Memorandum

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

Date: July 14, 2017

Project #: 13539.00

From: Jack Madden, PE

Re: Center Trail Connection
Phase 4 Feasibility Study
Hopkinton, MA

1.1 Project Background

This Feasibility Report includes existing conditions, feasible alternatives, impacts, estimated construction costs, and anticipated permitting actions associated with the design and construction of a Shared Use Path (SUP) connecting the existing Upper Charles Trail parking lot in neighboring Milford, MA (Parking Lot) with potential connections to the existing Center Trail being investigated along the Hayden Rowe (SR 85) corridor between the Milford-Hopkinton town line to Grove Street in Hopkinton. Specifically, the study looks at the impact of bicycle-pedestrian facility types within the existing Right of Way of SR 85 (ROW). 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 Project Area consists primarily of the ROW between the Parking Lot access approximately 300 feet south of the Milford-Hopkinton town line to the Hopkins School driveway (Loop Road) south of the intersection of SR85 and Grove Street, a distance of approximately 2.1 miles.

The Project Area was determined based on the UCTC's desire to connect possible future segments of the complete SUP alignment as defined in separate feasibility studies (see Phases 1 and 2). The UCTC believes that, due to limited availability of Town-owned property upon which to align an off-road facility directly between the Parking Lot and the Center Trail, the use of the SR85 to make connections where needed would be a practical alternative. The exact access points and connections have yet to be determined.

2.2 Project Area General Land Uses

SR 85, locally identified as Hayden Rowe Street, is the major surface north-south corridor through Hopkinton, MA classified by the Massachusetts Department of Transportation (MassDOT) as an "urban minor arterial". SR 85 is not on the National Highway System (NHS) and it is a Town-maintained road. From the MassDOT Functional Classification:

> "[Full Access Minor Arterials]" provide a lower level of regional connectivity than principal arterials, by linking towns and cities together. These roadways can provide the highest level of mobility through rural areas without principal arterials, while providing important connections between the principle arterial and collector network in urban areas. Vehicular speeds vary between 25 M.P.H. in urban areas to as high as 55 M.P.H. in rural areas. These roadways support intra county level shopping centers, moderate residential development, and travel through many urban town centers.

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1 Cedar Street
Suite 400
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P 401.272.8100

SR 85 passes through moderately dense residential and commercial development that increases in density as one travels toward the northern end of the study limits. The Town Elementary, Middle and High Schools are accessed by SR85 including a newly constructed Elementary School on the East Side of SR85 between Chamberlain Street and Hilltop Road.

Figure 1: Showing the Project Area and Town Owned Parcels (White Shading)

3.1 Design Policy Related to Bicycle and Pedestrian Accommodation

The US Department of Transportation (USDOT) policy and the 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 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.

In the March 31, 2017 letter regarding Chapter 90 apportionment for Fiscal Year 2018, the State encourages the Town of Hopkinton to explore opportunities for additional infrastructure funding through MassDOT's Complete Streets and Municipal Small Bridge Programs. The Contact for these programs is MassDOT Community Relations Director Rick Colon (857)368-9010.

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-Use Path

Rail-with-Trail

- **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/Side 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** – A rail-with-trail is a SUP parallel and adjacent to a railroad.

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- **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 Guidance

The project criteria has 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 Engineering Directive E-14-006, *Design Criteria for MassDOT Highway Division Projects*, 12/19/2014.
- 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

Based on discussions with the Upper Charles Trail Committee (UCTC), the future connection between the existing UCT trail in Milford and the existing Center Trail in the Center of Hopkinton will fill a gap in the regional non-motorized transportation network. The preferred facility type would be one which offers complete separation from vehicular traffic and would be used by bicyclists, pedestrains, and other non-motorized users of all ages.

While this desired facility has been recommended along other segments and within other phases of the proposed SUP, minimum required roadway dimensions per MassDOT will influence the type of facility that will best fit within the available ROW. This study will look at a range of trail types that are be considered appropriate per State and Federal guidelines.

The analysis of Alternatives will assume the following:

- The state ROW is 50 wide except where evidence has been found to suggest otherwise. Town parcel information has been acquired from the MassGIS database.
- The existing centerline is located directly in the center of the corresponding State Highway Lines.

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- The existing centerline is the crown of the roadway and will be maintained in the evaluation of the alternatives. Any alteration to the centerline of the road will require a full-depth reconstruction of the roadway and full compliance with current MassDOT standards.

SR85 within our study area can be broken down into four distinct segments (see Figure 2):

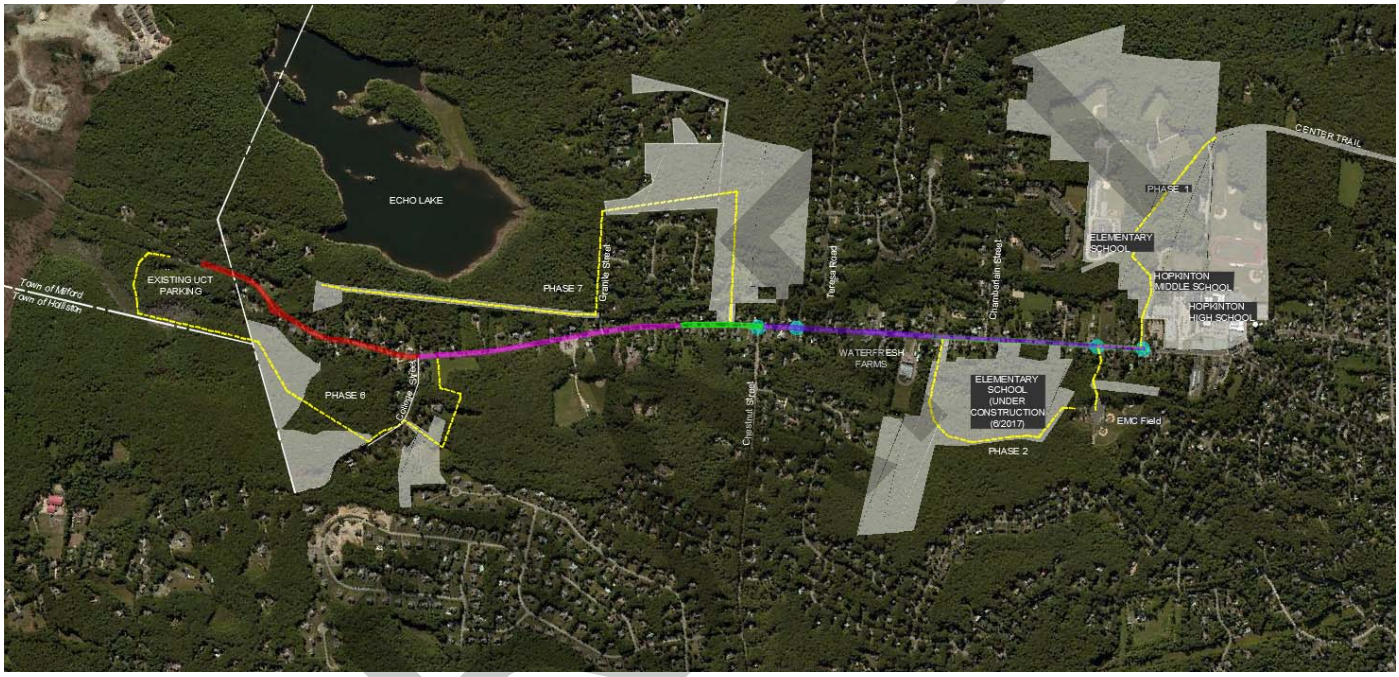

Figure 2: Showing the Segments within the Study Area.

For all Proposed Alternatives below, see attached figures

<u>Segment 1</u> (Red)

<u>Description</u>

Segment 1 is defined as the length of SR 85 between the Parking Lot and the northern corner of the intersection with College Street (0.52 mi). Pavement width is 28' +/- with 12' travel lanes in each direction and 2'+/- shoulders on either side. ROW is 50'Wide. The roadway can be described as "winding", with moderate changes to the horizontal and vertical curvature throughout. Sightlines are limited due to roadside trees, utility poles and rock outcroppings immediately adjacent to the edge of pavement that further narrow the corridor. The road is crowned at the centerline and water is shed off the edge of pavement. As one travels north of the Parking lot towards College Street, driveways become more frequent and houses sit closer to the roadway.

Posted speed is 30mph.

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Proposed Alternatives

- **Alternative 1A:** A 10' wide bi-directional Side Path along the east shoulder is proposed between the Parking Lot and College Street. The east side is recommended because of the challenge of providing a safe pedestrian crossing of SR 85 through this segment.
    - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians. No crossing of SR85 would be required.
    - Impacts: Relocating utility poles, removing ledge, permanent ROW taking of a 6'-wide swath of frontage along the entire State Highway Line.
- **Alternative 1B:** 5-6' wide Side Path along shoulder on both sides of road is proposed between the Parking Lot and College Street. This option would require a crossing of SR85.
    - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
    - Impacts: Relocating utility poles, removing ledge.
- **Alternative 1C:** 5-6' wide Shoulder Bike Lanes on both sides of road is proposed between the Parking Lot and College Street. Some traffic separation is provided with a 3' wide painted buffer. The bike lane and the buffer qualify for MassDOT's shoulder requirement for the State's functional classification of this roadway. This option would require a crossing of SR85.
    - Benefits: On-road, buffered, bicycle facility would make on-road connection towards the center trail for bicycles.
    - Impacts: Relocating utility poles, removing ledge.

Segment 2 (Magenta)

Description

Segment 2 is defined as the length of SR 85 between the north corner of College Street and 204 Hayden Rowe Street (0.57 mi). Pavement width is 30' +/- with 12' travel lanes in each direction and 3'+/- shoulders on either side. ROW is 50'Wide. The roadway can be described as straight with minimal changes to the vertical alignment. Sightlines are good with an increase in frequency of driveway openings as one travels north. North of Granite Street, on the west side of the road there is a 3' bituminous sidewalk separated from the shoulder with a bituminous berm and a 2' grass strip. The road is crowned at the centerline and water is shed off the edge of pavement. Overhead utilities run along the east side.

Posted speed is 40 mph.

Proposed Alternatives

- **Alternative 2A:** A 10' wide bi-directional Side Path along the west shoulder is proposed between College Street and 204 Hayden Rowe Street. The west side is recommended because of the utility poles and

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overhead wires on the east side, suitable crossing conditions, and the potential of future access to the existing Wyckoff Trail to the west (see phase 7).

- Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
- Impacts: Permanent ROW taking of a 4'-wide swath of frontage along the entire west side State Highway Line.

- **Alternative 2B:** 5-6' wide Side Path along shoulder on both sides of road is proposed between College Street and 204 Hayden Rowe Street.
  - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
  - Impacts: Relocating utility poles on east side.
- **Alternative 2C:** 5-6' wide Shoulder Bike Lanes on both sides of road is proposed between College Street and 204 Hayden Rowe Street. Some traffic separation is provided with a 3' wide painted buffer. The bike lane and the buffer qualify for MassDOT's shoulder requirement for the State's functional classification of this roadway.
  - Benefits: On-road, buffered, bicycle facility would make an on-road connection towards the center trail for bicycles.
  - Impacts: minimal

Segment 3 (Green)

Segment 3 is defined as the length of SR 85 approaching the Chestnut Street Intersection between 204 Hayden Rowe Street and the northern corner of the intersection with Chestnut Street (0.17 mi). Pavement width is 30' +/- with 12' travel lanes in each direction and 3'+/- shoulders on either side. ROW is 52'Wide. The roadway can be described as straight with minimal changes to the vertical alignment. Sightlines are good with frequent of driveway openings. On the west side of the road, there is a 5' concrete sidewalk separated from the shoulder with a bituminous berm and an 8' grass strip. There is bituminous berm along the east side shoulder. The road is crowned at the centerline and water is shed off the edge of pavement. Overhead utilities run along the east side.

Posted speed is 40 mph.

Proposed Alternatives

- **Alternative 3A:** A 10' wide bi-directional Side Path along the west shoulder is proposed between 204 Hayden Rowe Street and the north side of the Chestnut Street Intersection. The west side is recommended because of the utility poles and overhead wires on the east side, suitable crossing conditions and the possibility of accessing Town-owned property to the west from the Town-owned lot at 192 Hayden Rowe Street (see phase 7)

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- Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
- Impacts: minimal

- **Alternative 3B:** 5-6' wide Side Path along shoulder on both sides of road is proposed between 204 Hayden Rowe Street and the north side of the Chestnut Street Intersection.
  - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
  - Impacts: Relocating utility poles on east side.
- **Alternative 3C:** 5-6' wide Shoulder Bike Lanes on both sides of road is proposed between 204 Hayden Rowe Street and the north side of the Chestnut Street Intersection. Some traffic separation is provided with a 3' wide painted buffer. The bike lane and the buffer qualify for MassDOT's shoulder requirement for the State's functional classification of this roadway.
  - Benefits: On-road, buffered, bicycle facility would make an on-road connection towards the center trail for bicycles.
  - Impacts: Relocating utility poles, removing ledge.

Segment 4 (Purple)

Segment 4 is defined as the length of SR 85 between the northern corner of the intersection with Chestnut Street and the Loop Road Entrance (0.82 mi). Pavement width is 30' +/- with 12' travel lanes in each direction and 3'+/- shoulders on either side. ROW is 50'Wide. The roadway can be described as straight with minimal changes to the vertical alignment. Sightlines are good with frequent of driveway openings. On the west side of the road, there is a 5' concrete sidewalk separated from the shoulder with a granite curb. There is an existing bituminous berm along the east side shoulder. **The Town of Hopkinton is currently in design of a 5' wide bituminous sidewalk on the east side that will connect the northeast corner of Chestnut to the EMC Field driveway.** The road is crowned at the centerline and water is shed off the edge of pavement. Overhead utilities run along the east side.

Proposed Alternatives

- **Alternative 4A:** A 10' wide bi-directional Side Path along the east shoulder is proposed between the Chestnut Street Intersection and the Loop Road. The east side is recommended because the Town is currently proposing new 5' wide bituminous sidewalks along the east side of Hayden Rowe within these limits; there is a new Elementary school under construction, and there the possibility of accessing Town-owned property to the east from the Town-owned lot at 147 Hayden Rowe Street to make the connection to the Center Trail (see phase 2).
  - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.

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  - Impacts: Permanent ROW taking of a 4'-wide swath of frontage along the entire State Highway Line; Utility poles; Fire Hydrants.

- **Alternative 4B:** 5-6' wide Side Path along shoulder on both sides of road is proposed between the Chestnut Street Intersection and the Loop Road.
  - Benefits: Easy to access Shared Use Path would provide traffic-separated transportation and recreation facility for bicyclists and pedestrians.
  - Impacts: Relocating utility poles on east side, reclaiming substantial property encroachments into ROW on west side.
- **Alternative 4C:** 5-6' wide Shoulder Bike Lanes on both sides of road is proposed between the Chestnut Street Intersection and the Loop Road. Some traffic separation is provided with a 3' wide painted buffer. The bike lane and the buffer qualify for MassDOT's shoulder requirement for the State's functional classification of this roadway.
  - Benefits: On-road, buffered, bicycle facility would make an on-road connection towards the center trail for bicycles.
  - Impacts: Impacts existing curb and concrete sidewalk and drain structures on west side. Does not facilitate the planned sidewalks on the east side.

5.1 General Applicable Environmental Guidance

This Feasibility Report was developed using data provided by the Massachusetts Office of Geographic Information (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 alternatives. 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 three SUP alignments and other criteria for evaluation, 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

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- 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
- 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

Quantities for comparison TBD

5.2.2 Considerations Relating to Pedestrians and Bicyclists

Each of the Alternatives considered will improve the pedestrian and bicyclist's connection from the Parking Lot to the Center Trail. Each alignment was developed in order to maximize the separation of pedestrians and cyclists from vehicular traffic and to maximize safety at crossing locations.

The Alternatives were ranked based on the amount of separation from vehicles.

Alternative A for each segment has the most separation from vehicles. Alternative C has the least separation from vehicles.

5.2.3 Air Quality Impacts

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

5.2.4 Noise Impacts

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

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5.2.5 Impacts to Outstanding Resource Water

Quantities for comparison TBD

5.2.6 Impacts to Wetlands

Quantities for comparison TBD

5.2.7 100 Year Floodplain Impacts

Quantities for comparison TBD

5.2.8 Certified Vernal Pools

Quantities for comparison TBD

5.2.9 NHESP Priority and Estimated Habitat

Quantities for comparison TBD

5.2.10 Areas of Critical Environmental Concern

Quantities for comparison TBD

5.2.11 National Register Historic Properties and Districts

Quantities for comparison TBD

5.2.12 Hazardous Materials Sites

Quantities for comparison TBD

5.2.13 Construction Impacts

Quantities for comparison TBD

5.2.14 Visual Impacts

Quantities for comparison TBD

5.2.15 Public Utilities

Utilities encountered in the project corridor include overhead pole-mounted electric transmission lines along the east side of SR 85. While several of these Alternatives may impact these overhead lines, there is no significant impact to underground utilities anticipated with the three alternatives proposed.

5.2.16 Public Facilities

Quantities for comparison TBD **5.2.17 Environmental Justice**

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

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5.2.18 Construction Cost

Quantities for comparison TBD **5.2.19**

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 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 alternatives presented comply 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.

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 three alternative alignments were scored based the favorability of the 19 criteria described above. Scoring was based on which alternative was the most effective or had the least impact for each of the criteria. A score of 3 was the most favorable, while a score of 1 was the least favorable. The scores were totaled for each to arrive at the final score to determine the most favorable alternative overall.

Scoring results TBD.

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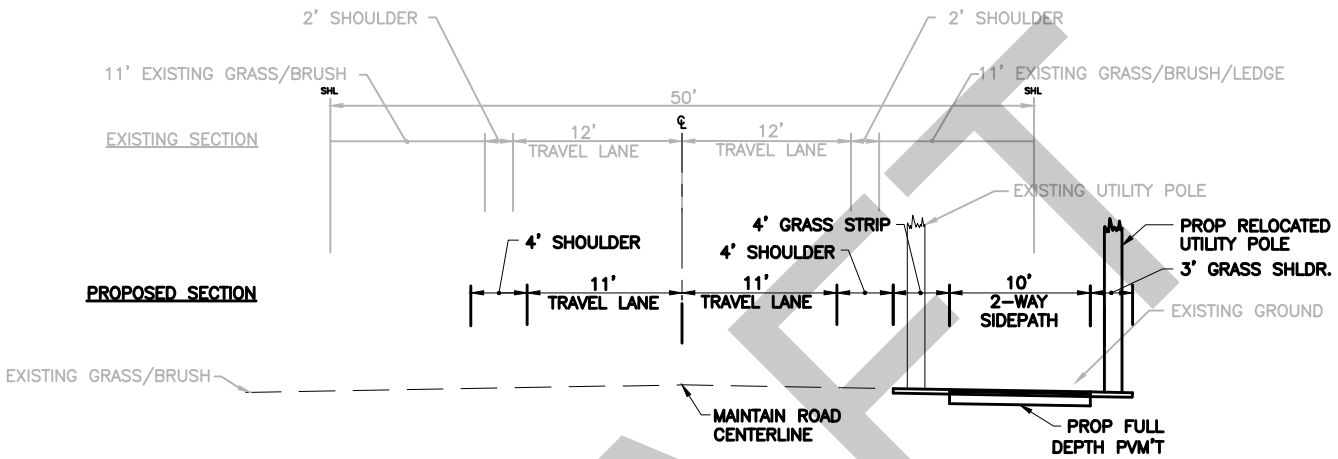

ALTERNATIVE 1A

SEPARATED TWO-WAY SIDEPATH

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EXISTING SECTION

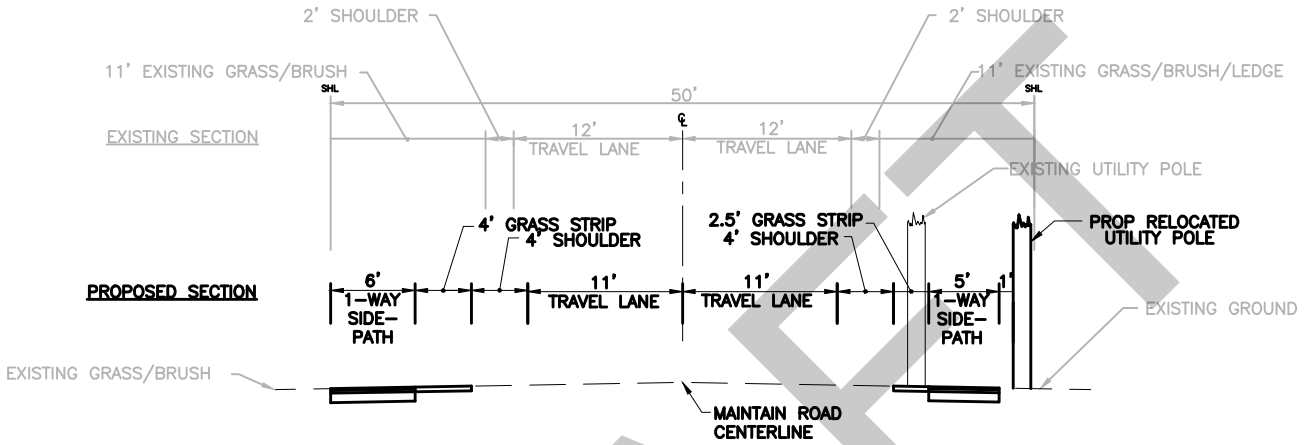
HAYDEN ROWE STREET (SR85)
UCT PARKING LOT TO COLLEGE ST.
LOOKING NORTH

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



ALTERNATIVE 1B

SEPARATED SIDEPATH, BOTH SIDES

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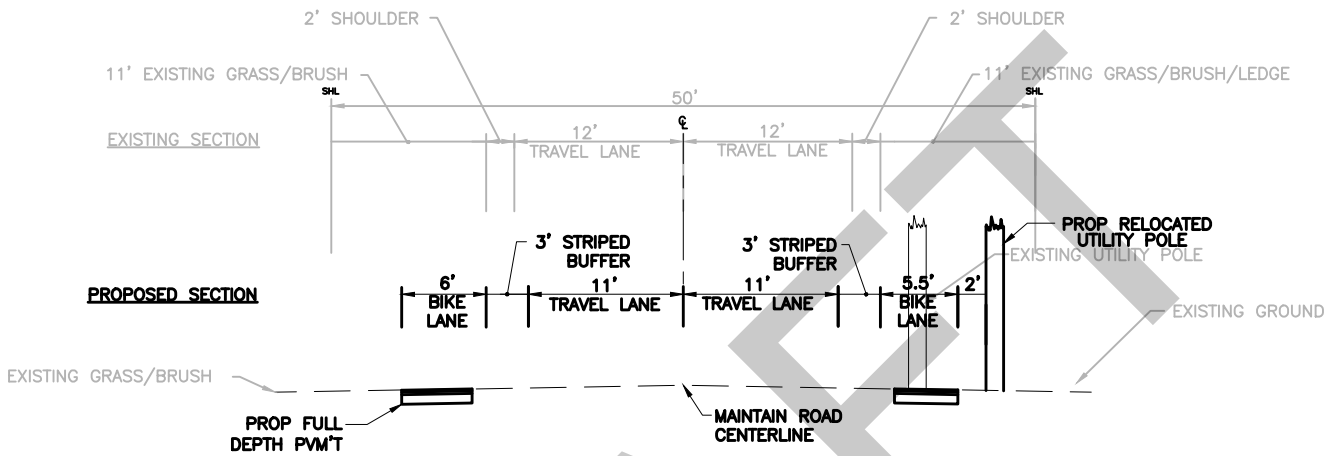
EXISTING SECTION

HAYDEN ROWE STREET (SR85)
UCT PARKING LOT TO COLLEGE ST.
LOOKING 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



ALTERNATIVE 1C

SHOULDER BIKE LANES

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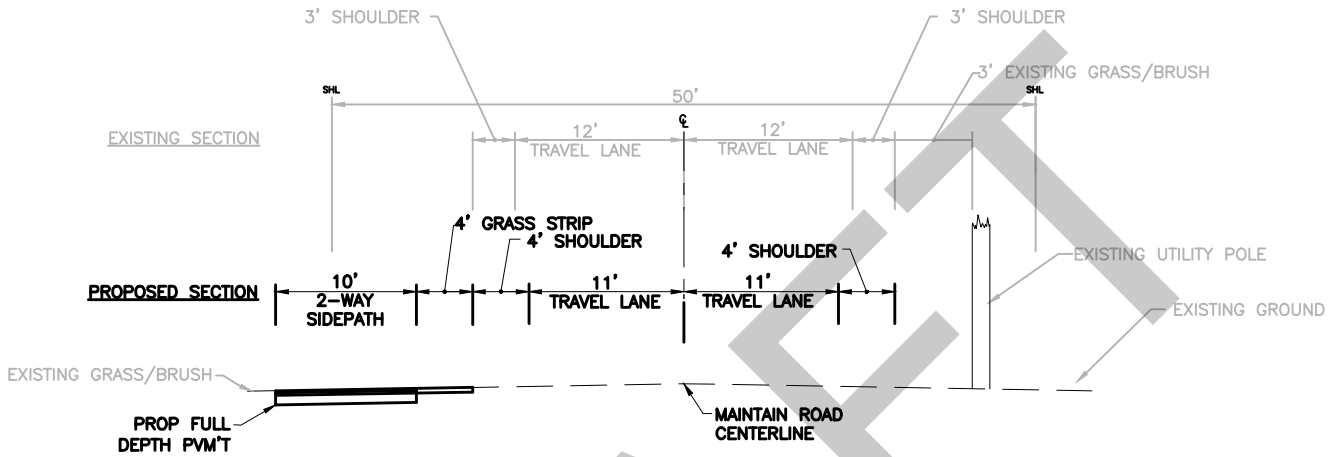
EXISTING SECTION

HAYDEN ROWE STREET (SR85)
UCT PARKING LOT TO COLLEGE ST.
LOOKING 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



ALTERNATIVE 2A

SEPARATED TWO-WAY SIDEPATH

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EXISTING SECTION

HAYDEN ROWE STREET (SR85)
COLLEGE ST. TO 204 HAYDEN ROWE ST.
LOOKING NORTH

PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT

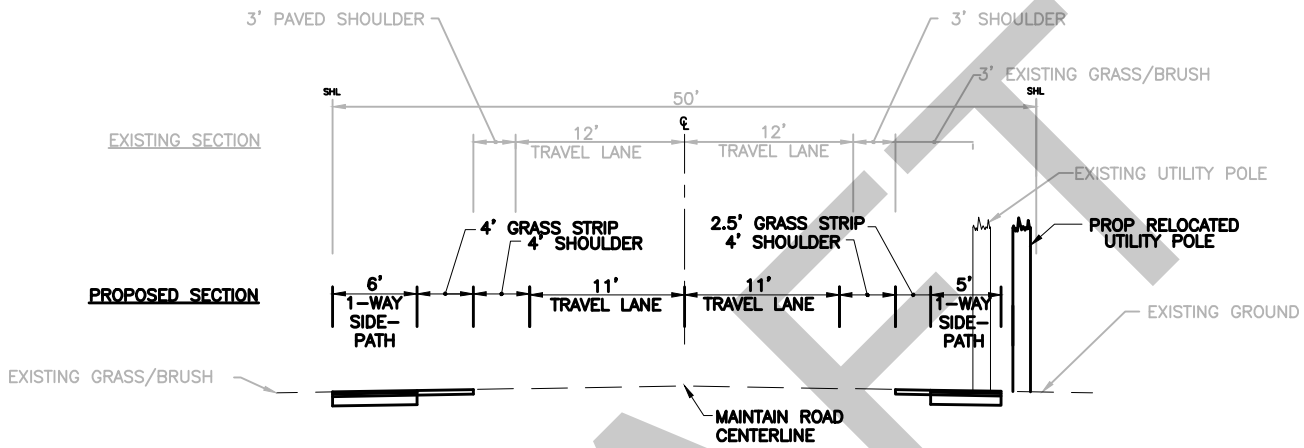
SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER 2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Segment 2 - Typical Section
Feasibility Study - Phase 4
Upper Charles River Trail
Hopkinton, MA

Alternative 2A

7/14/2017



ALTERNATIVE 2B

SEPARATED SIDEPATH BOTH SIDES

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EXISTING SECTION

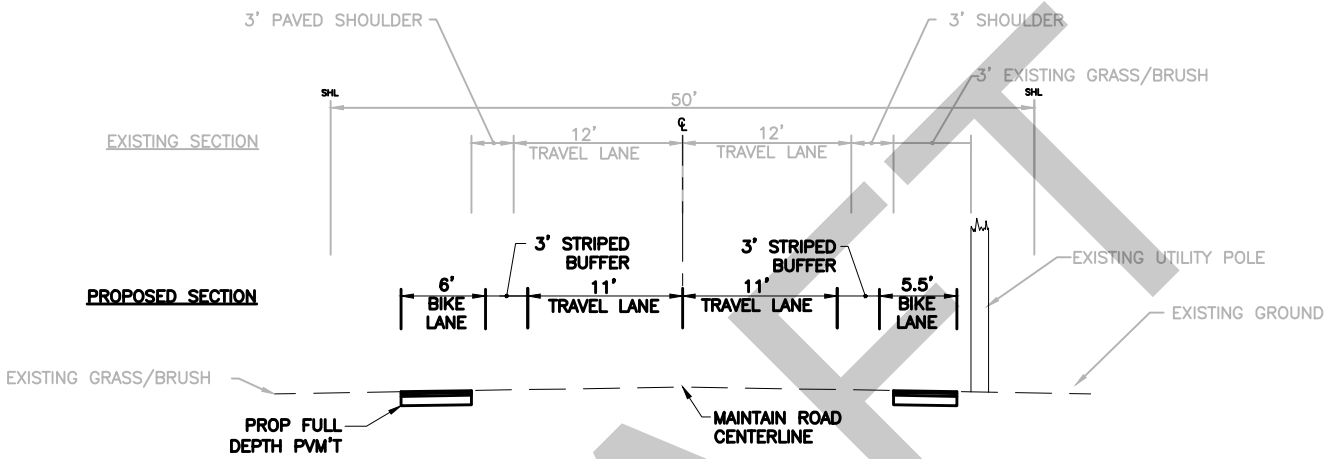
HAYDEN ROWE STREET (SR85)
COLLEGE ST. TO 204 HAYDEN ROWE ST.
LOOKING NORTH

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



ALTERNATIVE 2C

SHOULDER BIKE LANES

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EXISTING SECTION

HAYDEN ROWE STREET (SR85)
COLLEGE ST. TO 204 HAYDEN ROWE ST.
LOOKING NORTH

PAVEMENT NOTES:

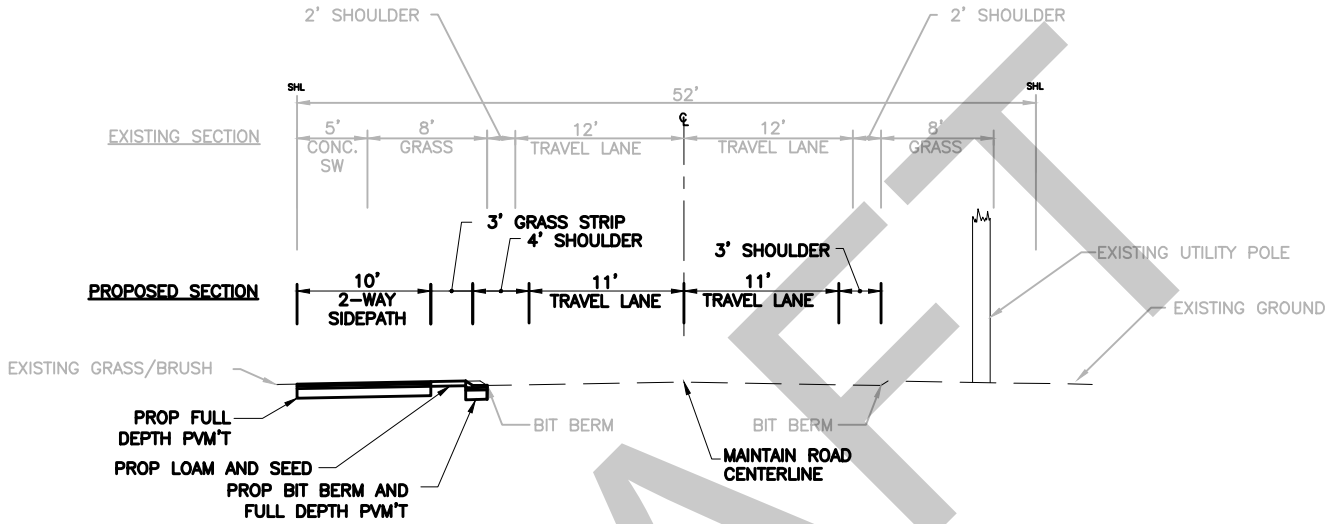
PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER 2–1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC–19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Segment 2 - Typical Section
Feasibility Study - Phase 4
Upper Charles River Trail
Hopkinton, MA

Alternative 2C

7/14/2017



ALTERNATIVE 3A

SEPARATED TWO-WAY SIDEPATH

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EXISTING SECTION

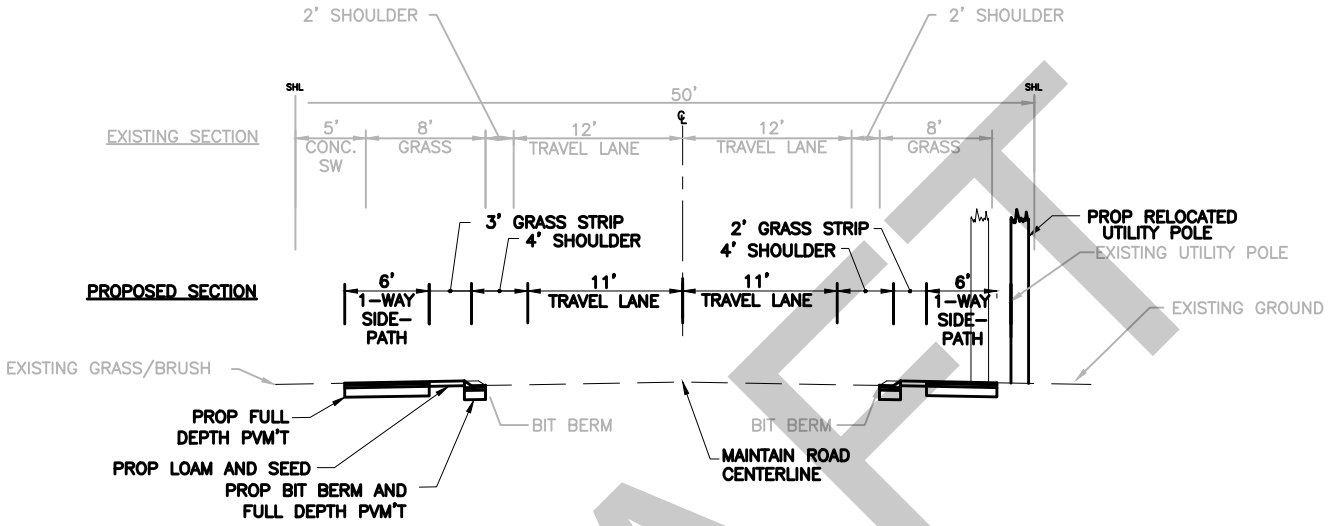
HAYDEN ROWE STREET (SR85)
204 HAYDEN ROWE ST. TO CHESTNUT STRET
LOOKING NORTH

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



ALTERNATIVE 3B

SEPARATED SIDEPATH, BOTH SIDES

DRAFT

EXISTING SECTION

HAYDEN ROWE STREET (SR85)
204 HAYDEN ROWE ST. TO CHESTNUT STRET
LOOKING NORTH

PAVEMENT NOTES:

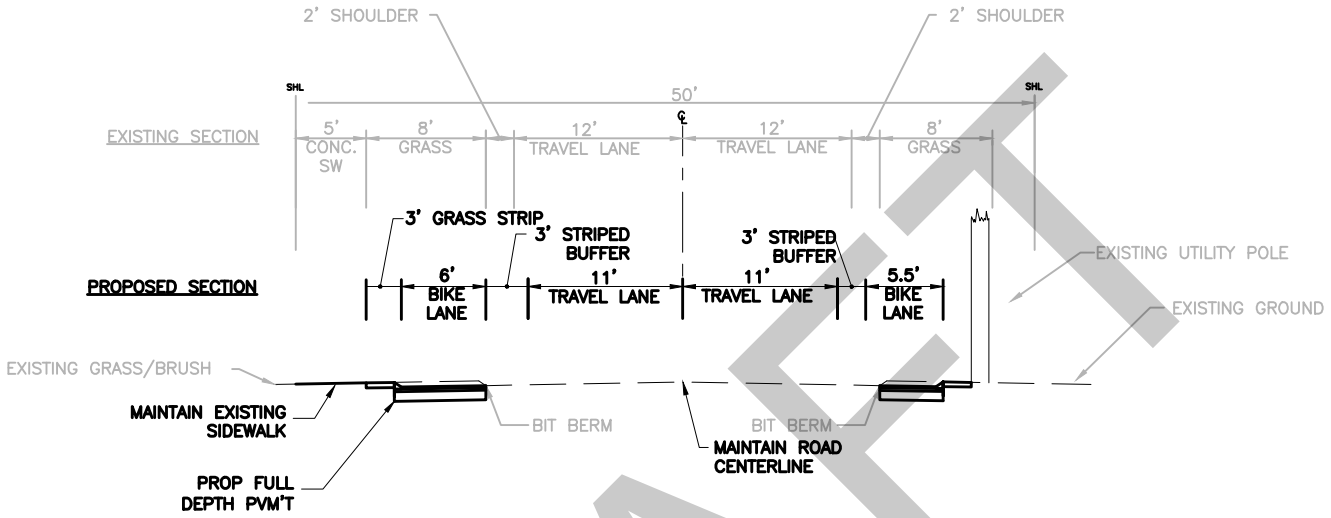
PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER
2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Segment 3 - Typical Section
Feasibility Study - Phase 4
Upper Charles River Trail
Hopkinton, MA

Alternative 3B

7/14/2017



ALTERNATIVE 3C

SHOULDER BIKE LANES

DRAFT

EXISTING SECTION

HAYDEN ROWE STREET (SR85)
204 HAYDEN ROWE ST. TO CHESTNUT STRET
LOOKING NORTH

PAVEMENT NOTES:

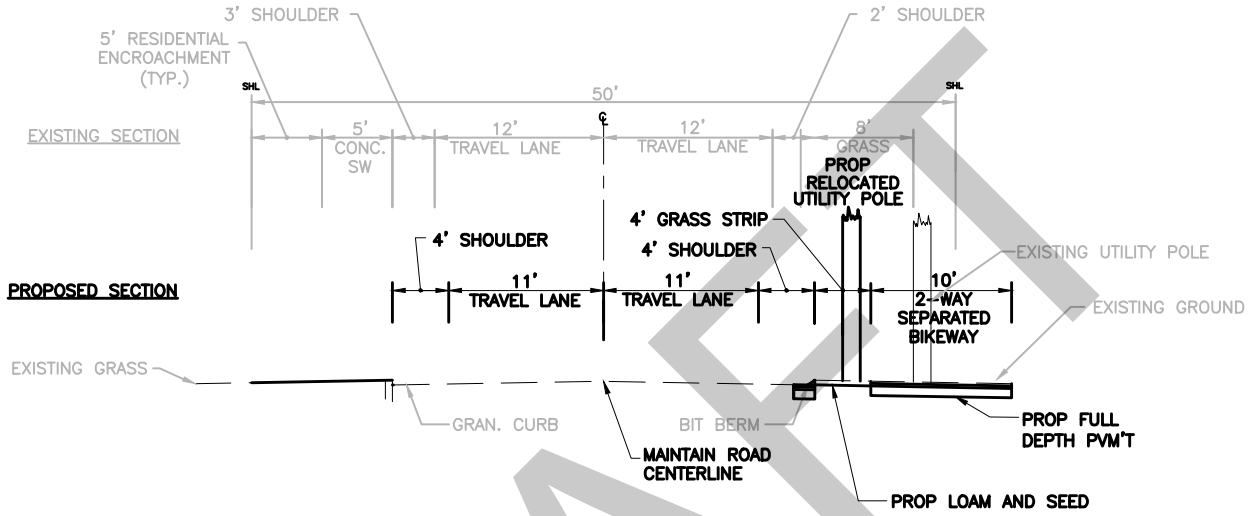
PROPOSED FULL DEPTH PAVEMENT
SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER 2–1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC–19.0) OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

Segment 3 - Typical Section
Feasibility Study - Phase 4
Upper Charles River Trail
Hopkinton, MA

Alternative 3C

7/14/2017



ALTERNATIVE 4A

SEPARATED TWO-WAY SIDEPATH

DRAFT

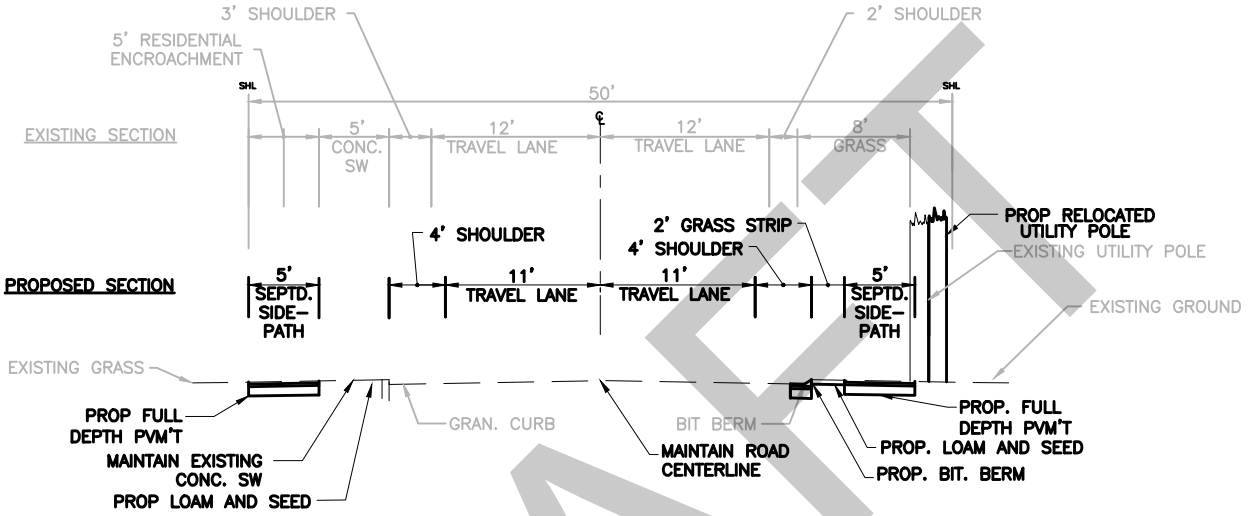
EXISTING SECTION

HAYDEN ROWE STREET (SR85)
CHESTNUT STRET TO THE LOOP ROAD ENTRANCE
LOOKING 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



ALTERNATIVE 4B

SEPARATED SIDEPATH, BOTH SIDES

DRAFT

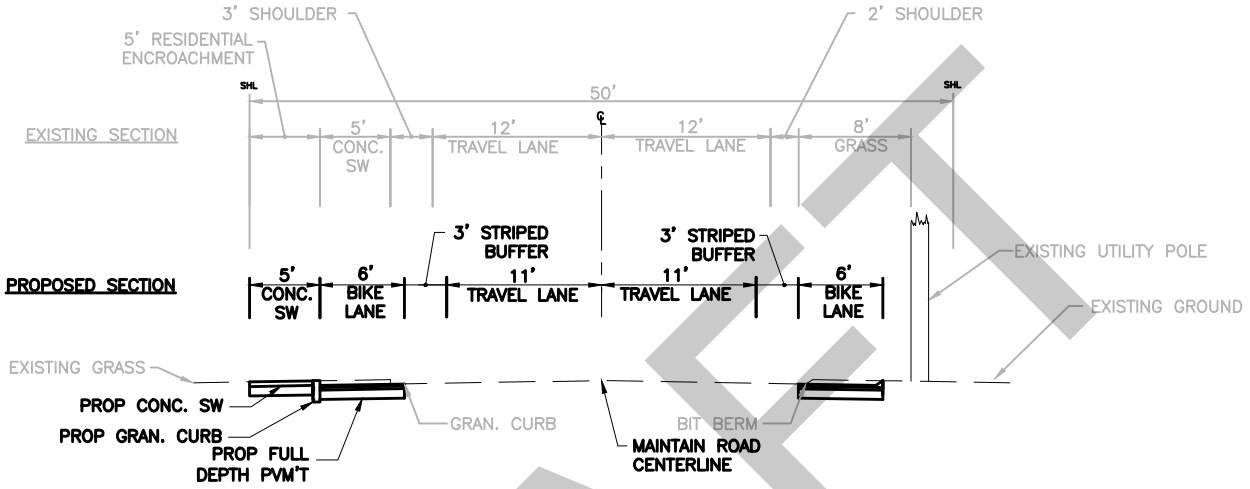
EXISTING SECTION

HAYDEN ROWE STREET (SR85)
CHESTNUT STRET TO THE LOOP ROAD ENTRANCE
LOOKING 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



ALTERNATIVE 4C

SHOULDER BIKE LANES

DRAFT

EXISTING SECTION

HAYDEN ROWE STREET (SR85)
CHESTNUT STRET TO THE LOOP ROAD ENTRANCE
LOOKING 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