Memorandum

To: Upper Charles Trail Committee
Town of Hopkinton
18 Main Street
Hopkinton, MA 01748

Date: January 5, 2018

Project #: 13539.00

From: Jack Madden, PE

Re: Phase 7 Upper Charles Trail
Feasibility Study
Hopkinton, MA

1.1 Project Background

This Feasibility Report includes existing conditions, a proposed alignment, impacts, estimated construction costs, and anticipated permitting actions associated with the design and construction of a Shared Use Path (SUP) connecting Hayden Rowe Street at Granite Street with Hayden Rowe Street just north of Chestnut Street (Proposed SUP Alignment) as well as improvements to the existing Echo Trail (Echo Trail) in the Town of Hopkinton, MA. Completion of this Feasibility Report is the initial step in moving this project through the Town's funding and procurement process. The purpose of this Feasibility Report is to help inform the Town's decision on whether or not to pursue the further design and construction of this facility.

2.1 Project Area Boundaries

The Proposed SUP Alignment Project Area consists of Town-owned parcels bounded approximately by Hayden Rowe Street (State Route 85) to the east, Granite Street to the South, South Barn Road to the west, and Teresa Road to the north. The Echo Trail exists entirely on the Town-owned parcel (U25 11 0) south of Granite Street along the eastern side of Echo Lake.

2.2 Project Area General Land Uses

This project proposes to construct an SUP through existing open space on a combination of Milford Water Company parcels along Granite Street, and Town-owned parcels that are heavily wooded with some existing cart paths, an abandoned rail bed, and an existing utility easement. The interior portion of the Proposed SUP Alignment project area has been identified as "Conservation Land" by the Massachusetts Geographic Information Systems (MassGIS) database. The Town of Hopkinton is currently considering plans for a recreational "dog-park" with parking on a Town-owned parcel at 192 Hayden Rowe Street. Adjacent parcels are identified as within "Residential-B" zoning. There is an existing cart path along the Proposed Echo Trail that is used for recreational purposes and access to the Milford Water Company property (R34 15 0) (See Figure 1).

3.1 Design Policy Related to Bicycle and Pedestrian Accommodation

The US Department of Transportation (USDOT) policy and the Massachusetts Department of Transportation (MassDOT) policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. The USDOT policy states that every transportation agency, including state DOT's, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including

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health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.

3.2 Definitions of Bikeway Types

The following types of bikeways were considered during the preparation of this memo. These bikeway definitions are taken from the *AASHTO Guide for the Development of Bicycle Facilities 2012 Fourth Edition*.

Marked Shared Land

Paved Shoulder

Bike Lane

- **Shared Lane Bikeway** – Shared lane bikeways are best used on minor local neighborhood streets with low speeds and low traffic volumes where bicycles can share the road without special provisions. Generally, the speed differential between motorists and bicyclist is typically 15 mph or less and motor vehicle speeds of 30 mph or less. Traffic volumes on the roadway are typically less than approximately 1000 vehicles per day.
- **Marked Shared Lane Bikeway** – Marked shared-lane bikeways are best used on local collectors or minor arterials with narrow travel lanes where bike lanes are not feasible due narrow lanes, space constraints and right-of-way limitations. Traffic volumes can be variable but the motor vehicle speed limit should be 35 mph or less.
- **Paved Shoulder** – Paved shoulders are paved areas adjacent to the roadway travel lanes delineated by a longitudinal pavement marking. Paved shoulder bikeways are best used on rural roadways that connect town centers or other attractions but can be used in urban areas. Traffic volumes can be variable but the motor vehicle posted speed should be in the range of 40-55 mph. The width of the shoulder should be dependent on characteristics of the adjacent motor vehicle traffic (i.e. wider shoulders should be used on higher speed roadways) but a shoulder width of 4 feet is considered the minimum for bicycle travel.
- **Bike Lane** – A bike lane is a portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and if used, signs. Bike lanes can be used on major roads to provide quick and direct bicycle access to the same destinations as motorists. Bike lanes can also be used on collector roads or congested urban streets. Generally, roadway design speeds are more than 25 mph. Traffic volumes can vary as the motor vehicle/bicycle speed differential is generally a more important factor in the decision to provide bike lanes.

Shared-Use Path

- **Shared-Use Path** – A shared-use path (SUP) is a bikeway outside of the roadway traveled way and physically separated from motorized vehicular traffic by a buffer or barrier. The SUP can be either within the roadway right-of-way or on an independent alignment. SUP's are also used by pedestrians including skaters, wheelchairs users and joggers/walkers. The types of design criteria for SUP's (design speed, minimum curve radii, stopping sight distance, etc.) are of similar type for design of roadways but modified based on the operating characteristics of a bicycle as a vehicle and bicyclist as a vehicle operator.

Rail-with-Trail

- **Rail-with-Trail** – A rail-with-trail is a SUP parallel and adjacent to a railroad.
- **Rail-to-Trail** – A rail-to-trail is a SUP constructed within the remaining bed of a former rail line. Often the rail bed had been constructed by cutting and filling the existing terrain to maintain straight alignment and gentle even grades which is compatible with ADA accessibility requirements.

3.3 Design Criteria

The project criteria have been derived based on standard engineering practice and the successful application of regulatory standards and guidelines. The primary references for the project criteria listed include:

- The American with Disabilities Act (ADA) Design Guidelines for Shared-Use Paths;
- The Massachusetts Department of Transportation *Massachusetts Highway Department Project Development and Design Guide*, 2006.
- The Massachusetts Department of Transportation *Separated Bike Lane Planning and Design Guide*, 2012.
- The American Association of State Highway and Transportation Officials (AASHTO) *2012 Guide for the Development of Bicycle Facilities, 4th Edition*, (AASHTO Bike Guide);
- AASHTO *2011 A Policy on Geometric Design of Highways and Streets* (The AASHTO Green Book); and
- The *Manual on Uniform Traffic Control Devices* (MUTCD) 2009 Edition with revisions and applicable Interim Approvals.
- Related DOT Engineering Directives.

4.1 Design Criteria

The Phase 7 Upper Charles Trail (Phase 7 UCT) Proposed SUP Alignment will provide a traffic-separated two-way SUP from Hayden Rowe Street approximately at Chestnut Street west through Town-owned parcels along the northern boundary of a proposed "dog park" and conservation land to a point where it turns in a southerly direction through an undeveloped Town-owned parcel to Granite Street, crossing Granite Street at grade, turning in an easterly direction resuming as a sidepath adjacent to the south edge of Granite Street to where it intersects with Hayden Row Street.

The Echo Trail segment will provide a traffic separated two-way SUP along an existing footpath and former rail bed. There is no proposed connection at the current time to the UCT south to Milford.

The existing terrain within the project limits is variable with water crossings, stone walls, exposed tree roots and rocks, and variable topography. In order to comply with current Federal Highway Administration (FHWA) guidelines for accessibility in the design of SUP's, existing grades and surfaces would need to be modified to accommodate users with disabilities. The FHWA's *Designing Sidewalks and Trails for Access Part II of II* (2014), which describes best practices for designing sidewalks and trails, recommends that 70% of the grades along an SUP be 5% or less; and that any grade over 5% provide rest areas at regular intervals. In addition, with any grades greater than 6% a 30mph design speed should be used to calculate horizontal curves and stopping sight distance. It is not anticipated that major changes to the existing grade along the Proposed SUP Alignment will be required (See Figure 1).

Due to the existing cart path alignments, the suitable compatibility with the proposed "dog-park", and the limited access opportunities on Granite Street, the UCTC will consider the following alignments:

Proposed SUP Alignment

- From the north at the northeast corner of the Town-owned parcel at 192 Hayden Rowe Street (U24 8 0), a 12'-wide, two-way Shared Use Path (SUP) runs in a westerly direction along the property line to the back of the parcel where it crosses a Town-owned parcel (U24 10 A) and former rail bed. Here the trail splits. To the north, the alignment follows the former rail bed to where the Town-owned parcel terminates at parcel U24 4 A. Here, the alignment heads in an easterly direction as a 10'-wide SUP along an existing 15'-wide easement to its outlet at Hayden Row Street north of Chestnut Street where it terminates at the sidewalk. At the aforementioned split, the Proposed Alignment heads in a westerly direction onto a Town-owned parcel (U24 10 0) along an existing cart path which crosses over a channelized stream and continues along the northern boundary of the proposed "dog park" following the existing cart path along the edge of the wooded portion of the lot. Where the existing cart path turns south and then west again before entering the wooded portion of the lot, the Proposed Alignment continues in a westerly direction and crosses over two seasonal water crossings before turning to the south (**Section 1**). The Proposed Alignment follows a spur of the cart path for a short distance before entering a thickly wooded and undeveloped Town-owned parcel (U25 38 0). The Proposed Alignment follows the contour of the land in a more or less southerly direction along the path of an existing stream offset by 50' to 100' to Granite Street (**Section 2**). At Granite Street the two-way SUP crosses to the south side. The crossing will consist of reflective pavement markings, a flashing beacon, and advanced warning signage. From the shoulder on the south side of the Granite Street Right of Way, the two-way SUP turns and heads in an easterly direction along Granite Street. A bridge/boardwalk structure will be required at the two existing culverts under Granite Street. The

Proposed Alignment will include a 10'-wide SUP with a 6'-wide grass buffer to the existing edge of pavement. The Proposed Alignment continues to Hayden Row Street where it will terminate prior to the stop-controlled intersection (**Section 3**).

Proposed Echo Trail Spur

- From the Proposed SUP Alignment on Granite Street, approximately 150' west of Hayden Rowe Street on the northern property line of the Town-owned parcel (U25 11 0) and former rail bed known as the "Echo Trail", the Echo Trail heads in a southerly direction as a 12'-wide two-way SUP. The Echo Trail will be approximately 3000' feet in length and terminate at the southern end of the Town-owned parcel (**Section 4**).

5.1 General Applicable Environmental Guidance

This Feasibility Report was developed using data provided by the Massachusetts Office of Geographic Information Systems (MassGIS). This database is a compilation of information acquired from a broad base of public and private agencies and serves as a useful tool for the purposes of planning and assessing potential suitability of land use and development. The findings below are useful for identifying stakeholders and anticipating permitting requirements for the proposed alignment. Further research, field verification and field survey will be needed to verify the findings of this report before proceeding to final design.

5.2 Anticipated Impacts and Criteria

This section describes the anticipated environmental impacts of the Proposed SUP Alignments and the Echo Trail and other criteria for evaluation (See Impact Analysis Summary), including:

- Relocation Impacts and Right of Way Acquisition
- Considerations Relating to Pedestrians and Bicyclists
- Air Quality Impacts
- Noise Impacts
- Impacts to Outstanding Resource Water
- Impacts to Wetlands
- Floodplain Impacts
- Impacts to Certified Vernal Pools
- Impacts to NHESP Priority and Estimated Habitats
- Impacts to Areas of Critical Environmental Concern
- Impacts to National Register Historic District and Property
- MassDEP Approved Wellhead Protection Area (Zone II)
- Impacts to Hazardous Waste Sites
- Construction Impacts

- Visual Impacts
- Impacts to Public Utilities
- Public Facilities Connections
- Environmental Justice Impacts
- Construction Costs
- Operations and Maintenance

5.2.1 Relocation Impacts and Right-of-Way Acquisition

The Proposed SUP Alignment utilizes parcels owned by the Town of Hopkinton where possible; however, the proposed Phase 7 UCT could potentially encroach on private property where it cannot be avoided.

- Where Segment 1 utilizes an existing easement on parcel U24 4 A, temporary construction easements and/or purchase of the property within the easement area may be required in order to construct the path.
- Where Segment 3 traverses the southern edge of the Granite Street ROW, it will potentially impact the adjacent Milford Water Company property to the south. Possible permanent easements and/or property acquisitions will likely be required.

The Echo Trail is not anticipated to encroach on private property.

5.2.2 Considerations Relating to Pedestrians and Bicyclists

The Proposed SUP Alignment will improve pedestrian and bicyclists' access to open space along the Hayden Rowe Street corridor and facilitate future expansion to existing open space and recreational trails.

The Proposed SUP Alignment is mostly separate from the roadway with the exception of the crossing on Granite Street The adjacent sidepath along Granite Street is separated with a 6' grass buffer which meets MassDOT criteria for a Separated Bike Facility. The Crossing on Granite Street as well as the locations where the facility accesses Hayden Rowe Street should be designed to current standards for operations and safety.

The Echo Trail will improve the existing Echo Trail corridor and provide additional recreational opportunities on a Town-owned parcel.

These facilities shall meet minimum requirements for Americans with Disabilities Act (ADA) standards for accessibility including but not limited to grades and detectable warnings for the visually impaired.

5.2.3 Air Quality Impacts

Air quality in the study area would not be substantially affected by project construction because of the temporary nature of bikeway construction and the confined right-of-way.

An air quality analysis has not been performed as part of this evaluation report nor is it deemed to be needed.

5.2.4 Noise Impacts

Construction activities would result in a moderate but temporary noise impact to receptors at various locations adjacent to proposed construction. Noise levels would vary depending on the type and number of pieces of equipment active at any one time. Noise impacts during construction can be mitigated by limiting the construction time periods.

5.2.5 Impacts to Outstanding Resource Water

Massachusetts Department of Environmental Protection (DEP) has designated certain waters for protection based on their outstanding socio-economic, recreational, ecological and/or aesthetic values. The Outstanding Resource Water within the vicinity of our project limit has been identified as a Public Water Supply Watershed, specifically the watershed of Echo Lake which serves as the headwaters of the Charles River.

Based on the MassGIS database, the Proposed SUP Alignment is entirely within an area of Outstanding Resource Water and will impact 117,936 SF.

The Echo Trail is entirely within an area of Outstanding Resource Water and will impact 62,008 SF.

5.2.6 Impacts to Wetlands

Potential impacts to wetlands falls under the jurisdiction of the DEP. The wetlands boundary information used in the Impact Analysis was derived from aerial infrared photography and field checked by the DEP's Wetlands Conservancy Program (WCP).

Based on the MassGIS data, there are several locations in the study area in which the Proposed SUP Alignment appears to directly impact wetland areas, the 100' wetland buffer zone, and the 200' riverbank wetland buffer.

- **Direct Impact to Freshwater Wetlands:** 8,705 SF
- **100' Buffer Area Impacts:** 70,475 SF
- **200' Riverbank Impacts:** 8,800 SF

Based on the MassGIS data, the Echo Trail appears to directly impact wetland areas and the 100' wetland buffer zone.

- **Direct Impact to Freshwater Wetlands:** 53 SF
- **100' Buffer Area Impacts:** 20,959 SF
- **200' Riverbank Impacts:** 0 SF

5.2.7 100 Year Floodplain Impacts

The most current National Flood Insurance Program (NFIP) data was used to determine the potential flood hazard for the area of study. The primary risk classifications used are the 1-percent-annual-chance flood event, the 0.2-percent-annual-chance flood event, and areas of minimal flood risk.

Based on the MassGIS database, the study area is not within the 100-year floodplain.

5.2.8 Certified Vernal Pools

The Natural Heritage and Endangered Species Program (NHESP) certifies vernal pools according to the Guidelines for the Certification of Vernal Pool Habitat (MA Division of Fisheries and Wildlife, 2009). Certified vernal pools are protected under the state Water Quality Certification regulations, the state Title 5 regulations, and the Forest Cutting Practices Act regulations, as well as those certified vernal pools that fall under the jurisdiction of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Based on the MassGIS database, the Proposed SUP Alignment and the Echo Trail do not impact certified vernal pools.

5.2.9 NHESP Priority and Estimated Habitat

The NHESP maintains a database of the habitats of State-listed rare species in Massachusetts based on observations documented in the last 25 years. Areas delineated as Priority Habitats include wetlands, uplands and marine habitats. The Estimated Habitats of Rare Species are based on occurrences of rare wetland wildlife observed within the last 25 years and entered into the NHESP database.

Based on the MassGIS database, there are no NHESP Priority and Estimated Habitats within the project limits.

5.2.10 Areas of Critical Environmental Concern

The Secretary of Energy and Environmental Affairs (EEA) has designated places in Massachusetts that receive special recognition because of the quality and significance of their natural and cultural resources. These areas, identified as Areas of Critical Environmental Concern (ACEC), require a stricter environmental review of certain kinds of proposed development administered by the Department of Conservation and Recreation (DCR) on behalf of the EEA.

Based on the MassGIS database, there are no ACEC's identified within the project limits.

5.2.11 National Register Historic Properties and Districts

The historic resources considered in this analysis are those included in the Massachusetts Cultural Resource Information System (MACRIS) maintained by the Massachusetts Historical Commission (MHC). These resources include buildings, burial grounds, structures and objects as well as areas and districts recognized by the National Register of Historic Places and local historic and preservationist agencies.

Based on the MassGIS database, there are no National Register impacts anticipated within our project limits.

5.2.12 MassDEP Approved Wellhead Protection Area (Zone II)

Wellhead protection areas are important for protecting the recharge area around public water supply (PWS) groundwater sources. A Zone II is a wellhead protection area that has been determined by hydro-geologic modeling and approved by the DEP's Drinking Water Program (DWP). A Zone II classification is that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield, with no recharge from precipitation).

Based on the MassGIS database, there are no Approved Wellhead Protection Area impacts anticipated within our project limits.

5.2.13 Hazardous Materials Sites

The DEP's Bureau of Waste Site Cleanup (BWSC) maintains a database of all reported releases of oil or hazardous material into the environment. The dataset reviewed in this analysis includes confirmed Hazardous Material Sites with Activity and Use Limitation (AUL). The AUL is a legal document that identifies activities and uses of the property that may or may not occur and the owner's obligation and maintenance conditions that must be followed to ensure the safe use of the property.

Based on the MassGIS database, there are no known hazardous materials sites located within our project limits.

5.2.14 Construction Impacts

Construction of the project will be performed primarily along existing roadways and footpath alignments in forested open space on Town-owned parcels. Impacts to natural habitats and existing recreational resources will be minimized as much as possible.

For the purposes of analyzing the impact, existing footpaths are considered an established intrusion in the forest environment. This impact, therefore, is limited to Segment 2. The area of the proposed path segments (length X 20'-wide impact width) along undeveloped right of way is approximately 33,000 SF.

5.2.15 Visual Impacts

Each segment of the Proposed SUP Alignment and Echo Trail has been evaluated based on the width of clearing and earthwork required to meet standards for proper drainage, accessibility and requirements for safety. For the purposes of the impact assessment, a 20'-wide clearing is assumed for each Segment based on the proposed cross section.

Segment 1 will have minimal visual impact and will be limited primarily to the immediate shoulder of the road along Granite Street.

Segment 2 will require moderate tree and brush clearing within existing woodland as well as earthwork in order to provide ADA compliant grades.

Segment 3 will have minimal visual impact and will be limited primarily to the existing cart paths on Town-owned parcel U24 10 0.

Segment 4 (Echo trail Spur) will have minimal visual impact and will be limited primarily to the existing cart paths on Town-owned parcel U25 11 0.

5.2.16 Public Utilities

Known existing utilities within the project area include overhead electric transmission lines along Granite Street. The proposed cross section will allow these poles to remain in place within the 5' buffer strip.

Involvement with utilities in both the planning and design phases are recommended to determine feasibility and safety of construction.

5.2.17 Public Facilities

The Proposed Alignment will improve bicycle and pedestrian access from Hayden Rowe Street south of Granite Street to Hayden Rowe Street north of Chestnut via a traffic-separated facility. Access to Town-owned open space for recreation including the Echo Trail and the proposed "dog-park" will be improved as well.

5.2.18 Environmental Justice

According to the MassGIS database, the project is not located within an area identified as an Environmental Justice Zone.

5.2.19 Construction Cost

Preliminary construction estimates have been calculated based on three typical cross sections developed for an SUP alignment along an undeveloped right-of-way and along an existing roadway. Items include site clearing, excavation for and placement of new pavement structure, boardwalk structure, loam and seed, and signing and striping.

Anticipated cost for each item was researched using the most current available (9/2016-9/2017) MassDOT Weighted Bid Prices, which are based on actual competitive bid pricing on MassDOT construction contracts. Contingencies for Mobilization (3%), Drainage (5%), Construction (40%), and additional MassDOT Construction (25%) are based on empirical data and are included in the overall preliminary construction estimates.

The Proposed SUP Alignment construction estimate is **$1,950,000**.

The Echo Trail construction estimate is **$650,000**.

For survey and mapping, soil borings, geotechnical design, path design, permitting, and construction bidding services, 15% - 20% of the construction cost should be budgeted.

The Proposed SUP Alignment design estimate is **$293,000 – $390,000**.

The Echo Trail design estimate is **$97,500 - $130,000**.

5.2.20 Maintenance & Operations

Maintenance

Basic maintenance activities include keeping the trail surface free of debris, identifying and correcting surface hazards, keeping signs and pavement markings in good condition and cutting back encroaching vegetation to maintain adequate sight distances on the bikeway and at road crossings. Having a written operations and maintenance plan and an emergency response plan will also enable town officials to determine manpower and budgets needed to implement these plans.

We recommend coordination with the Town Public Safety Officers, School Department and the Department of Public Works regarding access and maintenance so that their recommendations can be incorporated into the project design.

Operations

The project vision for this portion of the Bikeway is a continuous facility for non-motorized travel with portions suitable for use by both bicyclists and pedestrians. The Proposed Alignment presented complies with accepted industry standards and criteria for an SUP and encourages users to comply with uniform traffic operations and laws. Thus, the signs, pavement markings and other amenities are designed to convey that message through the use of common standards of color, shape and graphics as used on typical roadway signs without "over-signing" the natural landscape.

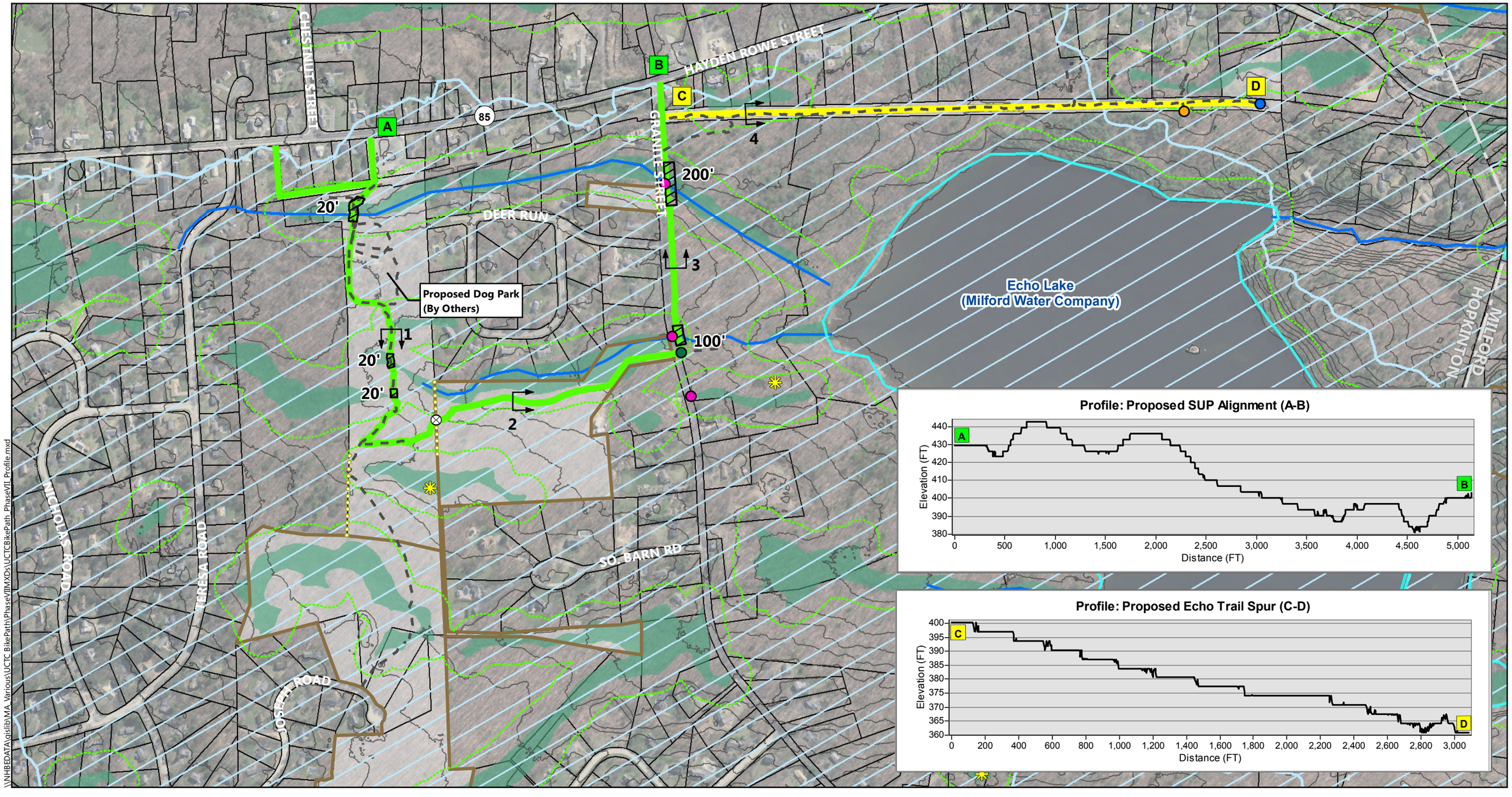
It is recommended that for the off-road SUP sections, "trail use rules" be posted at trail access points, as appropriate. Additionally, it is recommended that the Town review their existing by-laws as they relate to trails and shared-use facilities to verify if changes or additions are needed.

6.1 Conclusion

The Proposed SUP Alignment will provide a traffic-separated bicycle and pedestrian facility that will contribute to the overall Shared Use Path between the existing Upper Charles Trail in Milford, the existing Center Trail, and the proposed Upper Charles Trail in Ashland, MA.

The Echo Trail will provide a traffic-separated bicycle and pedestrian facility that will improve access to a Town-owned parcel for recreational uses and could potentially contribute to the overall Shared Use Path between the existing Upper Charles Trail in Milford, the existing Center Trail, and the proposed Upper Charles Trail in Ashland, MA.

Impacts analyzed in this report will provide an approximate guide for future planning and design of this facility as needed. While projected impacts to water resources appear significant, considerations are made to the nature of the project and the alternatives available. Because this project proposes to improve access for non-motorized users and the improvements will enhance existing recreation opportunities, it is anticipated that approvals and opportunities for funding will be forthcoming.



0 250 500 1000 Feet

- Proposed SUP Alignment
- Echo Trail Spur
- Existing Footpath*
- Existing Stone Wall
- Proposed 12-ft Wide Water Crossing
- Existing Break in Stone Wall
- Existing Culvert
- Chainlink Gate
- Stockade Barrier
- Proposed At-Grade Crossing
- NHESP Potential Vernal Pools
- Outstanding Resource Water
- 100-Year Floodplain
- Conservation/Public Land
- MassDEP Wetland
- 100-ft Wetland Buffer
- Assessor's Tax Parcel
- Town Boundary
- 10-ft Index Contour
- Section View

* This linework shown inclues two separate data sets

Upper Charles Trail | Hopkinton, Massachusetts

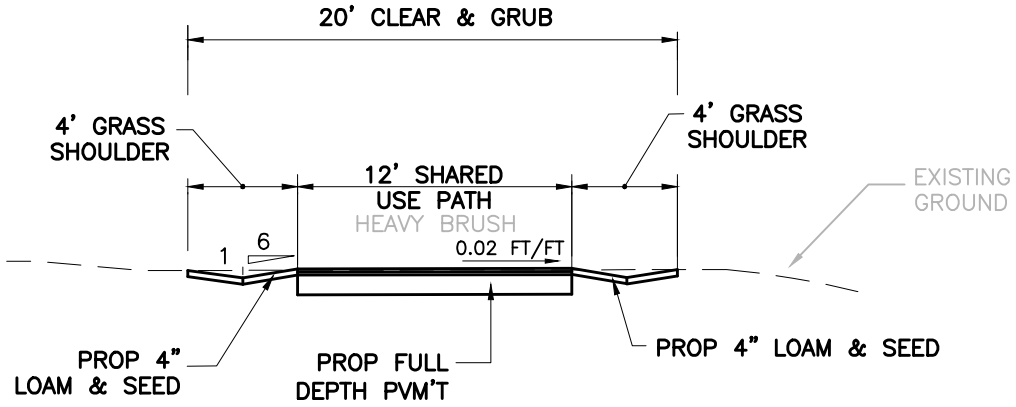
The following resources are not present within the project vicinity:
1. Areas of Critical Environmental Concern (ACEC)
2. NHESP Certified Vernal Pools and Priority Habitat
3. Chapter 21E Sites
4. Hazardous Waste Generators
5. NHESP Certifield Vernal Pools
6. MassDEP Approved Wellhead Protection Areas

Upper Charles Trail Phase VII Profile

Source Info: MassGIS, VHB

Impact Analysis Summary

#	Impact Criteria	Proposed SUP Alignment	Proposed Echo Trail
1.	Relocation Impacts and ROW Acquisition	May require minor acquisitions on Segment 1 due to required width for separated sidepath owned by Milford Water Co. as well as along Segment 3 where proposed alignment utilizes an existing 15'-wide easement	No acquisitions are anticipated
2.	Considerations Relating to Pedestrians and Bicyclists	This alignment provides a vehicle-separated facility for bicyclists and pedestrians as much as possible; will be compliand with current ADA regulations, and will improve access for non-motorized users.	This alignment provides a vehicle-separated facility for bicyclists and pedestrians; will be compliand with current ADA regulations; and will improve access to Town-owned parcel for recreational uses.
3.	Air Quality Impacts	Temporary minor impacts during construction	Temporary minor impacts during construction
4.	Noise Impacts	Temporary minor impacts during construction	Temporary minor impacts during construction
5.	Outstanding Resource Water (ORW) Impacts	117,936 SF impact to Outstanding Resource Waters	62,008 SF impact to Outstanding Resource Waters
6.	Wetlands	Yes, the off-road bikeway would alter Freshwater Wetlands and 100-Foot Perimeter Wetland located along its route. 8,705 SF Direct Impacts	Yes, the off-road bikeway would alter Freshwater Wetlands and 100-Foot Perimeter Wetland located along its route. 53 SF Direct Impacts
		70,475 SF 100' Buffer Area Impacts	20,959 SF 100' Buffer Area Impacts
		8,800 SF 200' Riverbank Impacts	0 SF 200' Riverbank Impacts
7.	Floodplain Impacts	Project limits are not in floodplain.	Project limits are not in floodplain.
8.	Certified Vernal Pools	There are no certified vernal pools within the project limits.	There are no certified vernal pools within the project limits.
9.	Threatened or Endangered Species (NHESP)	There are no Priority Habitats within the project limits.	There are no Priority Habitats within the project limits.
10.	Areas of Critical Environmental Concern (ACEC)	There are no ACEC's within the project limits.	There are no ACEC's within the project limits.
11.	National Register Districts	There are no National Register Districts within the project limits.	There are no National Register Districts within the project limits.
12.	MassDEP Approved Wellhead Protection Area(Zone II)	There ar no impacts to MassDEP Approved Wellhead Protection Areaswithin our project limits.	There ar no impacts to MassDEP Approved Wellhead Protection Areas within our project limits.
13.	Hazardous Waste Sites	There are no Hazardous Materials Sites within our project limits.	There are no Hazardous Materials Sites within our project limits.
14.	Construction Impacts	Yes. Clearing and earth work of undeveloped forest right of way 33,000 SF (0.76 Ac) .	No. Existing cart path will be improved.
15.	Visual Impacts	Yes. Clearing and vegetation removal totalling 116,020 SF (2.66 AC).	No. Existing cart path will be improved.
16.	Public Utilities	May impact existing overhead utilities on Segment 3 (overhead electric).	No impacts to existing utilities are anticipated.
17.	Public Facilities Connections	Provides separated bicycle and pedestrian facility within the Hayden Rowe Street corridor	Provides separated bicycle and pedestrian facility within the Hayden Rowe Street corridor
18.	Environmental Justice	There are no Environmental Justice areas within our project limits.	There are no Environmental Justice areas within our project limits.
19.	Construction/Design Cost	$1,950,000/$293, 000 - $390,000	$650,000/$97,500 - $130,000
20.	Operations and Maintenance	Recommend a written operations and maintenance plan and an emergency response plan.	Recommend a written operations and maintenance plan and an emergency response plan.



GRADE </= 5%

FROM AP 24/LOT 10
FACING SOUTH

PAVEMENT NOTES:

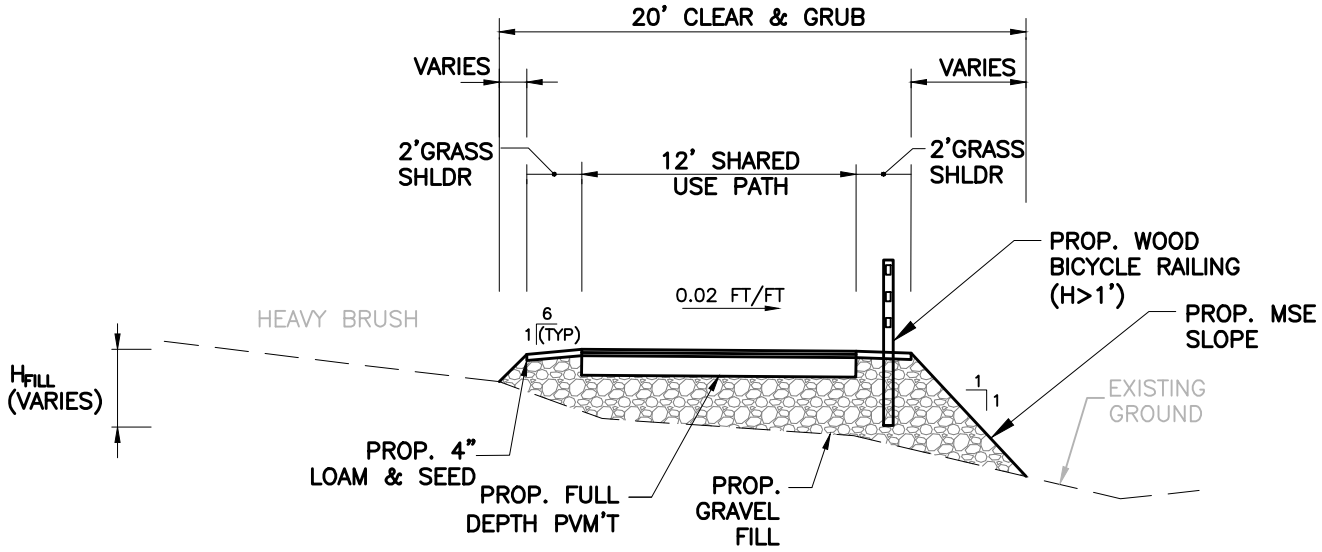
PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER
2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Typical Section
Upper Charles River Trail
Phase VII
Town of Hopkinton, MA

Section 1

12/13/2017



SECTION VIEW
FACING WEST

GRADE </= 5%

FROM GRANITE STREET
FACING NORTH

PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER
2–1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC–19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

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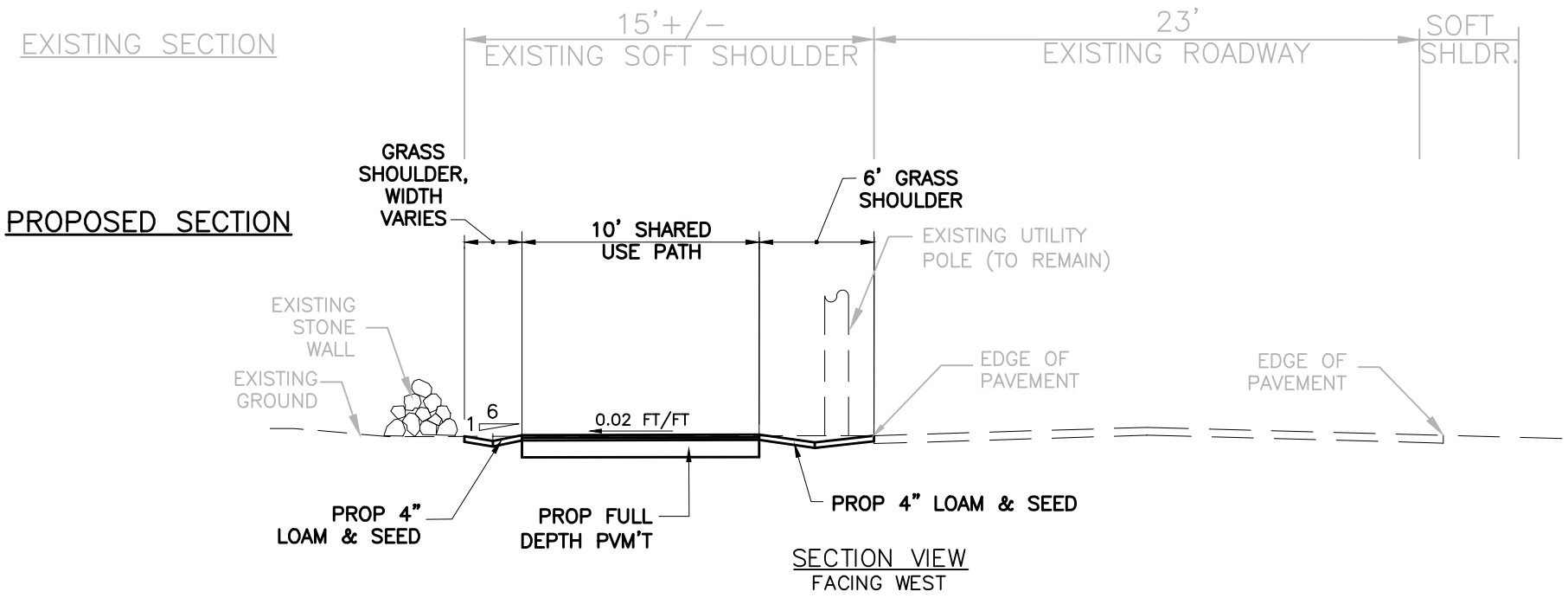
Upper Charles River Trail
Phase VII
Town of Hopkinton, MA

Section 2

12/13/2017



SECTION VIEW
FACING WEST

GRANITE STREET
FACING WEST

PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT

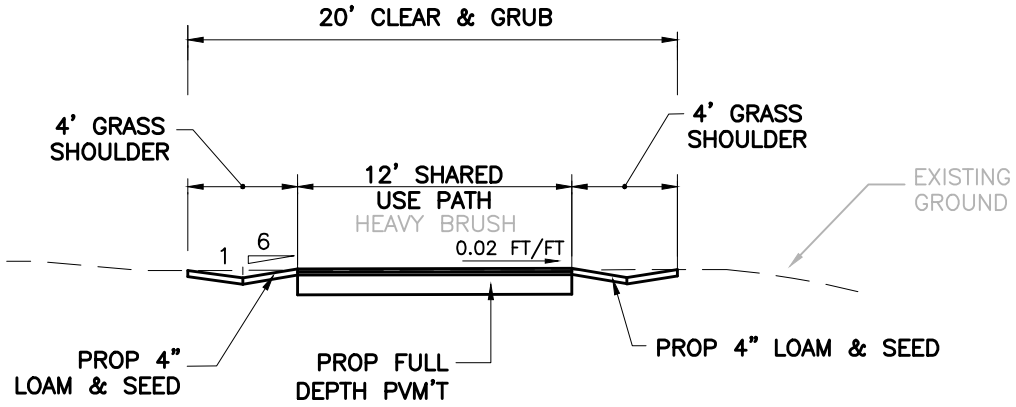
SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER
2–1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC–19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

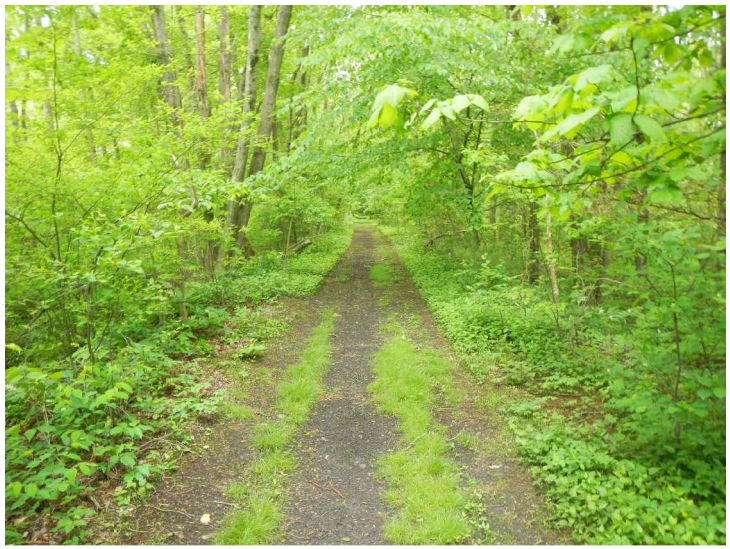
Typical Section
Upper Charles River Trail
Phase VII
Town of Hopkinton, MA

Section 3

12/13/2017



GRADE </= 5%



FROM AP 24/LOT 10
FACING SOUTH

PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER
2–1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC–19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Typical Section
Upper Charles River Trail
Phase VII
Town of Hopkinton, MA

Section 4

12/13/2017

1 Cedar Street
Suite 400
Providence
Rhode Island 02903
401-272-8100

Upper Charles River Trail Phase VII
Hopkinton, Massachusetts
December 29, 2017

Proposed Alignment - Estimated Construction Cost			Total Cost
Segment 1	2700 LF	$	393,800
Segment 2	1650 LF	$	215,033
Segment 3	1450 LF	$	466,500
At Grade Crossing - Granite St.	1 EA	$	50,000
Total Proposed Alignment Project Length	5800 LF		

SUBTOTAL:	$	1,125,333
Mobilization (3%)	$	33,760
Drainage (5%)	$	56,267
Contingency (40%)	$	450,133
MassDOT Construction Contingency (25%)	$	281,333
	$	1,946,827
SAY:	$	1,950,000

*Estimate is for comparison puposes only. Estimate does not include costs of design, permitting, ROW acquisition, utility work, lighting improvements.

1 Cedar Street
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Upper Charles River Trail - Phase VII
Proposed SUP Alignment/Segment 1 (2700 LF+/-)
Hopkinton, Massachusetts
December 18, 2017

Segment Length (ft)	2700
Impact Width (ft)	20
Proposed Section (1-4)	1
Proposed Grade of Section (%)	<5%

Description	Unit Price	Quantity	Total Cost
Full Depth Pavement - Bikeway (Including Excavation)	$60.00 /SY	3,520 SY	$211,200.00
Loam Borrow & Seed	$8.00 /SY	1,200 SY	$9,600.00
Signing, Striping & Pavement Markings	$5,000.00 /LS	1 LS	$5,000.00
Clearing and Grubbing	$5.00 /SY	3,000 SY	$15,000.00
Erosion Control Barrier	$7.50 /FT	5,400 FT	$40,500.00
Additional Earthwork (25% of total length)	$35.00 /CY	1,500 CY	$52,500.00
Boardwalk/Bridge	$1,000.00 /FT	60 FT	$60,000.00
		SUBTOTAL:	$393,800.00
		Mobilization @ 3%	$11,814.00
		Drainage @ 5%	$19,690.00
		Contingency (40%)	$157,520.00
		MassDOT Construction Contingency (25%)	$98,450.00
		Construction Total	$681,274.00
		SAY:	$690,000.00

* Prices Based on Weighted Average Bid Prices (August 2016)

1 Cedar Street
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Upper Charles River Trail - Phase VII
Proposed SUP Alignment /Segment 2 (1650 LF+/-)
Hopkinton, Massachusetts
December 18, 2017

Segment Length (ft)	1650
Impact Width (ft)	20
Proposed Section (1-3)	2
Proposed Grade of Section (%)	<5%

Description	Unit Price	Quantity	Total Cost
Full Depth Pavement - Bikeway (Including Excavation)	$60.00 /SY	2,200 SY	$132,000.00
Loam Borrow & Seed	$8.00 /SY	733 SY	$5,866.67
Signing, Striping & Pavement Markings	$2,000.00 /LS	1 LS	$2,000.00
Clearing and Grubbing	$5.00 /SY	3,667 SY	$18,333.33
Erosion Control Barrier	$7.50 /FT	3,300 FT	$24,750.00
Additional Earthwork (25% of total length)	$35.00 /CY	917 CY	$32,083.33

SUBTOTAL:	$215,033.33
Mobilization @ 3%	$6,451.00
Drainage @ 5%	$10,751.67
Contingency (40%)	$86,013.33
MassDOT Construction Contingency (25%)	$53,758.33
Construction Total	$372,007.67

* Prices Based on Weighted Average Bid Prices (August 2016)

SAY: $380,000.00

1 Cedar Street
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Upper Charles River Trail - Phase VII
Proposed SUP Alignment /Segment 3 (1450 LF+/-)
Hopkinton, Massachusetts
December 18, 2017

Segment Length (ft)	1450
Impact Width (ft)	20
Proposed Section (1-3)	3
Proposed Grade of Section (%)	follows grade of road

Description	Unit Price	Quantity	Total Cost
Full Depth Pavement - Bikeway (Including Excavation)	$60.00 /SY	1,406 SY	$84,333.33
Loam Borrow & Seed	$8.00 /SY	1,289 SY	$10,311.11
Signing, Striping & Pavement Markings	$5,800.00 /LS	1 LS	$5,800.00
Clearing and Grubbing	$5.00 /SY	3,222 SY	$16,111.11
Erosion Control Barrier	$7.50 /FT	2,900 FT	$21,750.00
Additional Earthwork (25% of total length)	$35.00 /CY	806 CY	$28,194.44
Boardwalk/Bridge	$1,000.00 /FT	300 FT	$300,000.00
		SUBTOTAL:	$466,500.00
		Mobilization @ 3%	$13,995.00
		Drainage @ 5%	$23,325.00
		Contingency (40%)	$186,600.00
		MassDOT Construction Contingency (25%)	$116,625.00
		Construction Total	$807,045.00

* Prices Based on Weighted Average Bid Prices (August 2016)

SAY:	$810,000.00

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Upper Charles River Trail Phase VII
Hopkinton, Massachusetts
December 29, 2017

Echo Trail - Estimated Construction Cost			Total Cost
Segment 4	3000 LF	$	375,667
Total Echo Trail Project Length	3000 LF		

SUBTOTAL:	$	375,667
Mobilization (3%)	$	11,270
Drainage (5%)	$	18,783
Contingency (40%)	$	150,267
MassDOT Construction Contingency (25%)	$	93,917
	$	649,903
SAY:	$	650,000

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Upper Charles River Trail - Phase VII
Echo Trail (3000 LF+/-)
Hopkinton, Massachusetts
December 18, 2017

Segment Length (ft)	3000
Impact Width (ft)	20
Proposed Section (1-4)	4
Proposed Grade of Section (%)	<5%

Description	Unit Price	Quantity	Total Cost
Full Depth Pavement - Bikeway (Including Excavation)	$60.00 /SY	4,000 SY	$240,000.00
Loam Borrow & Seed	$8.00 /SY	1,333 SY	$10,666.67
Signing, Striping & Pavement Markings	$5,000.00 /LS	1 LS	$5,000.00
Clearing and Grubbing	$5.00 /SY	3,333 SY	$16,666.67
Erosion Control Barrier	$7.50 /FT	6,000 FT	$45,000.00
Additional Earthwork (25% of total length)	$35.00 /CY	1,667 CY	$58,333.33
		SUBTOTAL:	$375,666.67
		Mobilization @ 3%	$11,270.00
		Drainage @ 5%	$18,783.33
		Contingency (40%)	$150,266.67
		MassDOT Construction Contingency (25%)	$93,916.67
		Construction Total	$649,903.33
		SAY:	**$650,000.00**

* Prices Based on Weighted Average Bid Prices (August 2016)