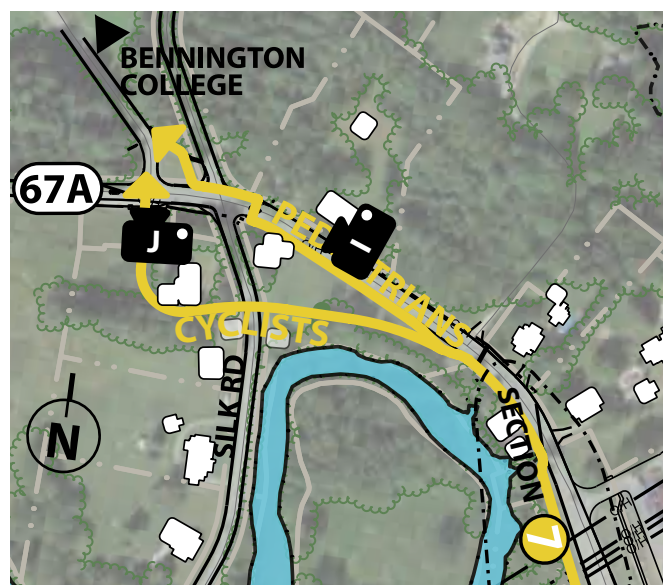
In 2006 College Drive was reconfigured to a “T” by eliminating the “Y” leg of its intersection with Matteson Road.

### BICYCLE AND PEDESTRIANS

Bennington College is the origin and destination for many walking and biking trips. The campus’s path system connects to Matteson Road just above the intersection with VT67A. Despite the presence of pedestrians and cyclists, the intersection is built only for motor vehicles. There are no crosswalks, sidewalks, pedestrian refuge islands, bike lanes, or other facilities to accommodate or provide safety for pedestrians and cyclists.

### PATH ALIGNMENT

College Drive is the entrance to Bennington College and the preferred cycling route to North Bennington. The goal is to safely connect the Ninja Path to College Drive.



Just northwest of the box culvert at the edge of the Harwood property, the path will split into two—one branch for pedestrians and the other for cyclists. Because pedestrians tend to take the shortest route, the pedestrian path will be a direct route along VT67A along the bottom of the embankment. Just before Silk Road the path will cross VT67A on a new crosswalk protected by a new 6-foot wide pedestrian refuge island. This pedestrian crossing location was chosen because it has better sight distance than other possible locations (see *Appendix J: Site Distance Diagram*). The walkway then crosses Mattison Road on a new crosswalk and links to the existing walkway into the Bennington College Campus.

The curb radius at Matteson Road is quite wide. We recommend shortening it to 15 feet to slow fast vehicle turns and to shorten the crossing distance.

The bicycle path, after splitting from the pedestrian path, runs along the back of a property owned by Bennington College and crosses Silk Road about 200-feet below the VT67A intersection, a location chosen for its good sight distance. The path then cuts through another property owned by Bennington College and aligns directly opposite the entrance to Bennington College Drive, crossing VT67A at a “T,” to make cyclists more visible and less vulnerable to turning vehicles.

A new median island on VT67A just west of College Drive will calm and channelize traffic as it approaches the intersection.

#### RECOMMENDATIONS FROM VTRANS HSIP LOCATION REVIEW (See *Appendix*.)

- Install a 30 mph advisory speed plaque below the intersection/turn sign for VT67A northbound traffic;
- Install a dynamic intersection sign with a Watch for Cross Traffic plaque with detection on Silk Rd;
- Consider a roundabout for this location.



**Pedestrian Crossing:** Pedestrians on the path will cross Route 67 East of the complex intersection with Mattison, Silk, and College Roads.

## RIGHT OF WAY

The path will cross two properties straddling Silk Road, both owned by Bennington College. The project team met with officials from the school, including Bennington College President Mariko Silver. The administration expressed enthusiastic support for the project, and granted verbal permission to use college property for the path.

## NATURAL & CULTURAL RESOURCES

This section of path will not disturb any known natural or cultural resources (see Appendix, Resource Map)

- Most of the alignment is on previously disturbed ground.
- There will be little or no removal of material during path construction.

## PERMITS NEEDED IN THIS SECTION

- Storm Water Management Permit from the VT Agency of Natural Resources

- Storm Water Construction General Permit from the VT Agency of Natural Resources
- Act 250 Permit Amendment
- Section 1111 Permit from VTrans
- Maintenance agreement with VTrans for the pedestrian refuge island

## MAINTENANCE CHALLENGES

- The pavement markings that mark the bike lane through the intersection, and the new crosswalks will need to be maintained. Common pavement marking materials are paint, thermoplastic, and epoxy. Paint is the least expensive and least durable option. Epoxy is a durable material that can last 3-5 years depending on traffic volume and snowplow use. Thermoplastic lasts 3-6 years but is more susceptible to snowplow damage.
- The pedestrian refuge island will need to be cleaned and cleared of snow. The college or Town will need to sign a maintenance agreement with the state to do this.



**Cyclist Crossing:** Cyclist using the path will cross 67A in line with College Road, at which point the path will continue into separated bike lanes.

# IV. PROJECT DETAILS

## COST ESTIMATE

This cost estimate assumes the use of federal funds, which requires a design engineer and a construction inspector.

### ALTERNATIVE A

#### GRAVEL PATH (WITH PAVED SPUR BETWEEN BENNINGTON COLLEGE AND HANAFORD)

Total Construction	\$661,581
Engineering/Construction Administration (25%)	\$165,395
Contingency (25%)	\$165,395
<b>TOTAL COST</b>	<b>\$992,371</b>

### ALTERNATIVE B

#### PAVED PATH

Total Construction	\$931,574
Engineering/Construction Administration (25%)	\$232,893
Contingency (25%)	\$232,893
<b>TOTAL COST</b>	<b>\$1,397,362</b>

SEE APPENDIX FOR DETAILED COST ESTIMATE.

---

## COMPATIBILITY WITH PLANNING EFFORTS

The need to create a safe and appealing facility for pedestrians and cyclists to travel between downtown Bennington, the Northside Drive commercial corridor and North Bennington Village is identified in:

- The *Bennington Town Plan*, adopted October 11, 2010
- The *Bennington County Regional Plan*, adopted March, 2015
- The Bennington County Regional Commission's *Active Transportation Project Guide*, updated February 2013

The *Bennington County Regional Plan*, **Section 10.6: Bicycling and Walking:**

Priority pedestrian and bicycle improvements in the region include:

2. Ninja Trail: On and off road connection between Bennington's downtown, the Northside Drive area, Bennington College, and North Bennington.

Also, the *Bennington Town Plan* states in **Section 6.3 Pedestrian and Bicycle Transportation:**

Bicycling is an extremely efficient transportation option that also is a popular recreational activity for residents and tourists to the area. Any type of human-powered transportation has the added benefits of promoting good health and reducing vehicle congestion and emissions. Bennington provides a beautiful natural and historic environment for walking and bicycling and the town should actively work to ensure that adequate facilities are available to encourage these activities.

Such multi-use pathways improve mobility options for residents and can serve as tourism resources as well. They also contribute to the quality of life appeal for a community and as such can be one important factor that attracts new businesses to the area.

The town has explored options for several other multi-use paths. Two possible routes would extend from the Bennington Pathway: one following the Walloomsac River all the way to the Henry Covered Bridge and the other following the rail spur into North Bennington Village. Another potential route would connect the pathway along the river to North Bennington by passing through the Bennington College campus.

## **PATH MAINTENANCE**

- The gravel path will need to be periodically re-graded.
- The gravel path will not be cleared of snow in winter.
- The paved pedestrian spur connecting Hannaford and Bennington College, and the pedestrian refuge island on VT67A will be used in winter and should be maintained year-round.
- There should be a barrier or gate system to keep out ATVs.

## **UTILITY IMPACTS**

The path will not impact any existing utilities.

## **PATH OWNERSHIP**

The Town of Bennington will own and maintain the path.

## **PUBLIC INVOLVEMENT**

There is strong public support for the Ninja Path. The project started as a volunteer-community effort by a diverse group of local residents and leaders. The “Ninjas” sought to create a path connecting Bennington and North Bennington. They organized workdays to clear sections of path and to pick up litter and debris.

- A public meeting was held to discuss the application to the grant for this scoping study on July 8th, 2013. Public comments were positive and the Selectboard voted unanimously in favor of applying for the scoping study.
- Bennington College’s administration has pledged to support the project.
- The Bennington Area Chamber of Commerce has played an active role in promoting The Ninja Path.
- A group of volunteers meets periodically to clear brush and pick up litter along sections of the path alignment.



*Volunteers clearing a short section of the Ninja Path.*



---

## **PROJECT TIMELINE**

*(FOR FEDERALLY FUNDED PROJECT)*

The typical time to design and construct funded bicycle and pedestrian project using federal/state funds and administered through the VTrans Municipal Assistance Bureau (MAB) is 3-5 years. The Bureau's timeline template shows a typical project completion time of 41 months.

.....

### **NINJA PATH PROJECT SCHEDULE**

*(as a federal/state funded project)*

Scoping Study approved by Town: **June, 2015**

Submit funding application to VTrans: **July, 2015**

Receive grant approval: **August, 2015**

Grant Agreement executed: **October, 2015**

Procure design services: **December, 2015**

Project design/review/permitting/  
VTrans approvals/ROW acquisition: **February, 2016 – April, 2019**

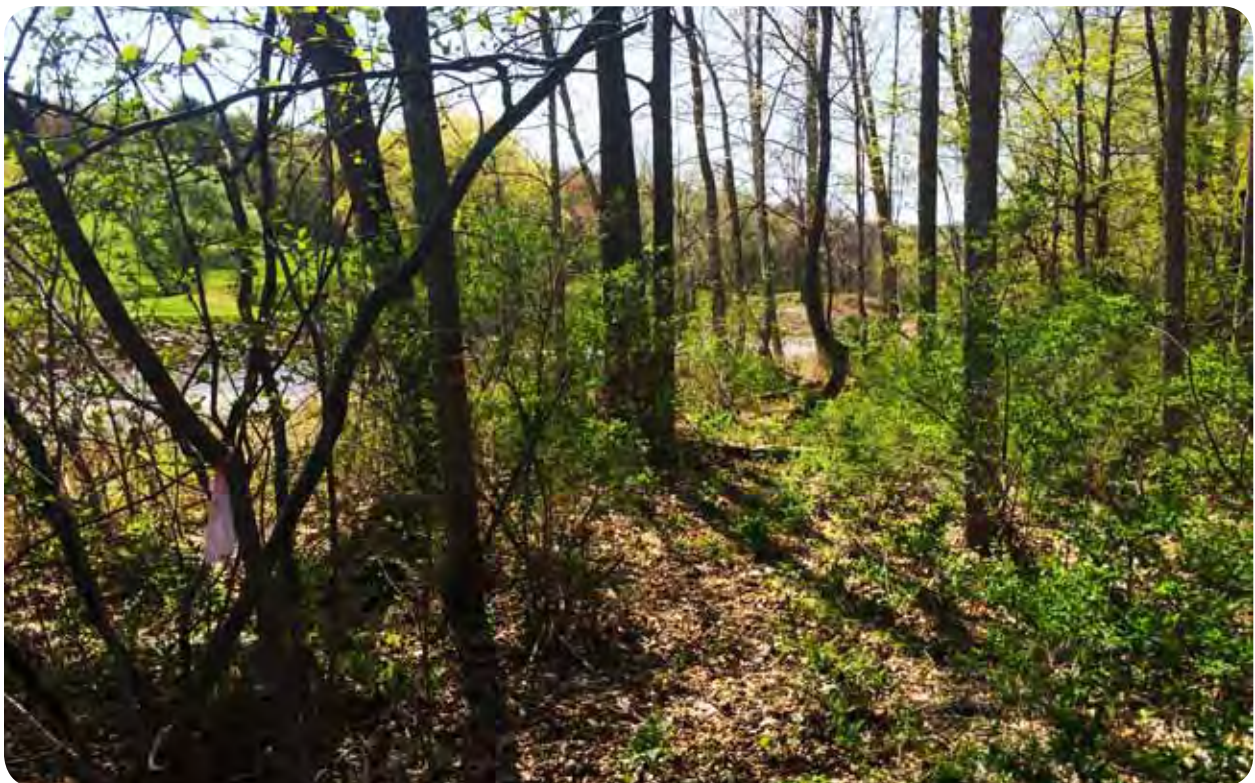
Proposal for contractor/advertisement/award: **April, 2019**

Begin construction: **May, 2019**

## VIABILITY

The Ninja Path is viable, feasible, and would create significant public value for a relatively modest cost.

- It creates a safe and inviting pedestrian and bicycle route along the region's busiest travel corridor that is now unsafe for bikes and pedestrians.
- It connects important origins and destinations: downtown Bennington, businesses along Northside Drive/VT67A/residential neighborhoods/Bennington College.
- The need for the path is identified in Town and Regional Planning Documents.
- The path enjoys broad support. Volunteer groups, local businesses, The Bennington Area Chamber of Commerce, The Vermont Department of Public Health, and Bennington College all strongly support the path project.
- There do not appear to be any significant ROW obstacles. All but one property owner has either granted informal permission to put the path on their land or, due to permit conditions, must allow the path. The alignment could be adjusted to avoid the two properties whose owner expressed ambivalence about the project.
- There do not appear to be any insurmountable permitting obstacles for constructing the pedestrian/bike bridge across Furnace Brook, and the hydraulic analysis found no adverse impacts. Path planners have already obtained a Floodway "No-Rise/No-Impact" Certification for the proposed bridge.
- VTrans has reviewed the proposed alignment for the path in state ROW buffering VT279 and the proposed intersection improvements at the VT67A/Silk Road/College Road/Mattison Road intersection and did not have any substantial objections.



# V. APPENDIX

## **APPENDIX**

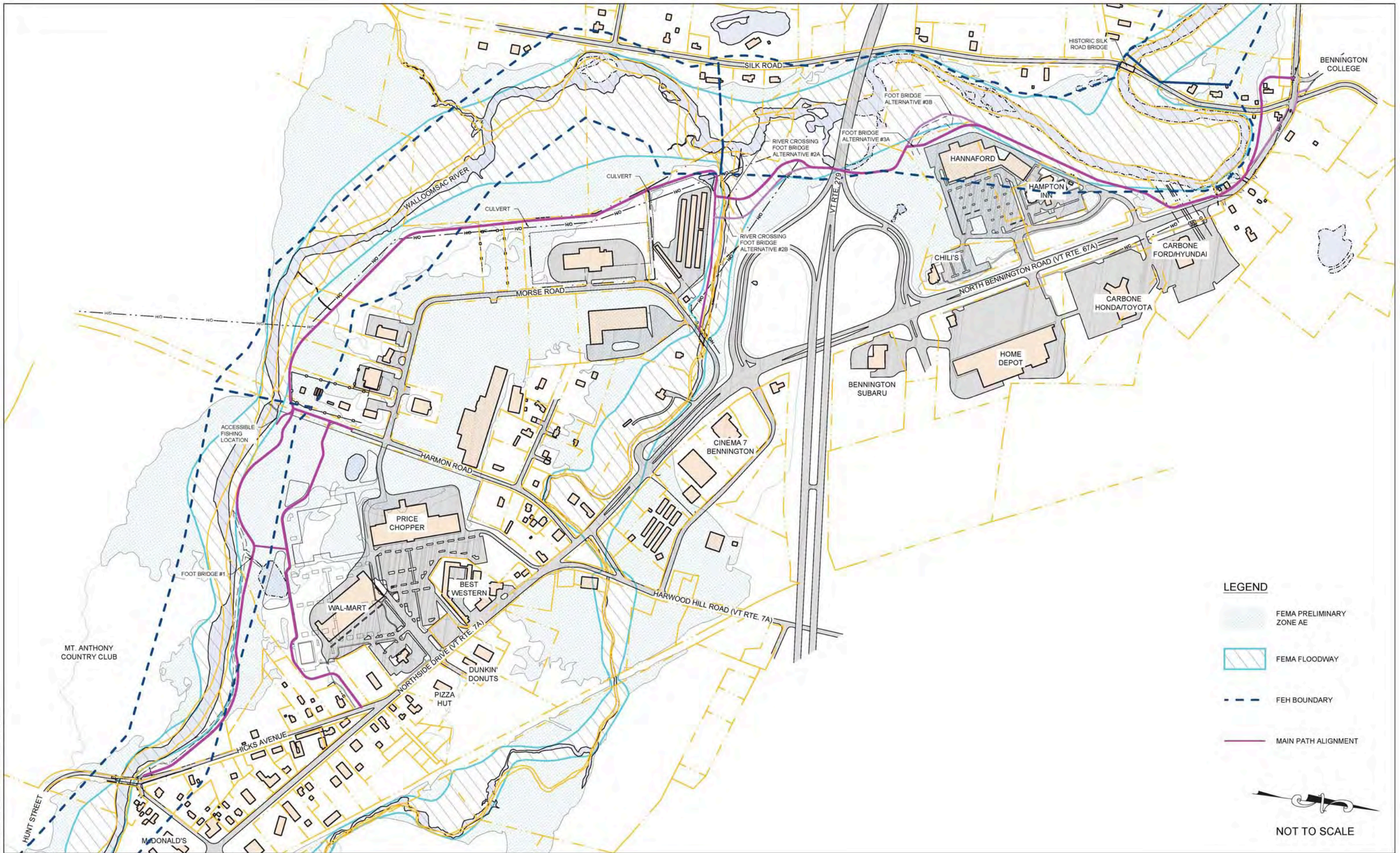
The following Attachment are included in the Appendix:

- A. Conceptual Design Plans
- B. Cost Estimate
- C. Right of Way Status Map
- D. Natural Resources Map
- E. Technical Memorandum Re: Furnace Brook hydraulic analysis for proposed pedestrian bridge
- F. Floodway “No-Rise/No Impact” Certification
- G. Agency of Natural Resources—Comments on conceptual layout of Ninja Path
- H. VTrans Highway Safety Improvement Program—Location Review of VT67A/Silk Rd./Matteson Rd./College Dr. Intersection
- I. Speed Study of VT67A at College Drive
- J. Sight Distance Diagram
- K. Memorandum: Justification of Proposed Ninja Path Alignment —Route 67A

# **APPENDIX A**

## **CONCEPTUAL PLANS**





- LEGEND**
-  FEMA PRELIMINARY ZONE AE
  -  FEMA FLOODWAY
  -  FEH BOUNDARY
  -  MAIN PATH ALIGNMENT



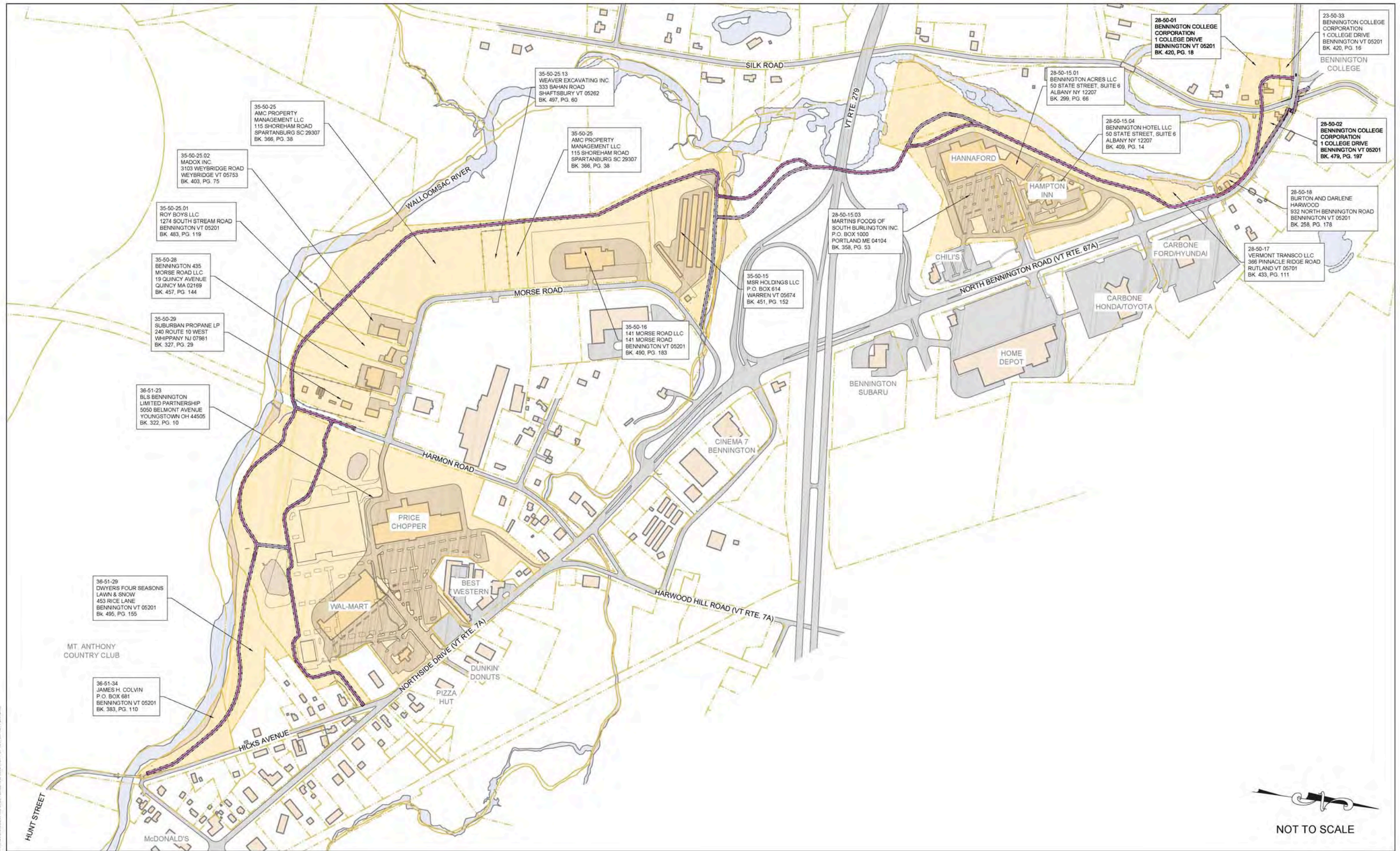
NOT TO SCALE

**MSK**  
**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 10, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

DEVELOPMENT IMPACT PLAN  
 (FLOOD PLAINS, FLOODWAYS, AND FEH ZONES)



NOT TO SCALE



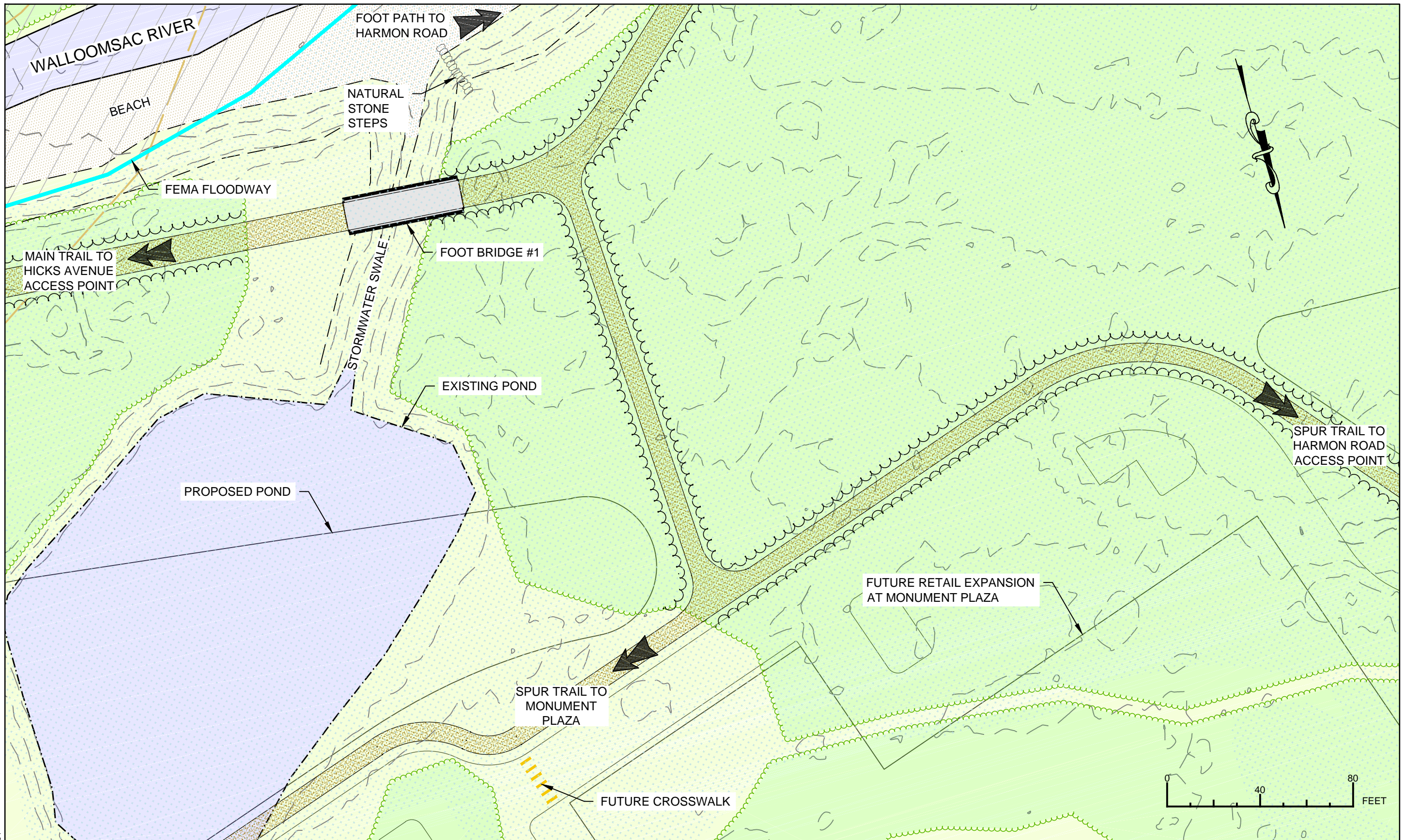
**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

RIGHT-OF-WAY IMPACT PLAN

E:\MSK PROJECT DATABASE WORKING FOLDER\NINJA TRAIL PLANS\SCOPING STUDY\SC-400 LARGE SCALE PLANS.DWG  
01 December 2014 15:01:01



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

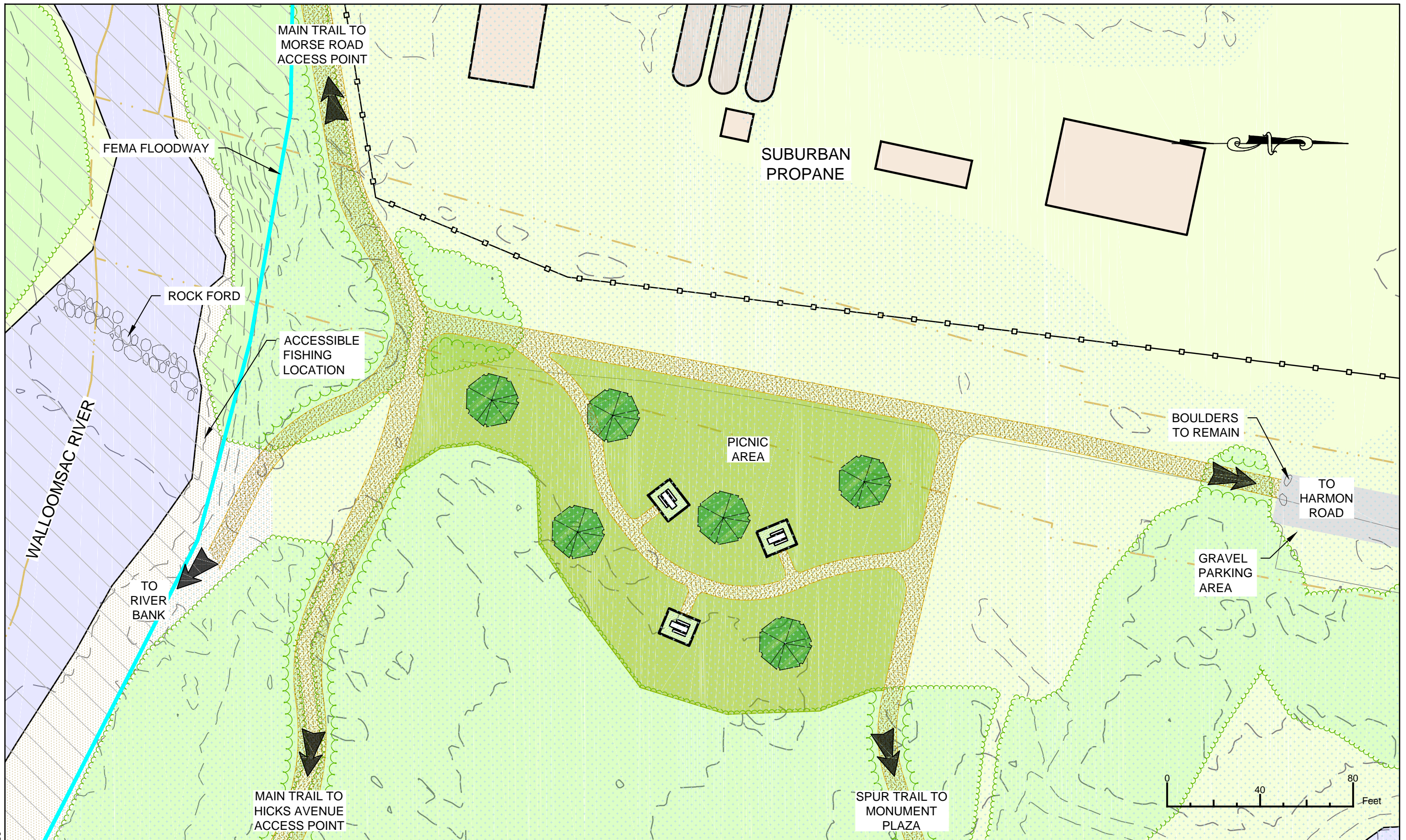
# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

DETAIL PLAN AT PROPOSED BRIDGE CROSSING #1



E:\MSK PROJECT DATABASE WORKING FOLDER\NINJA TRAIL\PLANS\SCOPING STUDY\SC-400 LARGE SCALE PLANS.DWG  
01 December 2014 15:05:58



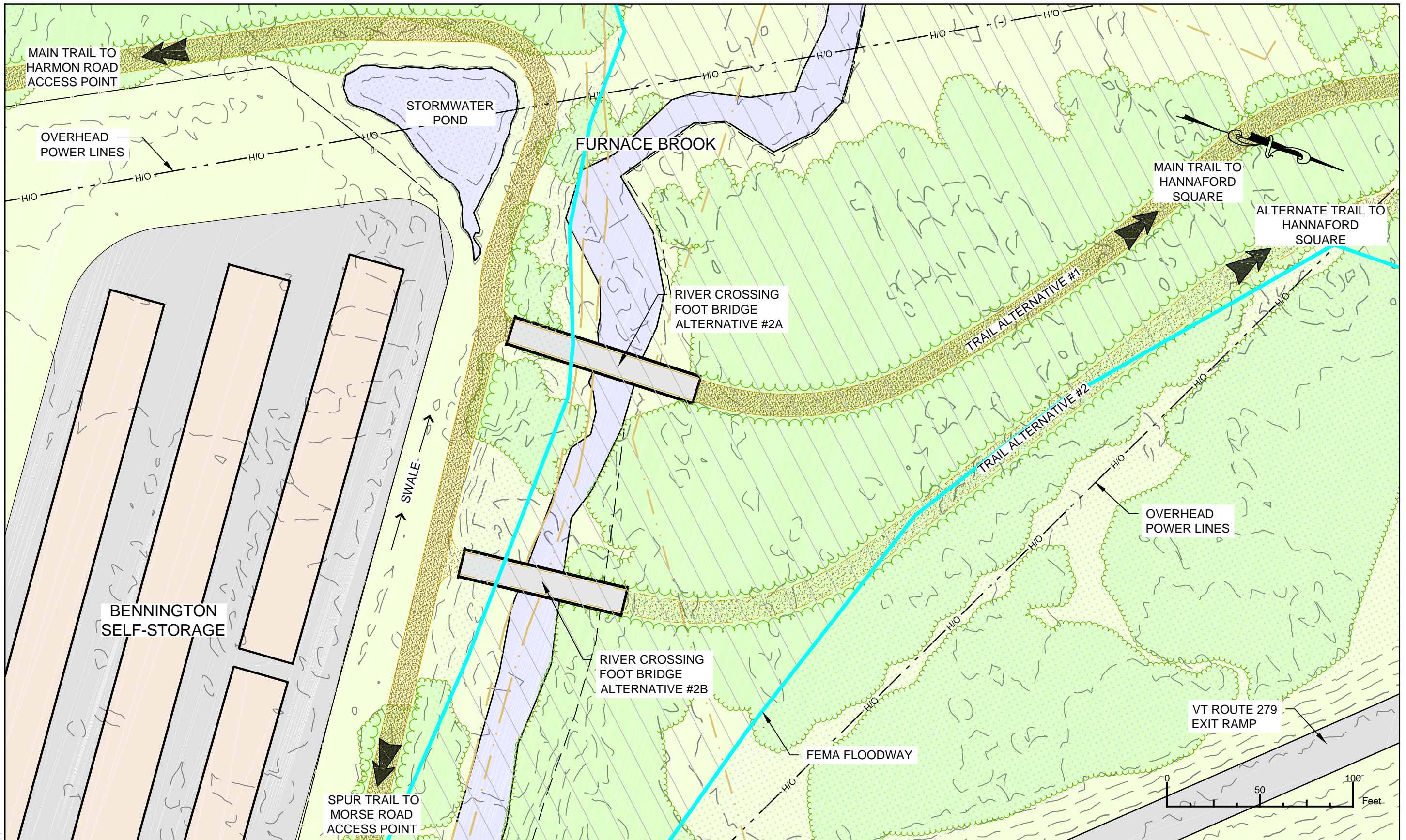
**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

DETAIL PLAN AT SUBURBAN PROPANE

E:\MSK PROJECT DATABASE WORKING FOLDER\NINJA TRAIL PLANS\SCOPING STUDY\SC-400 LARGE SCALE PLANS.DWG  
01 December 2014 15:07:41



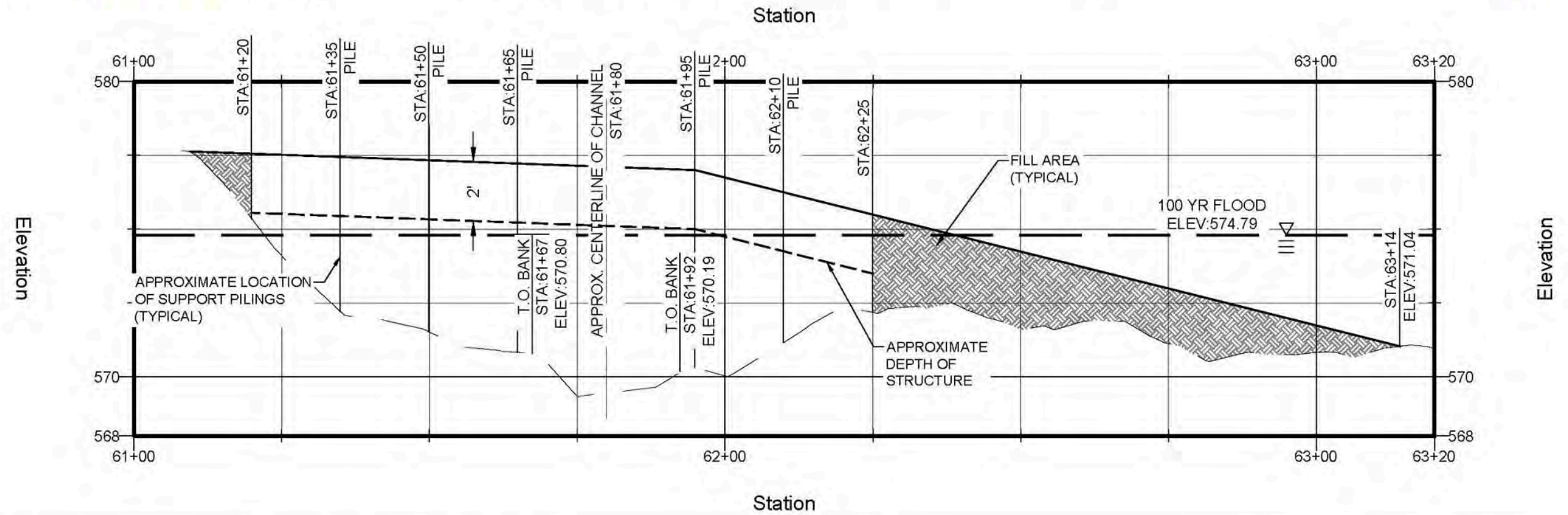
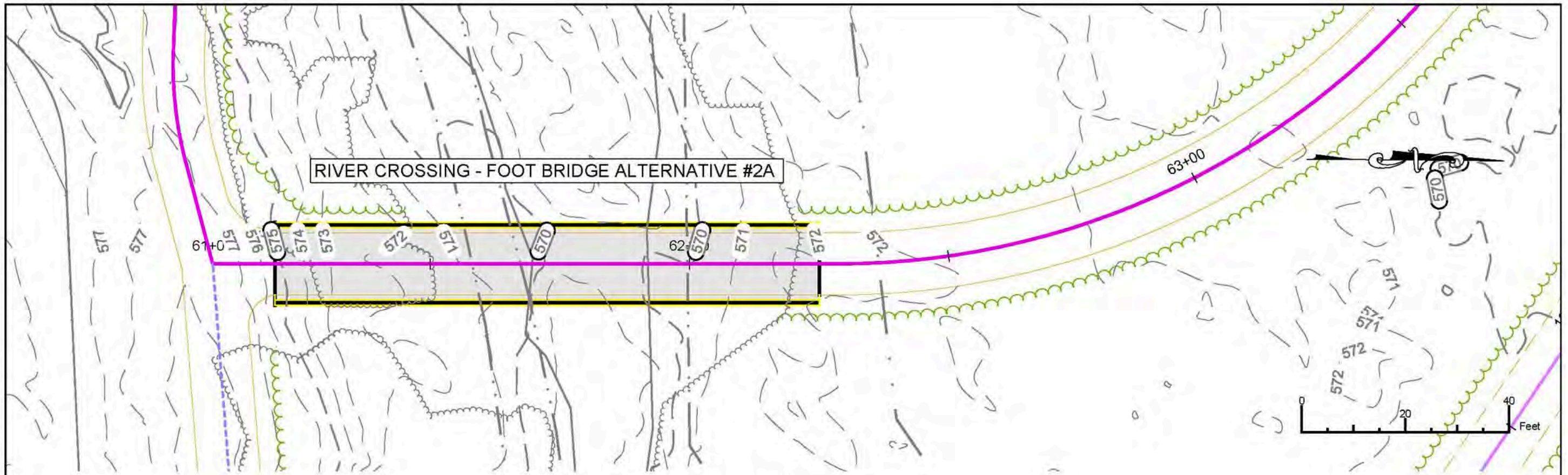
**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

DETAIL PLAN AT BENNINGTON SELF-STORAGE

E:\MSK PROJECT DATABASE WORKING FOLDER\NINJA TRAIL\PLANS\SCOPING STUDY\SHETS\VC-4-10 LARGE SCALE BRIDGE PLANS AND PROFILES.DWG  
01 December 2014 14:52:50



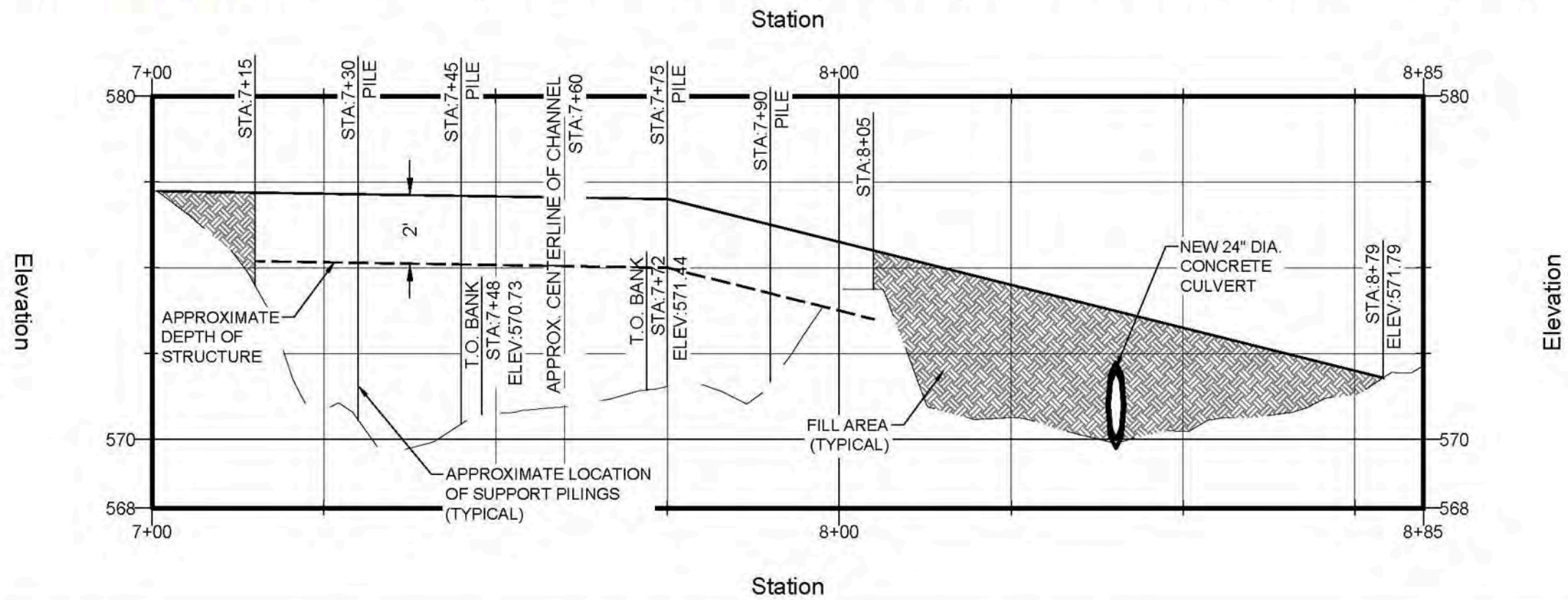
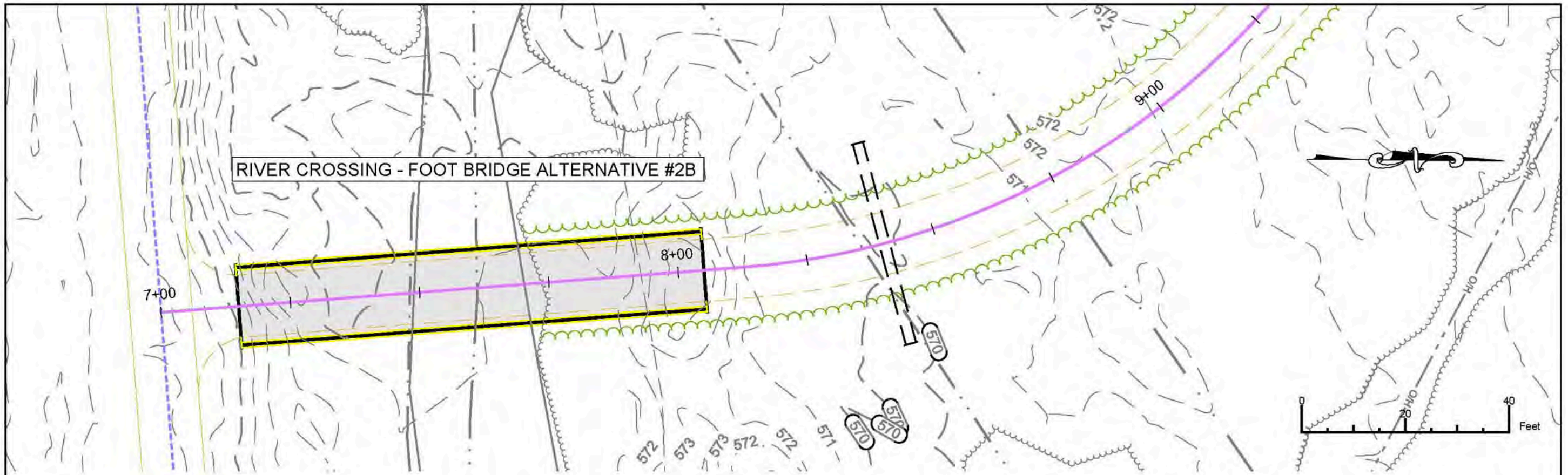
**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

# NINJA TRAIL SCOPING STUDY

## BENNINGTON, VERMONT 05201

*FURNACE BROOK CROSSING  
PLAN VIEW AND PROFILE  
STA: 61+00 TO STA: 63+20*

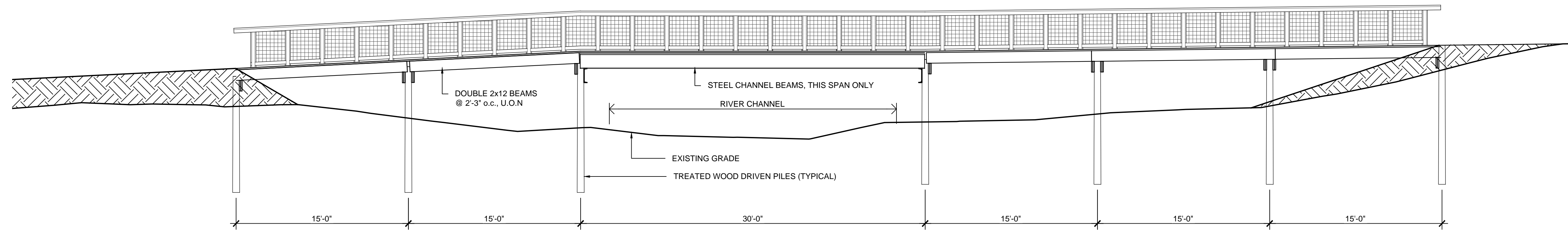
E:\MSK PROJECT DATABASE WORKING FOLDER\NINJA TRAIL\PLANS\SCOPING STUDY\SHETS\VC-4-10 LARGE SCALE BRIDGE PLANS AND PROFILES.DWG  
01 December 2014 14:55:20



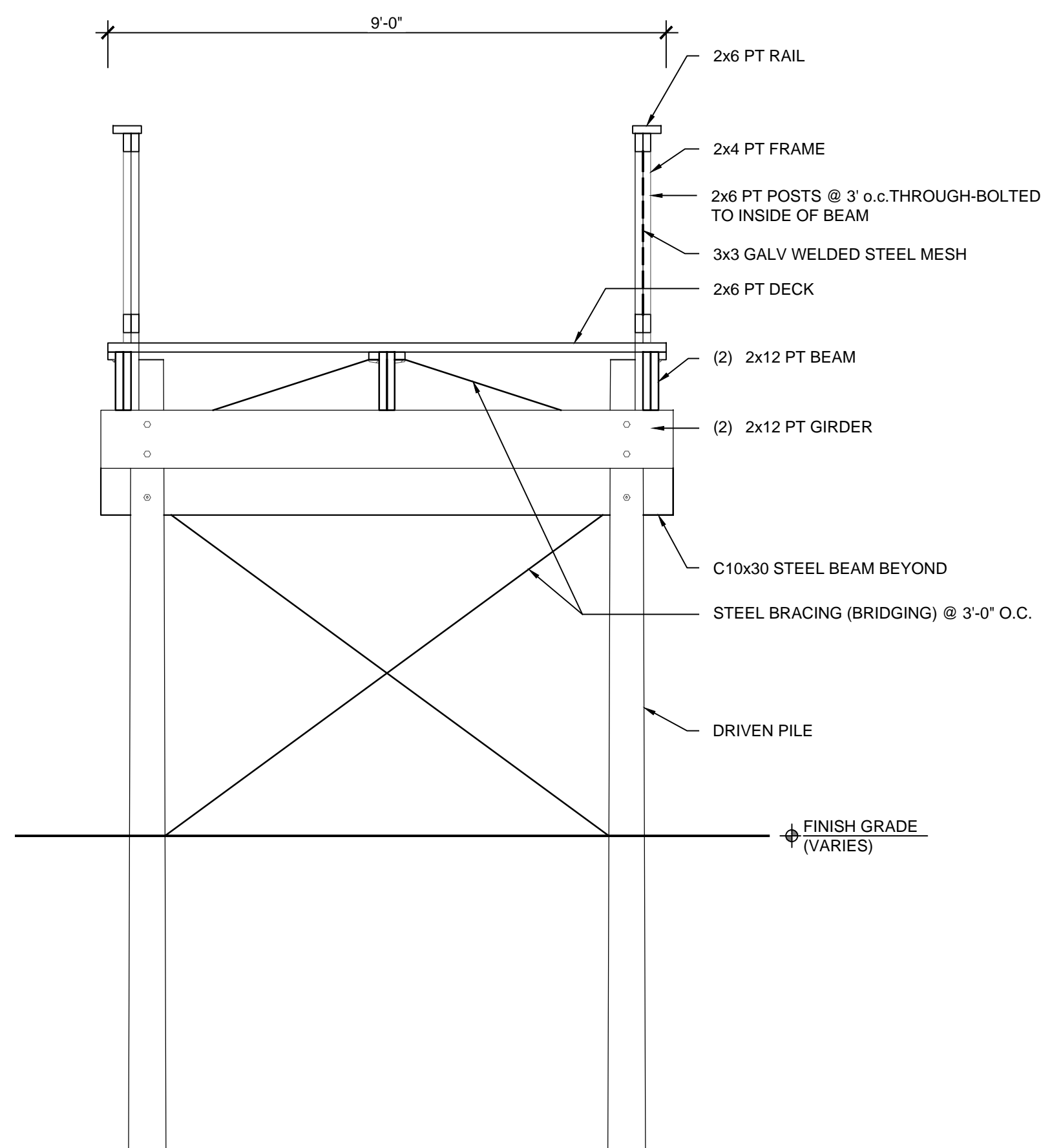
**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

**NINJA TRAIL SCOPING STUDY**  
BENNINGTON, VERMONT 05201

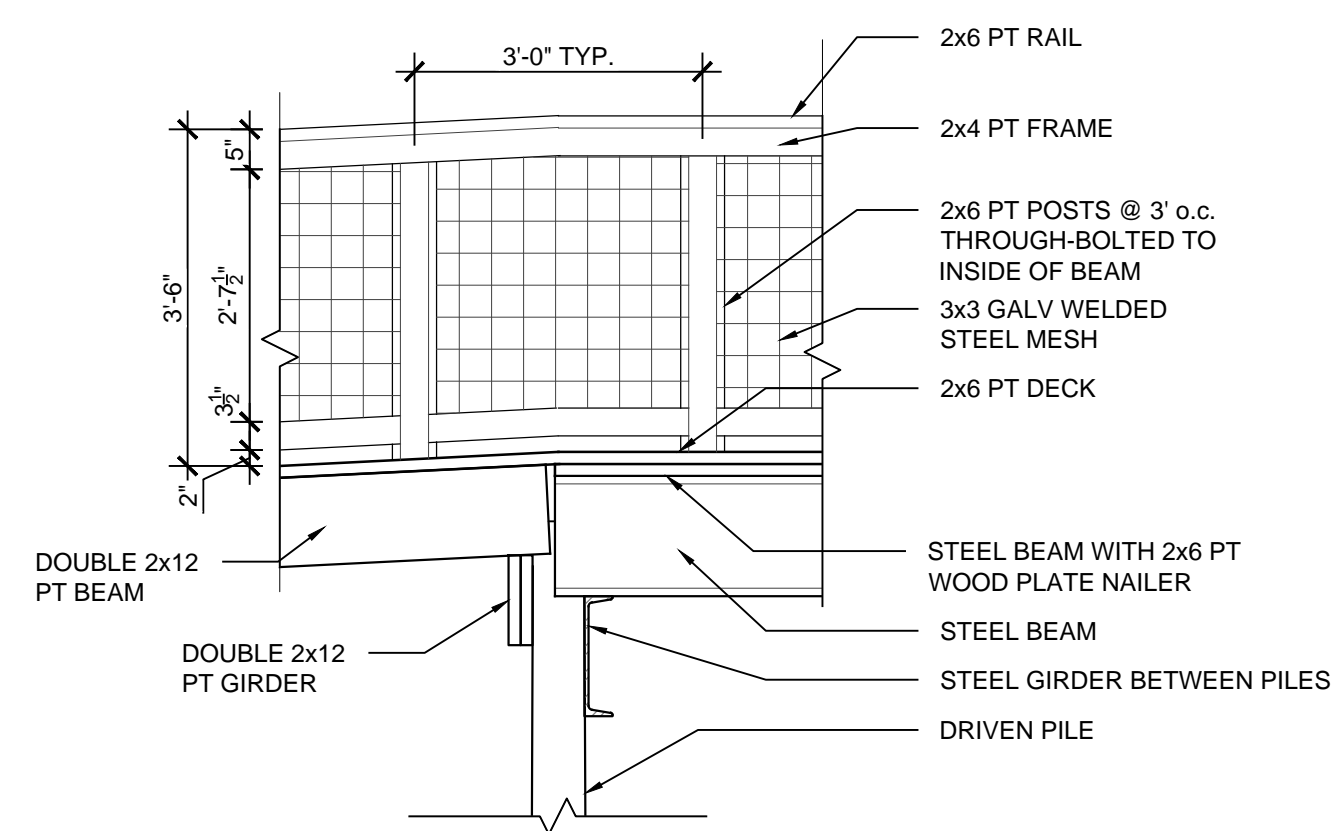
FURNACE BROOK CROSSING - ALTERNATE  
PLAN VIEW AND PROFILE  
STA: 7+00 TO STA: 8+85



1 BRIDGE ELEVATION  
3/16" = 1'-0"



2 SECTION DETAIL  
1/2" = 1'-0"



3 ELEVATION DETAIL  
1/2" = 1'-0"

E:\MSK PROJECT DATABASE\WORKING FOLDER\NINJA TRAIL\PLANS\SCOPING STUDY\SHEET\SC-000 SCHEMATIC BRIDGE DESIGN.DWG  
01 December 2014 10:32:23



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 10, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

**NINJA TRAIL SCOPING STUDY**  
BENNINGTON, VERMONT 05201

SCHEMATIC BRIDGE DESIGN



**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 10, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1201

REVISIONS	
NO.	DESCRIPTION

NINJA TRAIL  
 SCOPING STUDY  
 BENNINGTON, VT 05201

DRAWINGS THIS SHEET  
 PROPOSED HIGHWAY  
 MODIFICATION PLAN  
 VT ROUTE 67A

NUMBER	DATE
	07-31-2014
DRAWN	CHECKED
TJS	JMD

SHEET NUMBER  
**C-106**

**1** PROPOSED INTERSECTION - VT ROUTE 67A AT COLLEGE DRIVE  
 Scale: 1:10

© MSK PROJECT DATABASE WITH HIS POLYMERIZATION REACTION AND SCOPING STUDY ON THE COLLEGE TRAIL, INC.  
 7 December 2014 11:55 AM

# **APPENDIX B**

## **COST ESTIMATE**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	4.2	ACRE	\$ 25,000.00	\$ 104,419.19
203.15	COMMON EXCAVATION	5401.1	CY	\$ 15.00	\$81,016.67
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	46.6	CY	\$ 50.00	\$2,331.48
203.30	EARTH BORROW	80.0	CY	\$ 15.00	\$1,200.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	5466.6	CY	\$ 40.00	\$218,662.22
406.25	BITUMINOUS CONCRETE PAVEMENT	184.0	TON	\$ 120.00	\$22,075.20
601.263	36" CPEP	40.0	LF	\$ 40.00	\$1,600.00
616.280	CAST-IN-PLACE CONCRETE CURB	481.0	LF	\$ 32.00	\$15,392.00
616.510	REMOVAL OF EXISTING CURB	140.0	LF	\$ 10.00	\$1,400.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 64,000.00	\$64,000.00
641.10	TRAFFIC CONTROL	1	LS	\$ 14,000.00	\$14,000.00
646.40	DURABLE WHITE LINE	350	LF	\$ 2.00	\$700.00
646.50	DURABLE CROSSWALK MARKINGS	33	LF	\$ 15.00	\$495.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	17613	SY	\$ 2.50	\$44,033.33
651.15	SEED (80 LBS/ACRE)	171.8	LB	\$ 11.15	\$1,915.47
651.18	FERTILIZER (28 LBS/1000 SF)	2619.1	LB	\$ 2.52	\$6,600.18
651.25	HAY MULCH (2 TON/ACRE)	4.3	TON	\$ 882.00	\$3,787.98
651.35	TOPSOIL	866.1	CY	\$ 50.00	\$43,305.56
900.62	FURNACE BROOK BRIDGE	1.0	EA	\$ 68,566.00	\$68,566.00
900.62	PARK IMPROVEMENTS	1.0	EA	\$ 25,000.00	\$25,000.00
900.64	FOOTBRIDGES	91.0	LF	\$ 500.00	\$45,500.00

Total Construction					\$661,581.09
Engineering/Construction Administration				25%	\$165,395.27
Contingency				25%	\$165,395.27

April 2015 **Total Cost \$992,371.64**



CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 1 - Hicks Ave to Harmon Road**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.8	ACRE	\$ 25,000.00	\$ 20,202.02
203.15	COMMON EXCAVATION	1200.0	CY	\$ 15.00	\$18,000.00
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	1200.0	CY	\$ 40.00	\$48,000.00
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 10,000.00	\$10,000.00
641.10	TRAFFIC CONTROL	1	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	3900	SY	\$ 2.50	\$9,750.00
651.15	SEED (80 LBS/ACRE)	29.8	LB	\$ 11.15	\$331.74
651.18	FERTILIZER (28 LBS/1000 SF)	453.6	LB	\$ 2.52	\$1,143.07
651.25	HAY MULCH (2 TON/ACRE)	0.7	TON	\$ 882.00	\$656.03
651.35	TOPSOIL	150.0	CY	\$ 50.00	\$7,500.00
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	51.0	LF	\$ 500.00	\$25,500.00

Total Construction					\$120,880.84
Engineering/Construction Administration				25%	\$30,220.21
Contingency				25%	\$30,220.21

April 2015 **Total Cost \$181,321.26**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 2 - Harmon Road Park**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.0	ACRE	\$ 25,000.00	\$ -
203.15	COMMON EXCAVATION	171.9	CY	\$ 15.00	\$2,577.78
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	237.3	CY	\$ 40.00	\$9,491.85
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 3,500.00	\$3,500.00
641.10	TRAFFIC CONTROL	0	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	580	SY	\$ 2.50	\$1,450.00
651.15	SEED (80 LBS/ACRE)	38.3	LB	\$ 11.15	\$427.57
651.18	FERTILIZER (28 LBS/1000 SF)	584.6	LB	\$ 2.52	\$1,473.29
651.25	HAY MULCH (2 TON/ACRE)	1.0	TON	\$ 882.00	\$845.55
651.35	TOPSOIL	193.3	CY	\$ 50.00	\$9,666.67
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	1.0	EA	\$ 25,000.00	\$25,000.00
900.64	FOOTBRIDGES	0.0	LF	\$ 500.00	\$0.00

Total Construction					\$54,432.71
Engineering/Construction Administration				25%	\$13,608.18
Contingency				25%	\$13,608.18

April 2015 **Total Cost \$81,649.07**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 3 - Morse Industrial Park**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	1.7	ACRE	\$ 25,000.00	\$ 43,181.82
203.15	COMMON EXCAVATION	1884.4	CY	\$ 15.00	\$28,266.67
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	1884.4	CY	\$ 40.00	\$75,377.78
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	40.0	LF	\$ 40.00	\$1,600.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 14,500.00	\$14,500.00
641.10	TRAFFIC CONTROL	0	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	6124	SY	\$ 2.50	\$15,311.11
651.15	SEED (80 LBS/ACRE)	46.7	LB	\$ 11.15	\$520.95
651.18	FERTILIZER (28 LBS/1000 SF)	712.3	LB	\$ 2.52	\$1,795.05
651.25	HAY MULCH (2 TON/ACRE)	1.2	TON	\$ 882.00	\$1,030.21
651.35	TOPSOIL	235.6	CY	\$ 50.00	\$11,777.78
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	0.0	LF	\$ 500.00	\$0.00

Total Construction					\$150,179.54
Engineering/Construction Administration				25%	\$37,544.89
Contingency				25%	\$37,544.89

April 2015 **Total Cost \$225,269.31**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 4 & 5 - Route 279 Section**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.6	ACRE	\$ 25,000.00	\$ 15,782.83
203.15	COMMON EXCAVATION	555.6	CY	\$ 15.00	\$8,333.33
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	555.6	CY	\$ 40.00	\$22,222.22
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 8,400.00	\$8,400.00
641.10	TRAFFIC CONTROL	0	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	1806	SY	\$ 2.50	\$4,513.89
651.15	SEED (80 LBS/ACRE)	13.8	LB	\$ 11.15	\$153.58
651.18	FERTILIZER (28 LBS/1000 SF)	210.0	LB	\$ 2.52	\$529.20
651.25	HAY MULCH (2 TON/ACRE)	0.3	TON	\$ 882.00	\$303.72
651.35	TOPSOIL	69.4	CY	\$ 50.00	\$3,472.22
900.62	FURNACE BROOK BRIDGE	1.0	EA	\$ 68,566.00	\$68,566.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	0.0	LF	\$ 500.00	\$0.00

Total Construction					\$116,494.17
Engineering/Construction Administration				25%	\$29,123.54
Contingency				25%	\$29,123.54

April 2015 **Total Cost \$174,741.25**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 6 Hannaford Plaza**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.9	ACRE	\$ 25,000.00	\$ 21,464.65
203.15	COMMON EXCAVATION	895.6	CY	\$ 15.00	\$13,433.33
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	895.6	CY	\$ 40.00	\$35,822.22
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 8,040.00	\$8,040.00
641.10	TRAFFIC CONTROL	0	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	2911	SY	\$ 2.50	\$7,276.39
651.15	SEED (80 LBS/ACRE)	22.2	LB	\$ 11.15	\$247.57
651.18	FERTILIZER (28 LBS/1000 SF)	338.5	LB	\$ 2.52	\$853.07
651.25	HAY MULCH (2 TON/ACRE)	0.6	TON	\$ 882.00	\$489.60
651.35	TOPSOIL	111.9	CY	\$ 50.00	\$5,597.22
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	40.0	LF	\$ 500.00	\$20,000.00

Total Construction					\$91,759.41
Engineering/Construction Administration				25%	\$22,939.85
Contingency				25%	\$22,939.85

April 2015

**Total Cost \$137,639.11**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 6 Hannaford Plaza**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.9	ACRE	\$ 25,000.00	\$ 21,464.65
203.15	COMMON EXCAVATION	895.6	CY	\$ 15.00	\$13,433.33
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	0.0	CY	\$ 50.00	\$0.00
203.30	EARTH BORROW	0.0	CY	\$ 15.00	\$0.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	895.6	CY	\$ 40.00	\$35,822.22
406.25	BITUMINOUS CONCRETE PAVEMENT	0.0	TON	\$ 120.00	\$0.00
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	0.0	LF	\$ 32.00	\$0.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 8,040.00	\$8,040.00
641.10	TRAFFIC CONTROL	0	LS	\$ -	\$0.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	2911	SY	\$ 2.50	\$7,276.39
651.15	SEED (80 LBS/ACRE)	22.2	LB	\$ 11.15	\$247.57
651.18	FERTILIZER (28 LBS/1000 SF)	338.5	LB	\$ 2.52	\$853.07
651.25	HAY MULCH (2 TON/ACRE)	0.6	TON	\$ 882.00	\$489.60
651.35	TOPSOIL	111.9	CY	\$ 50.00	\$5,597.22
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	40.0	LF	\$ 500.00	\$20,000.00

Total Construction					\$91,759.41
Engineering/Construction Administration				25%	\$22,939.85
Contingency				25%	\$22,939.85

April 2015

**Total Cost \$137,639.11**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 7 - Route 67A to College College Drive**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.2	ACRE	\$ 25,000.00	\$ 3,787.88
203.15	COMMON EXCAVATION	457.8	CY	\$ 15.00	\$6,866.67
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	13.6	CY	\$ 50.00	\$681.48
203.30	EARTH BORROW	40.0	CY	\$ 15.00	\$600.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	457.8	CY	\$ 40.00	\$18,311.11
406.25	BITUMINOUS CONCRETE PAVEMENT	58.9	TON	\$ 120.00	\$7,072.80
601.263	36" CPEP	40.0	LF	\$ 40.00	\$1,600.00
616.280	CAST-IN-PLACE CONCRETE CURB	184.0	LF	\$ 32.00	\$5,888.00
616.510	REMOVAL OF EXISTING CURB	0.0	LF	\$ 10.00	\$0.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 5,500.00	\$5,500.00
641.10	TRAFFIC CONTROL	1	LS	\$ 4,000.00	\$4,000.00
646.40	DURABLE WHITE LINE	0	LF	\$ 2.00	\$0.00
646.50	DURABLE CROSSWALK MARKINGS	0	LF	\$ 15.00	\$0.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	1488	SY	\$ 2.50	\$3,719.44
651.15	SEED (80 LBS/ACRE)	11.3	LB	\$ 11.15	\$126.55
651.18	FERTILIZER (28 LBS/1000 SF)	173.0	LB	\$ 2.52	\$436.06
651.25	HAY MULCH (2 TON/ACRE)	0.3	TON	\$ 882.00	\$250.26
651.35	TOPSOIL	57.2	CY	\$ 50.00	\$2,861.11
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	0.0	LF	\$ 500.00	\$0.00

Total Construction					\$57,913.49
Engineering/Construction Administration				25%	\$14,478.37
Contingency				25%	\$14,478.37

April 2015 **Total Cost \$86,870.24**

CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH - Section 8 - Route 67A Ped Section Only**

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	0.0	ACRE	\$ 25,000.00	\$ -
203.15	COMMON EXCAVATION	109.3	CY	\$ 15.00	\$1,638.89
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	33.0	CY	\$ 50.00	\$1,650.00
203.30	EARTH BORROW	40.0	CY	\$ 15.00	\$600.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	109.3	CY	\$ 40.00	\$4,370.37
406.25	BITUMINOUS CONCRETE PAVEMENT	62.0	TON	\$ 120.00	\$7,442.40
601.263	36" CPEP	0.0	LF	\$ 40.00	\$0.00
616.280	CAST-IN-PLACE CONCRETE CURB	297.0	LF	\$ 32.00	\$9,504.00
616.510	REMOVAL OF EXISTING CURB	140.0	LF	\$ 10.00	\$1,400.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 5,500.00	\$5,500.00
641.10	TRAFFIC CONTROL	1	LS	\$ 10,000.00	\$10,000.00
646.40	DURABLE WHITE LINE	350	LF	\$ 2.00	\$700.00
646.50	DURABLE CROSSWALK MARKINGS	33	LF	\$ 15.00	\$495.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	393	SY	\$ 2.50	\$983.33
651.15	SEED (80 LBS/ACRE)	6.5	LB	\$ 11.15	\$72.49
651.18	FERTILIZER (28 LBS/1000 SF)	99.1	LB	\$ 2.52	\$249.78
651.25	HAY MULCH (2 TON/ACRE)	0.2	TON	\$ 882.00	\$143.36
651.35	TOPSOIL	32.8	CY	\$ 50.00	\$1,638.89
900.62	FURNACE BROOK BRIDGE	0.0	EA	\$ 68,566.00	\$0.00
900.62	PARK IMPROVEMENTS	0.0	EA	\$ 25,000.00	\$0.00
900.64	FOOTBRIDGES	0.0	LF	\$ 500.00	\$0.00

Total Construction					\$46,388.51
Engineering/Construction Administration				25%	\$11,597.13
Contingency				25%	\$11,597.13

April 2015 **Total Cost \$69,582.76**



CONCEPTUAL OPINION OF PROBABLE COST FOR:

**NINJA PATH**

Alternative B: Paved Path

TOWN OF BENNINGTON, VERMONT 05201

ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
201.11	CLEAR AND GRUBBING	4.2	ACRE	\$ 25,000.00	\$ 104,419.19
203.15	COMMON EXCAVATION	5274.4	CY	\$ 15.00	\$79,116.67
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	46.6	CY	\$ 50.00	\$2,331.48
203.30	EARTH BORROW	80.0	CY	\$ 15.00	\$1,200.00
301.25	SUBBASE OF CRUSHED GRAVEL (COARSE GRADED)	5339.9	CY	\$ 40.00	\$213,595.56
406.25	BITUMINOUS CONCRETE PAVEMENT	2509.0	TON	\$ 120.00	\$301,081.20
601.263	36" CPEP	40.0	LF	\$ 40.00	\$1,600.00
616.280	CAST-IN-PLACE CONCRETE CURB	481.0	LF	\$ 32.00	\$15,392.00
616.510	REMOVAL OF EXISTING CURB	140.0	LF	\$ 10.00	\$1,400.00
635.11	MOBILIZATION/DEMOBILIZATION	1	LS	\$ 64,000.00	\$64,000.00
641.10	TRAFFIC CONTROL	1	LS	\$ 14,000.00	\$14,000.00
646.40	DURABLE WHITE LINE	350	LF	\$ 2.00	\$700.00
646.50	DURABLE CROSSWALK MARKINGS	33	LF	\$ 15.00	\$495.00
649.11	GEOTEXTILE FOR ROADBED SEPARATOR	17202	SY	\$ 2.50	\$43,004.17
651.15	SEED (80 LBS/ACRE)	168.7	LB	\$ 11.15	\$1,880.45
651.18	FERTILIZER (28 LBS/1000 SF)	2571.2	LB	\$ 2.52	\$6,479.52
651.25	HAY MULCH (2 TON/ACRE)	4.2	TON	\$ 882.00	\$3,718.74
651.35	TOPSOIL	850.3	CY	\$ 50.00	\$42,513.89
900.62	FURNACE BROOK BRIDGE	1.0	EA	\$ 68,566.00	\$68,566.00
900.62	PARK IMPROVEMENTS	1.0	EA	\$ 25,000.00	\$25,000.00
900.64	FOOTBRIDGES	91.0	LF	\$ 500.00	\$45,500.00

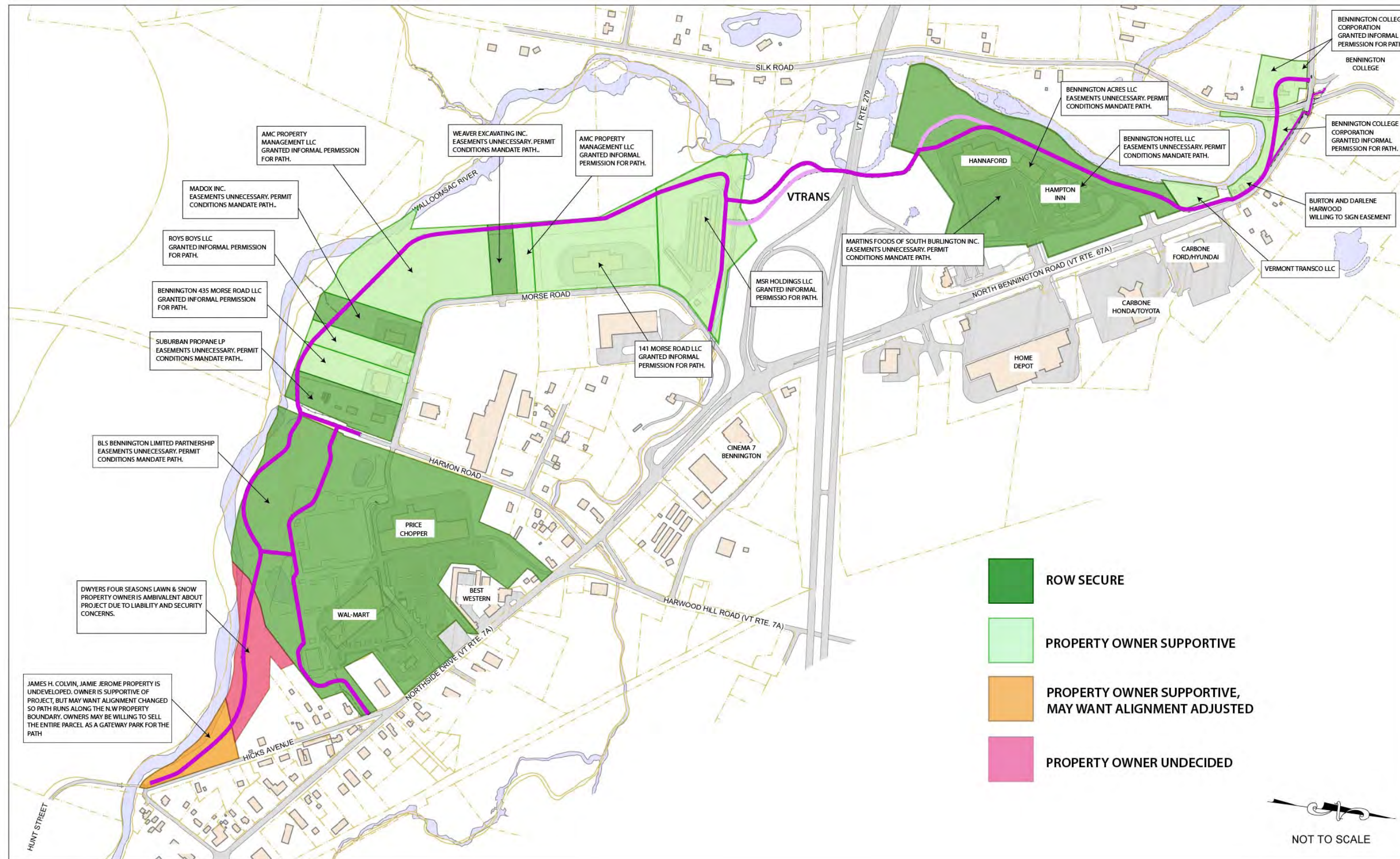
Total Construction					\$931,574.67
Engineering/Construction Administration				25%	\$232,893.67
Contingency				25%	\$232,893.67

February 2015

**Total Cost \$1,397,362.00**

# **APPENDIX C**

## **RIGHT OF WAY STATUS MAP**

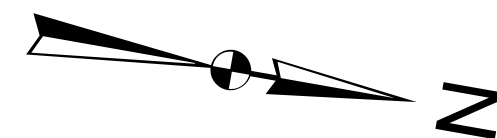
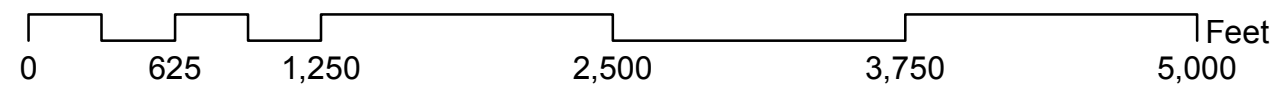
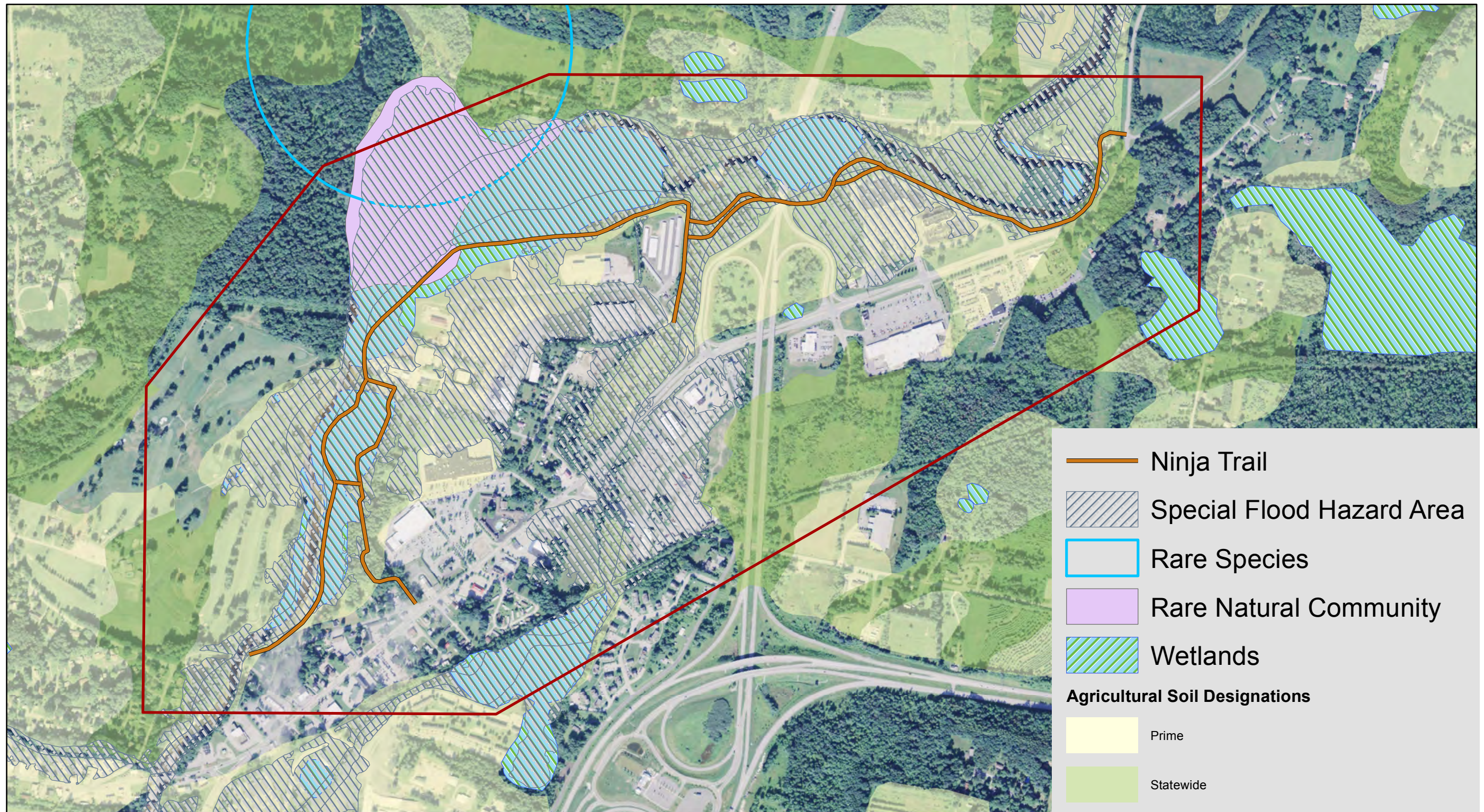


**RIGHT-OF-WAY STATUS (AS OF MAY 2015)**

# **APPENDIX D**

## **NATURAL RESOURCE MAP**

# Ninja Trail Natural Resources



# **APPENDIX E**

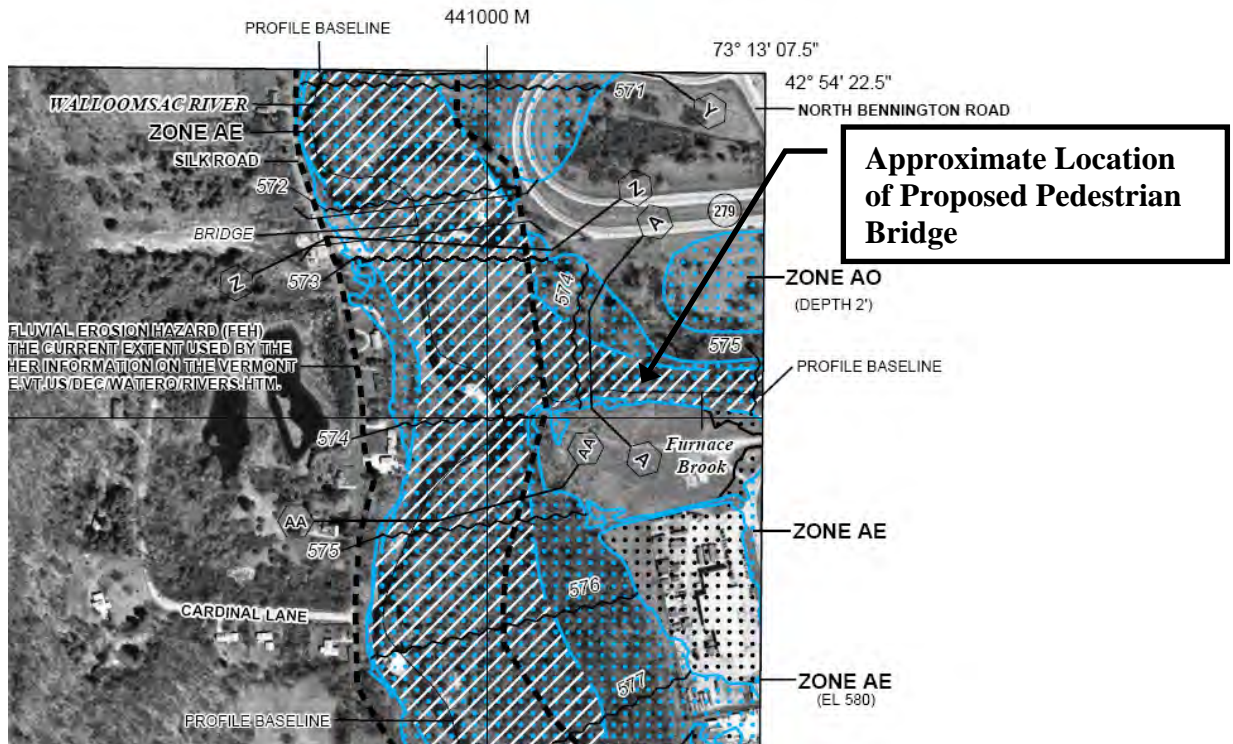
## **TECHNICAL MEMORANDUM: Re: Furnace Brook hydraulic analysis for proposed pedestrian bridge**

## TECHNICAL MEMORANDUM

**TO:** Jason Dolmetsch, MSK Engineering and Design, Inc.  
**FROM:** Roy Schiff and Brian Cote, Milone & MacBroom, Inc.  
**DATE:** December 18, 2014  
**RE:** Furnace Brook Hydraulic Analysis  
Proposed Pedestrian Bridge – Ninja Trail  
MMI# 5277-03

---

The planning and design of a pedestrian crossing over Furnace Brook that is part of the Ninja Trail Project is currently underway. The proposed trail travels along the southern channel bank adjacent to the Bennington Self Storage facility and crosses to the north towards the I-279 highway corridor. The proposed bridge and trail alignment will be located in and traverse the preliminary FEMA floodway of the Furnace Brook (Figure 1). The regulatory base flood elevation is 573.8 feet NAVD88 at the project site as shown on Panel 0413D of the preliminary Bennington County Flood Insurance Study (FIS).



**Figure 1: Excerpt from the Preliminary Flood Insurance Rate Map dated September 24, 2011  
(All base flood elevations in reference to the NAVD 88 vertical datum)**

To construct the proposed pedestrian bridge crossing, some fill material along with the support system of the bridge will be required within the floodplain and floodway. The floodway at this

location is approximately 125-foot wide minimum. Two locations for the pedestrian bridge were explored as part of this analysis. The first bridge location is located approximately 425 feet upstream of the confluence with the Walloomsac River. This crossing location is preferred for creating a more direct path through the floodplain. The second crossing location was suggested by the Vermont Agency of Natural Resources to cross in a more confined, and already managed location, approximately 550 feet upstream of the confluence where the existing floodplain is slightly narrower due to historic filling likely associated with the I-279 interchange. The Preliminary FIS indicates that the backwater effects during the 100-year flood from the Walloomsac River extend approximately 600 feet upstream along Furnace Brook.

The pedestrian bridge concept design consists of a 30-foot main span over the channel with elevated approaches on either side created using wooden piers set 15-feet apart (See concept design plan by MSK Engineering). The proposed design minimizes the amount of fill material placed in the floodplain.

The hydraulic analysis was prepared using the U.S. Army Corps of Engineers HEC-RAS software (version 4.1.0). A base model of Furnace Brook was created using the effective FEMA model, and then updated to add cross sections at the proposed bridge locations (Figure 2).



**Figure 2: Approximate location of Proposed Pedestrian Bridge Crossings #1 and #2**

The results of the hydraulic analysis with the proposed bridge at Location #1 indicates no change in the base flood elevation (Table 1). The primary reason there is no change is due to the



backwater condition from the Walloomsac River that controls the hydraulics at proposed pedestrian bridge location #1. Note that several alternatives were analyzed with the model during the concept design phase including both filled and elevated approaches, and no rise in the base flood occurred for either scenario. A range of boundary conditions were evaluated to investigate varying hydraulic conditions and no rise occurred for all scenarios. The elevated approaches were selected as a no adverse impact approach to minimize influencing sediment and debris transport in the floodplain.

**TABLE 1: Hydraulic Analysis Summary – Location #1**

<b>Location #1 – 425-feet upstream of Walloomsac Confluence</b>	<b>Flood Elevation (feet NAVD88)</b>			
	<b>10-year</b>	<b>50-year</b>	<b>100-year</b>	<b>500-year</b>
Existing Conditions	573.2	574.4	574.9	575.8
Proposed Conditions	573.2	574.4	574.9	575.8

NOTE: Results assume flooding on the Walloomsac River is at its peak for each storm event. Pedestrian bridge design includes 30' main span with 5-15' spans created using piers. Flood elevations taken at the upstream face of the proposed bridge location.

At Location #2, the hydraulic analysis indicates slightly different results. Comparing existing to proposed conditions results indicates that there is a 0.1-foot change in peak water surface elevation at the proposed bridge location during the 100- and 500-year floods (Table 2). The primary reason why there is a slight change in flood elevation is that the proposed bridge at Location #2 will occupy a larger percentage of the floodplain since the floodplain is narrower at this point along Furnace Brook. The proposed bridge at Location #2 remains within the backwater from the Walloomsac River.

**TABLE 2: Hydraulic Analysis Summary – Location #2**

<b>Location #2 – 550-feet upstream of Walloomsac Confluence</b>	<b>Flood Elevation (feet NAVD88)</b>			
	<b>10-year</b>	<b>50-year</b>	<b>100-year</b>	<b>500-year</b>
Existing Conditions	573.4	574.6	575.1	576.0
Proposed Conditions	573.4	574.6	575.2	576.1

NOTE: Results assume flooding on the Walloomsac River is at its peak for each storm event. Pedestrian bridge design includes 30' main span with 4-15' spans created using piers. Flood elevations taken at the upstream face of the proposed bridge location.

It is recommended that the proposed pedestrian bridge be placed at Location #1. The hydraulic analysis indicates that the bridge will not cause a rise in flood depths at this location. Velocities through the bridge will remain unchanged in this location, ranging from 2 feet per second during the 10-year storm to 4 feet per second during the 500-year storm. The hydraulic modeling indicates that the flood velocities are slightly higher at Location #2, which is an indication that scour along the bridge piers would be greater if the proposed bridge was placed at this narrower location.

5277-03-memo\_20141210.doc

# **APPENDIX F**

## **Floodway “No-Rise/No Impact” Certification**

**FLOODWAY "NO-RISE / NO-IMPACT" CERTIFICATION**

This document is to certify that I am duly qualified engineer licensed to practice in the State of

Vermont

*(State)*

. It is to further certify that the attached technical data supports

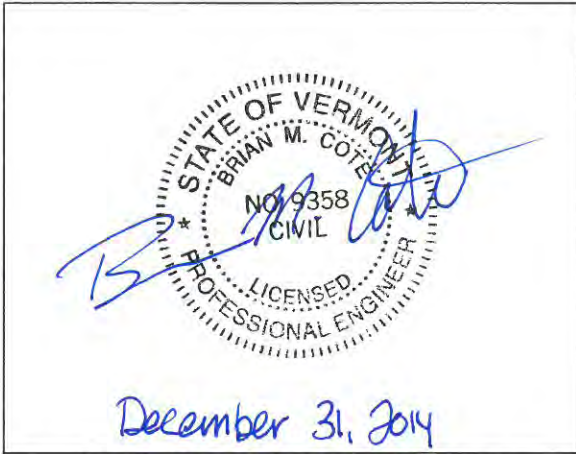
the fact that proposed Ninja Trail Pedestrian Bridge will not impact the base flood  
*(Name of Development)*

elevations, floodway elevations, and floodway widths on Furnace Brook at published  
*(Name of Stream)*

cross sections in the Flood Insurance Study for, Bennington, dated Preliminary  
Sept. 24, 2011  
*(Name of community)* *(Date)*

and will not impact the base flood elevations, floodway elevations\*, and floodway widths at the  
unpublished cross-sections in the area of the proposed development.

\* Note: The placement of the pedestrian bridge structure does  
cause a 0.06 foot change in surcharge depth upstream of the  
bridge, however the regulatory floodway width does not change.



**SEAL, SIGNATURE AND DATE**

Brian M. Cote, P.E., CFM

*Name*

Water Resource Engineer

*Title*

1 South Main Street - 2nd Floor  
Waterbury, VT 05676  
Ph: 802-882-8335

*Address*

**FOR COMMUNITY USE ONLY:**

Community Approval

Approved

Disapproved

Community Official's Name

Community Official's Signature

Title

# **APPENDIX G**

## **Agency of Natural Resources: Comments on conceptual layout of Ninja Path**

**Agency of Natural Resources  
Department of Environmental Conservation  
Watershed Management Division  
River Corridor & Floodplain Management**

**MEMORANDUM**

To: Jason Dolmetsch – MSK Engineering and Design  
From: Joshua Carvajal – Southern Vermont Floodplain Manager  
Cc: Jaron Borg - River Management Engineer  
Warren Foster - District 8 Coordinator  
Chet MacKenzie - Fisheries Biologists  
Jennifer Mojo - Regulatory Policy Analyst  
Shannon Pytlik - River Scientist  
Subject: Rivers Program comments on conceptual layout of Ninja Trail in Bennington, VT  
Date: October 4, 2014

---

Thank you for the opportunity to provide comments on a conceptual layout of the proposed Ninja Trail, as illustrated on the provided site plan titled Development Impact Study and dated September 9, 2014. The regulatory issues discussed during a conference call on 9/9/2014 and during a site visit on 9/12/14 are summarized below. As more detailed documents become available, ANR departments will complete their review of the project. Please feel free to contact me or the noted ANR staff if you have questions.

**Act 250 Jurisdiction** *Comments from Warren Foster:*

*It appears the whole project would disturb less than 10 acres so no independent trigger for Act 250. Nevertheless, the trail passes over at least four permitted tracts which would require amendments. These include:*

- 1. Bennington College (new parking and/or any new trail) 8B0539;*
- 2. Bennington Associates (Hannaford & Hampton inn) 8B0474;*
- 3. Morse Industrial Park affected owners—8B0088, 8b0157, 8b0403;*
- 4. Monument Plaza 8B0079 series.*

*I would expect to process all in one proceeding, as a material change to each permitted parcel, needing the signatures of these 250 permitted parcels. The other portions would not be subject to permitting as I read Act 250 Rule 71. (Online at - <http://www.nrb.state.vt.us/lup/publications/rules/2013rules.pdf>)*

**Easements**

Proposed easements for the Ninja Trail should include all area within the FEH zone plus an additional width along the outward boundary of this hazard zone. This additional width will allow the trail to be relocated as the stream channel migrates laterally through its natural meander pattern within the FEH zone. The actual dimension of this additional width will need to be determined based on incorporating the final trail path width as well as an appropriate slope width for future bank stabilization measures (i.e. rip rap slope protection). ANR requests a conceptual alternative plan be developed showing the potential future layout of the trail along the external boundary of the FEH and how this path would be incorporated into the existing buildings and infrastructure on parcels along the proposed trail alignment.

**Riparian Buffers**

Upon receipt of more detailed plans, Fish & Wildlife will provide comments regarding riparian buffers.

### **FEMA Regulatory Floodway**

Any encroachment into the FEMA regulatory floodway, will need to have a hydrological and hydraulic (H&H) analysis prepared to determine impacts to base flood elevations, floodway widths, and if a No-Rise certification is appropriate. Currently the only shown encroachments in the regulatory floodway are the proposed stream crossing points at Furnace Brook behind the storage units north of Morse Rd, a short section of the trail to the east of this crossing, and the section of trail behind the Hannaford's and Hampton Inn buildings. At-grade construction of the trail will be not need to be evaluated as part of this encroachment review but built-up sections of trail are considered fill and will need to be evaluated.

### **Fluvial Erosion Hazard (FEH) Zone**

Any stream crossing or trail located in the FEH Zone will need a permit from the Town of Bennington. Town FEH regulations do not specifically allow the path in this zone but driveways and access roads as well as excavation, filling and grading are allowed uses with a required review by ANR Rivers Program. Online at: <http://www.benningtonplanningandpermits.com/BPC/wp-content/uploads/2011/02/fehr.pdf>

### **Channel Management**

Stream Alteration Permits will be issued by ANR only after the top of stream bank erodes to the outer boundary of the FEH zone or erodes towards existing infrastructure (i.e. utilities, buildings, roads, etc...). This limitation in channel management activities will be a condition of any amended Act 250 permits and as a recommended condition of approval for any issued Town of Bennington permit(s) in the FEH area.

The intent of these permit restrictions is to allow for placement of the trail along the stream bank with the understanding that the Ninja trail must be relocated when the stream migrates within the FEH area. Reducing future channel management activities to protect the trail will allow the stream to more easily achieve a condition of dynamic equilibrium and prevent additional investment within this hazard zone.

### **Stream Crossing:**

The location of the proposed stream crossing behind Morse Road will need be outside the FEH zone, as currently shown. Ideally, this crossing should be located further upstream from the Furnace Brook confluence with the Walloomsac River. Confluences of streams tend to be dynamic locations with aggregation of sediment during high flood water levels and subsequent degradation of sediment during events with lower flood levels. Upstream from the proposed crossing location Furnace Brook has two existing earthen berms that restrict lateral migration of the stream channel. Placing a proposed stream crossing on these existing berms, approximately at the midpoint of the eastern most storage units, will utilize an area of channel confinement that has historically been maintained. This alternative upstream location would reduce the likelihood of long-term channel maintenance which would be needed if the crossing structure is placed closer to the confluence of the two waterways. Locating a stream crossing further upstream lessens the encroachment in and impact to the regulatory floodway of Furnace Brook.

An additional trail foot bridge is shown crossing the spillway of the Wal-Mart Plaza stormwater pond. Since this pond is an existing encroachment into the FEH zone, the foot bridge should not be located any closer to the stream than what infrastructure currently exists (i.e. if the spillway includes a vegetated or riprap channel that is currently maintained then the trail crossing may be located within this maintained area). Upon reconstruction of the Wal-Mart stormwater pond and spillway outside of the FEH zone, the location of the foot bridge and trail alignment will need to be relocated to outside of the FEH boundary.

# **APPENDIX H**

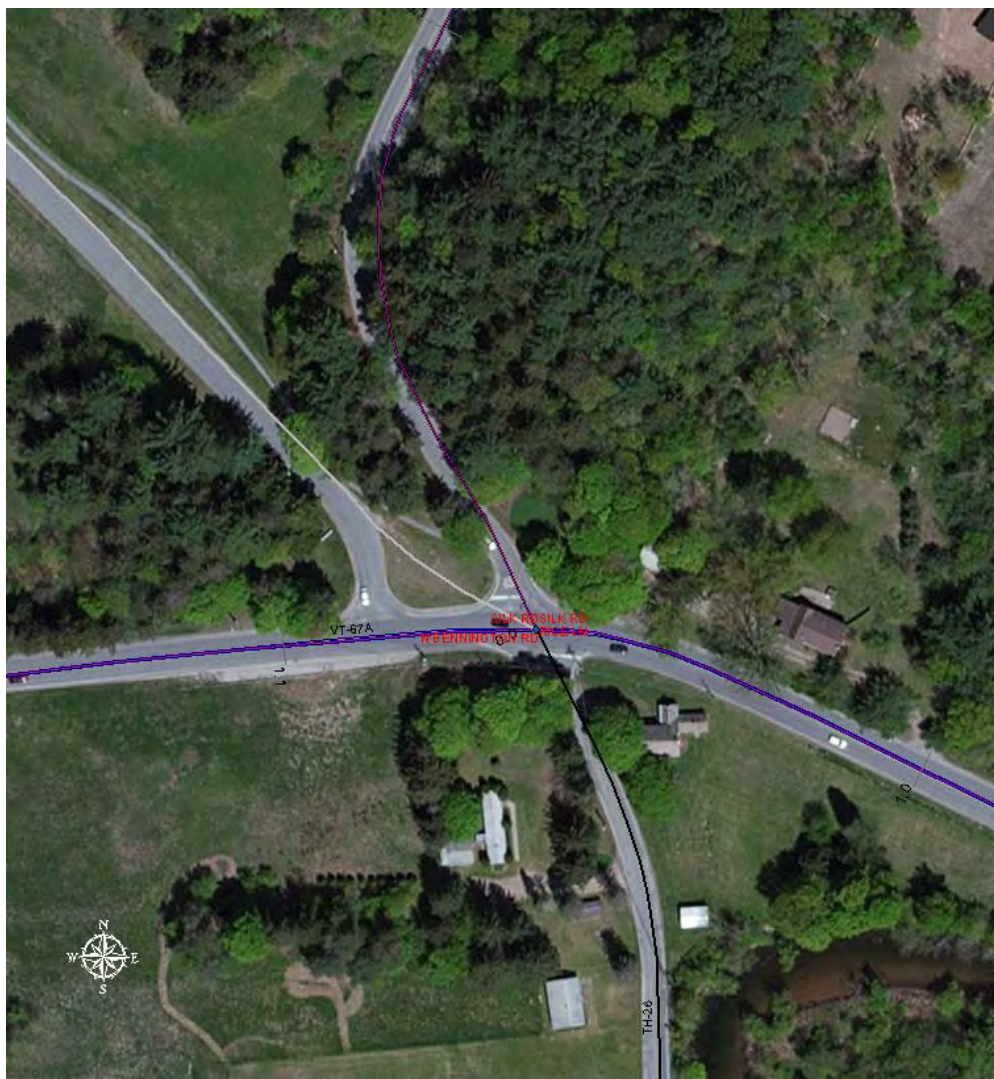
## **VTrans Highway Safety Improvement**

**Program: Location Review of  
VT67A/Silk Rd./Matteson  
Rd./College Dr. Intersection**

**Traffic Safety Section**  
Highway Safety Improvement Program  
Location Review

Town: Bennington HSIP No.: 13-032  
Route: VT 67A Silk Rd Mile point: 1.05 – 1.070  
Reviewed By: Mario Dupigny-Giroux Date Reviewed: October 11 2013  
Joe Kelly

**Location Map:**





# Traffic Safety Section

## Highway Safety Improvement Program

### Location Review

#### **Observations:**

##### *Location & Geometry*

This HSIP location is the four-way intersection of VT 67A, Silk Road and Matteson Rd in Bennington. This intersection is located between mile points 1.050 and 1.070 on VT 67A (route log 1.062). The mile points for the approach on Matteson Rd are 0 to 0.05. There are not mile points available for Silk Rd.

The intersection is controlled with stop signs on the Matteson Rd and Silk Rd approaches.

The intersection with College Rd (Private) and VT 67A is located approximately 130 ft west of the Silk Rd intersection.

VT 67A curves to the right past Silk Rd when traveling east. This curve extends from mile point 1.016 to 1.076 (route log direction). It has a degree of curvature of 9.78 degrees and a 364-foot radius.

East of Silk Rd on VT 67 A, the 2012 AADT was 6900 vehicles per day while it was 7500 vehicles per day west of Silk Rd. On the Matteson Rd approach, the AADT was 2000 vehicles per day.

The posted speed limit is 40 mph on VT 67A and the 2012 pavement condition was classified as good with an average rut depth of 0.077.

##### *Traffic Control Devices*

A 30 inches x 30 inches modified left turn sign with side roads is present at mile marker 0.98 for westbound traffic (VT 67A NB). A similar modified right curve sign is also present for the eastbound direction (VT 67A SB) at mile point 1.16.

There are overhead beacons at this intersection, one per direction. The beacons flash yellow on VT 67A and red for Matteson Rd and Silk Rd traffic.

##### *Traffic Studies*

Engineering speed studies were done, in 2008, in support of a Traffic Committee Request to increase the speed limit from 30 mph to 40 mph. These studies determined that, in the area of mile point 0.86, the 85<sup>th</sup> percentile speed was 43 mph and that it was 39 mph near mile marker 1.53.

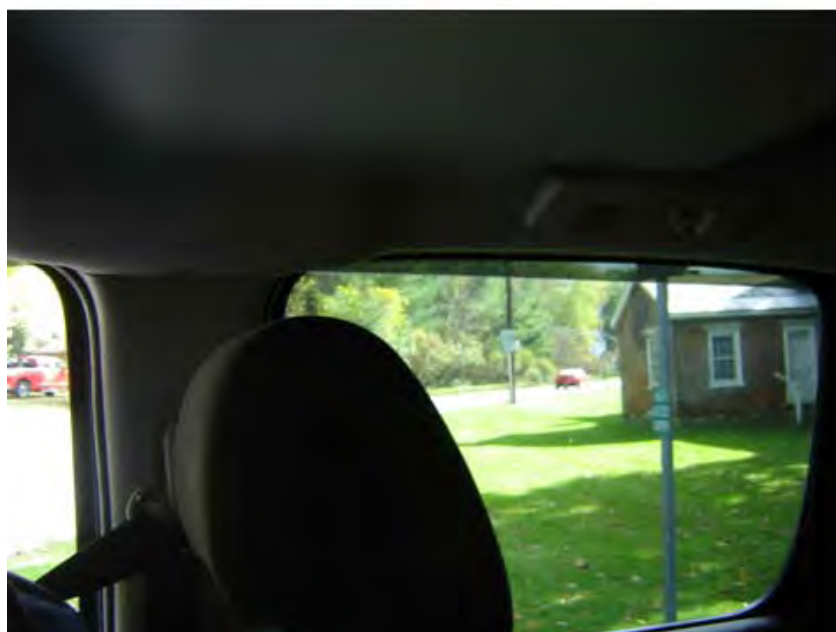
For the posted speed limit of 40 mph, the Green Book recommended stopping sight distance is 305 ft (360 ft for 50 mph). Similarly, the Green Book corner sight distance is 385 ft for a crossing maneuver (430 ft for 50 mph) and 445 ft for making a left turn (500 ft for 50 mph). These

# Traffic Safety Section

## Highway Safety Improvement Program

### Location Review

distances were measured in the field in October 2013. The stopping sight distance was measured to be approximately 525 ft while the corner sight distance to the right from Silk Rd was determined to be around 450 ft. Using GIS, the corner sight distance to the right is about 300 ft. The two pictures below show what is seen by a driver when looking to the right from Silk Rd. One of the pictures shows the view out of the passenger's window while the second one shows what is being seen when looking through the back passenger's window.



Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

# **Traffic Safety Section**

## Highway Safety Improvement Program

### Location Review

Ball banking of the curve that extends from mile point 1.016 to mile point 1.076 was performed in October 2013. Traveling in the northbound route log direction, a reading of 14 degrees was obtained at 40 mph, a reading of 13 degrees was measured at 35 mph and a reading of 8 degrees was registered at 30 mph. In the southbound route log direction, a reading of 12 degrees was obtained at 40 mph.

#### *Citizen's Complaints*

In September 2008, the Bennington Selectboard requested a speed analysis on VT 67A to increase the speed limit, stating that the conditions had changed since several businesses had closed and the College/Matteson Intersection had been modified (See the Past Projects Section). Traffic Operations conducted an engineering study and determined that the existing 40 mph speed limit be extended from about mile point 0.86 to mile point 1.92. This recommendation was approved by the Traffic Committee at their November 2008 meeting.

In March 2009, a resident requested that 30 mph advisory speed plaque be added to the intersection signs for the Silk Rd and Matteson Rd intersection. This request was denied due to the Traffic Committee Action that increased the speed limit to 40 mph earlier that year.

#### *Crash History*

There were a total of sixteen crashes reported between 2008 and 2012 in the area bounded by mile points 1.05 and 1.07. As one of these crashes took place near the College Entrance, fifteen crashes therefore took place at the Silk Rd intersection.

The predominant crash pattern at this intersection is a vehicle that is stopped at the Silk Rd approach and that continues across VT 67A to Matteson Rd while at the same time getting hit by a vehicle that is coming from the west (VT 67A NB). There were seven such occurrences out of the fifteen crashes. From the crash reports, the operators of the vehicles that were travelling along VT 67A were seeing the other vehicle stopped at Silk Rd, but the operators on Silk Rd were not necessarily being able to see that same vehicle. The drivers at fault in these right angle crashes (the drivers attempting to cross VT 67A from Silk Rd) were largely older drivers, aged above sixty-five (86%). The median age of these operators was 78 years of age and the average was 71. The fact that older drivers are involved in crashes at this intersection could indicate that these drivers on the Silk Rd approach have a hard time seeing westbound traffic or judging the speed the westbound vehicles are driving at or that they need more time to complete their crossing maneuver.

#### **Past Projects:**

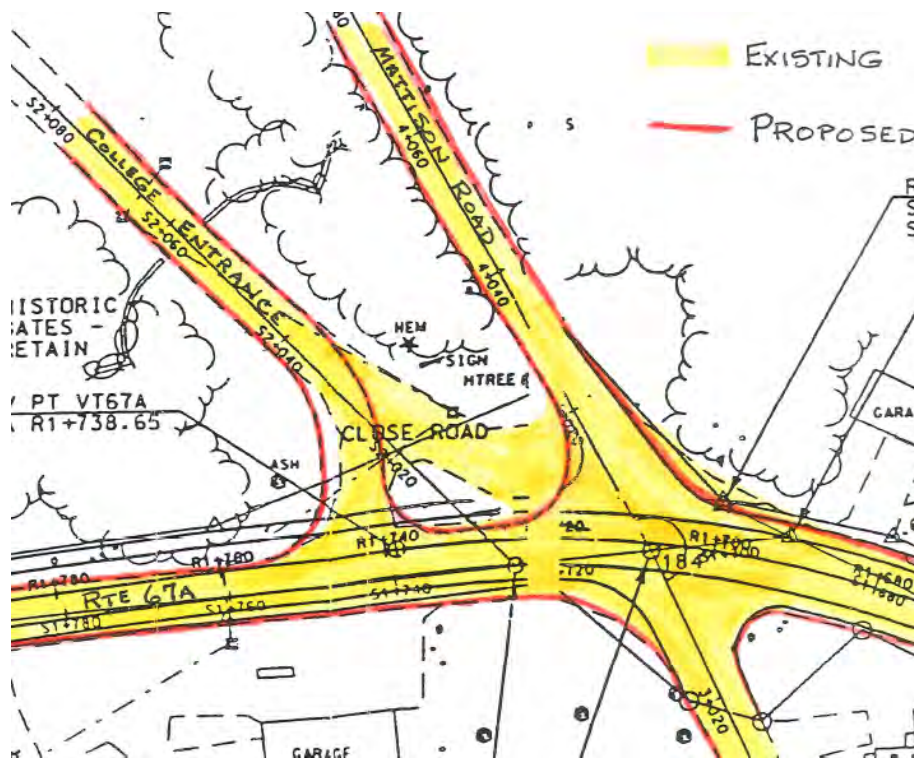
District # 1 reconfigured the Bennington College entrance to a "T", by eliminating the southeasterly leg of their "Y" drive that was connecting to Matteson Rd. This is illustrated in the

# Traffic Safety Section

## Highway Safety Improvement Program

### Location Review

plan sheet below and is the current configuration at this intersection. This project, M 1000(10), was completed in June 2006.



Paving projects STP 2626(1) 06B220 was completed in 2010. The project replaced the stop signs on Matteson Rd and Silk Rd, retained the one at College Drive, retained the street name signs and retained the alignment/intersection signs on VT 67A.

### **Past Work Orders:**

Work Order 01-230 was for the removal of the existing turn signs and the installation of the modified turn signs with the side roads on them. Work Order 08-605 was for the changing of the speed limit signs to match the new approved 40 mph speed.

Work order 04-071 was for the modification of the beacons.

# **Traffic Safety Section**

## Highway Safety Improvement Program

### Location Review

#### **Future Projects:**

ER IRNA(067) is for the repair of flood damage due to Irene along VT 67A and may not necessarily be in the area of the intersection.

#### **Discussion:**

The prevailing crash pattern at this intersection is a right angle crash in which a vehicle operated by an older driver (median age 78, average age 71) is crossing from Silk Rd to Matteson Rd and is getting hit by a westbound vehicle on VT 67A.

This intersection was last reviewed for safety in 2001. The recommendation at the time, given that a roundabout was planned for this intersection, was to replace the turn signs with modified turn signs that display the side roads. While a roundabout was not constructed, the intersection was modified, as the approach of College Rd that was connecting to Matteson Rd near its intersection with VT 67A was eliminated in favor of one unique drive for the College that intersect VT 67A into a "T".

The speed limit was 30 mph at the time of the previous safety review. It is now 40 mph.

Using the ball banking technique, it was found, traveling northbound in the route log direction, that an advisory speed of 30 mph is recommended.

The corner sight distance to the right from Silk Rd is limited. As measured in the field, the corner sight distance for this approach to the east is approximately 400-450 ft.

Short term actions could involve implementing a 30 mph advisory speed in the northbound route log direction, and also considering the installation of an intersection sign with a "watch for cross traffic" plaque that would flash when a vehicle is waiting on Silk Rd. This would involve the installation of vehicle detection on the Silk Rd approach.

As a longer term solution, the roundabout concept should be revisited for this intersection. A benefits/costs ratio of 1 is obtained when the cost to build a roundabout at this intersection is between \$1,575,000 and \$1,725,000 (corresponding to assumed annual traffic growths of 0.32% and 1% respectively). The benefits/costs ratio was generated using the 71% crash reduction factor shown in the Highway Safety Manual (14-11).

A traffic signal alternative is also justifiable from a benefits/costs ratio point of view. The construction cost to generate a benefits/costs ratio of 1 for the construction of a traffic signal was determined to be \$685,000 (using an annual traffic growth of 0.33% and the 44% crash reduction factor from CMF Clearing House, Harkey 2008). However, the signal warrants analysis performed by Traffic Research in October 2013 found that none of the warrants were met and that, therefore, a signal is not justified from a MUTCD perspective.

An operational analysis (FHWA Mark Doctor) using 2012 raw traffic counts indicates that a single lane roundabout would be adequate and that traffic delays on all approaches would vary

# **Traffic Safety Section**

## Highway Safety Improvement Program

### Location Review

between 5.3 and 5.8 seconds per vehicle. The analysis also shows that the 95<sup>th</sup> percentile queue would be around two vehicles on VT 67a and that it would be less than a vehicle on the side roads.

#### **Recommendations:**

The following summarizes the recommendations based on the above discussion.

- 1) Install a 30 mph advisory speed plaque below the intersection/turn sign for VT 67a northbound traffic;
- 2) Install a dynamic intersection sign with a Watch for Cross Traffic plaque with detection on Silk Rd;
- 3) Consider a roundabout for this location.

# COLLISION DIAGRAM

Key Number =

MUNICIPALITY: <u>Bennington</u>	COUNTY: _____	FILE: <u>HSIP13032</u>
INTERSECTION: <u>VT-67A</u>		CASE #: _____
PERIOD: <u>5</u> YEARS <u>0</u> MONTHS	FROM <u>1/1/2008</u> TO <u>12/31/2012</u>	BY: _____ DATE: <u>9/17/2013</u>



SYMBOLS		MANNER OF COLLISION	
→	MOVING VEHICLE	→ ←	REAR END
↘ ↗	TURNING VEHICLE	↘ ↗	LEFT TURN
↔	BACKING VEHICLE	↘ ↗	LEFT TURN
▭	PARKED VEHICLE	→ →	OVERTAKE
999	RECORD NUMBER	~→	OUT OF CONTROL
P	PEDESTRIAN	↔	HEAD ON
B	BICYCLIST	↘ ↗	RIGHT TURN
A	ANIMAL	↘ ↗	RIGHT TURN
□	FIXED OBJECT	↘ ↗	RIGHT ANGLE
■	Fatal	↘ ↗	SIDE SWIPE

# COLLISION DIAGRAM

Key Number = \_\_\_\_\_

MUNICIPALITY: _____ COUNTY: _____ INTERSECTION: <u>VT 67A</u> PERIOD: <u>2</u> YEARS <u>0</u> MONTHS FROM <u>1/1/2013</u> TO <u>12/31/2014</u>	FILE: <u>121467arice</u> CASE # : _____ BY: _____ DATE: <u>1/13/2015</u>
--	--



SYMBOLS		MANNER OF COLLISION	
→	MOVING VEHICLE	P	PEDESTRIAN
↘	TURNING VEHICLE	B	BICYCLIST
↔	BACKING VEHICLE	A	ANIMAL
▭	PARKED VEHICLE	□	FIXED OBJECT
999	RECORD NUMBER	■	Fatal
→	REAR END	↔	HEAD ON
↘	LEFT TURN	↘	RIGHT TURN
↙	LEFT TURN	↙	RIGHT TURN
→	OVERTAKE	↘	RIGHT ANGLE
↘	OUT OF CONTROL	↙	SIDE SWIPE



# **APPENDIX I**

## **Speed Study of VT67A at College Drive**

## North Bennington Rd (VT 67A)

North Bennington Rd.	Both Directions	Northbound	Southbound
Total Vehicles	324	172	152
Mean Speed	37.58	38	36
Mode Speed	39	37	35
Median Speed	37	38	36
85 <sup>th</sup> Percentile	41	42	40
95 <sup>th</sup> Percentile	43.8	42	40
Top Speed mph	51	49	51

### Advisory Speed of 30 mph

% Speeding 5 mph or more	74.6%	81.2%	67.7%
% Speeding 10 mph or more	27.7%	33.9%	21%
% Speeding (31 mph or greater)	95.6%	98.8%	92.5%

### Speed Limit of 40 mph

% Speeding 5 mph or more	3.3%	4.6%	1.9%
% Speeding 10 mph or more	0.3%	0%	0.6%
% Speeding (31 mph or greater)	18.2%	22.8%	13.1%

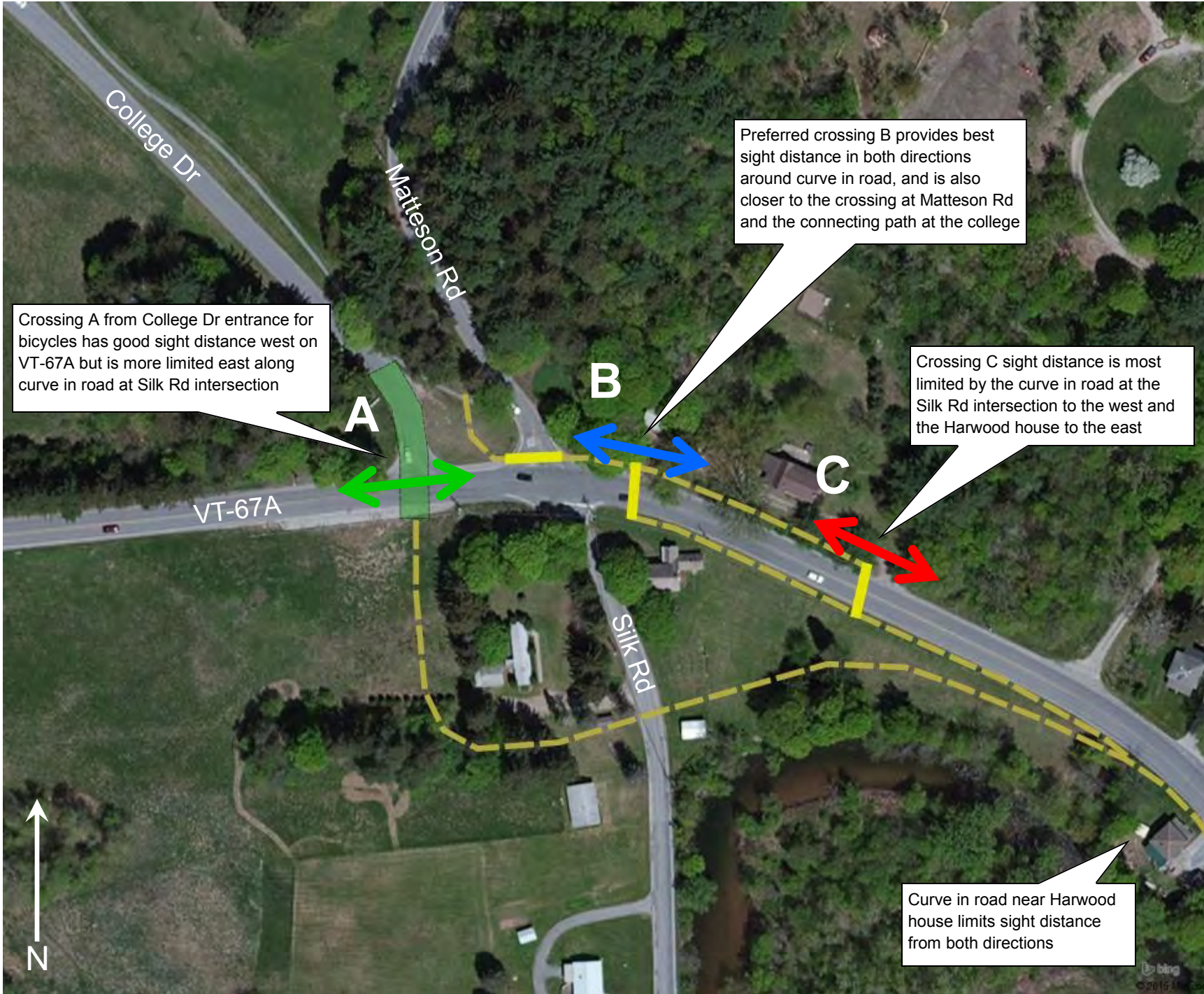
#### Notes:

- Speed data was collected on N Bennington Rd, covering the intersection of College Rd, Rice Ln, and Silk Rd. The speed limit along N Bennington Rd is 40 mph, but where the road curves at this intersection, the advisory speed is 30 mph. There is also a yellow flashing light to indicate a reduction in speed when approaching and traveling through this busy corridor.
- Speed data was collected:
  - Thursday May 1, 2014 from 1:15 – 2:00 pm
  - Friday May 2, 2014 from 8:15 – 8:45 am
  - Monday May 5, 2014 from 9:30 – 10:15 am

# **APPENDIX J**

## **Sight Distance Diagram For VT67A Crossing**

# Sight Distances from Proposed Crossings on VT-67A



- Crossing **A**  
330 ft East  
530 ft West
- Crossing **B**  
500 ft East  
520 ft West
- Crossing **C**  
260 ft East  
330 ft West

# **APPENDIX K**

## **Memorandum: Justification of Proposed Ninja Path Alignment – Route 67A**

## MEMORANDUM

**To:** Theresa Gilman, VTrans  
**From:** Mark Anders, BCRC  
**Re:** Justification of Proposed Ninja Path Alignment – Route 67A  
**Date:** June 16, 2015

This memo is an addendum to the Ninja Path Scoping Study. It's purpose is to explain in greater detail why the preferred alignment along Route VT67A was chosen over an alternative alignment (Alignment B), which would have the path cross VT67A at the signalized intersection by Hannaford and then continue along the northeast side of VT67A.

After initially comparing the two alternatives, it was determined that Alignment B was significantly less desirable, and, since scoping funds were limited, would not be considered in the study. The reasons for this are as follows:

### **The preferred alignment creates a better user experience**

The purpose of the Nina Path is to create a safe and appealing alternative to VT67A for non-motorized transportation (see Scoping Study, Purpose & Need). Route VT67A, a four-lane highway with strip-style commercial development, is an unappealing walking and biking environment. The preferred alignment minimizes the time users spend on VT67A because it goes through a wooded band behind Hannaford plaza and joins VT67A for only a short distance. Alignment B travels along VT67A for a longer distance, past Hannaford, Home Depot and the two Carbone car dealerships.

### **The preferred alignment crosses fewer driveway accesses**

The preferred alignment crosses only one residential driveway access. Alignment B crosses two busy commercial driveway accesses and five residential driveway accesses, putting path users at risk from turning vehicles. The *AASHTO Guide for the Development of Bicycle Facilities* cites turning conflicts at accesses as a reason why, "it is generally preferred to select path alignments in independent rights-of-way."

### **The preferred alignment VT67A crossing distance is shorter and has fewer turning conflicts**

Alignment B crosses VT67A at the four-way signalized intersection by Hannaford – a complex and busy intersection that is very challenging for pedestrians and cyclists to safely cross. VT67A is five lanes wide here (four travel lanes plus left turn lanes). In contrast, VT67A is only two lanes wide at the preferred crossing locations.

In addition to the long crossing distance, path users crossing VT67A on Alignment B would be exposed to a significant amount of turning traffic. Data consistently shows that crashes with pedestrians and cyclists occur far more often with turning vehicles than with through traffic. Both the Hannaford access and the Home Depot access are very busy. Both have two exiting lanes and one entrance lane. In contrast, the preferred alternative crossing location and design minimizes risk from turning vehicles (see Scoping Study, Section 8, pages 27-28).

*FHWA Intersection Safety Issue Brief 9* lists pedestrian problems at intersections. The problems that apply to Alignment B are: conflicts with turning vehicles, a wide crossing, right-turns-on-red, and complex signal phasing.

A pedestrian only signal phase, and prohibiting right-turns-on-red would increase safety but would add significantly to vehicle delay because many exiting vehicles turn right out of Hannaford and Home Depot.

Path users would also experience delay at the signalized intersection, which they would not with the Preferred Alignment.

### **The Preferred Alignment is more direct than Alternative B**

Pedestrian travel is slow, and pedestrians typically avoid indirect routes. From the southeast corner of Hannaford Square, where the two proposed alignments diverge, to College Drive, the Preferred Alternative's pedestrian route is approximately 3,000 feet, and the bicycle route is approximately 3,200 feet. Alignment B is approximately 3,750 feet, 17% longer than the preferred bicycle route and 25% longer than the preferred pedestrian route.

