

Design and Construction of Asphalt Paved Shared Use Paths

Representative Project:

Norwottuck Rail Trail
Rehabilitation

Amherst/Hadley/Northampton

Presenter:

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MassDOT Highway Design



Outline

□ Design Standards

- AASHTO
- ADA
- MassDOT

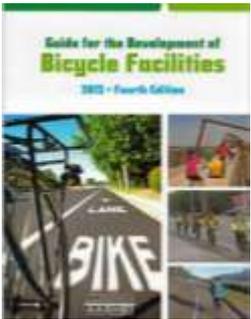
□ Design of Shared Use Path

- Design Elements
- Roadway Crossings
- Infrastructure Components

□ Representative Project

- Norwottuck Rail Trail (from design to construction)

Design Standards



- ❑ **Guide for the Development of Bicycle Facilities (2012)**
 - Published by the American Association of State Highway and Transportation Officials (AASHTO)
 - Federal Highway guidelines for all on-road and off-road bicycle facilities



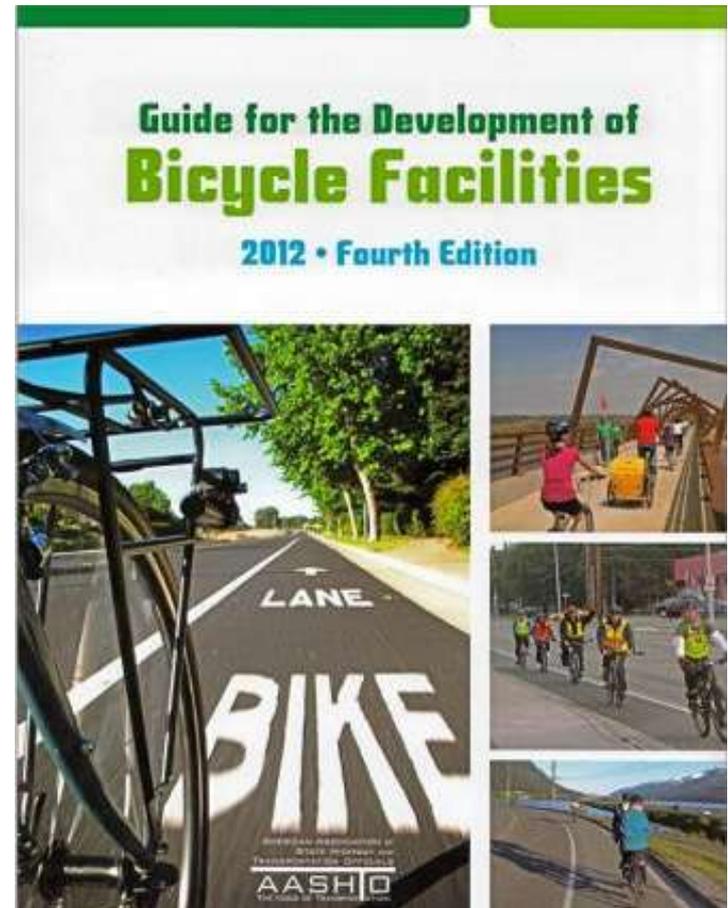
- ❑ **Public Right-of-Way Accessibility Guidelines (2011)**
 - Published by the United States Access Board
 - Supplementing the Americans with Disabilities Act (ADA) and Architectural Access Board (ABA) Guidelines to further address access for persons with disabilities.



- ❑ **Massachusetts Highway Department Project Development & Design Guide (2006)**

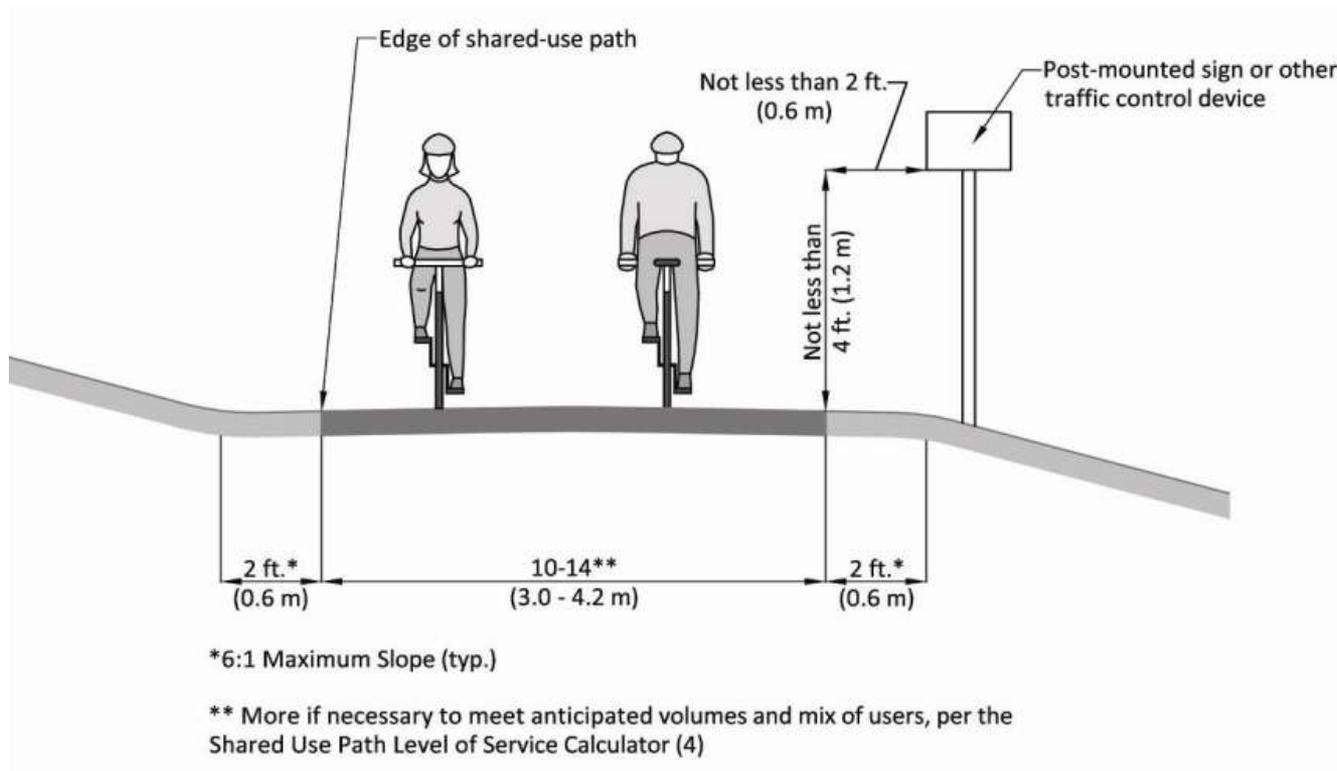
Design of Shared Use Paths

- ❑ **Elements of Design**
 - Path Width
 - Grade / Slope
 - Drainage
 - Lighting
- ❑ **Roadway Crossing**
 - Mid-Block Crossing
 - Path Alignment
- ❑ **Infrastructure**
 - Bridges
 - Railings
 - Tunnels



Design Elements

□ Path Width and Clearance



Source: AASHTO Guide for the Development of Bicycle Facilities

Design Elements

□ **Grade / Slope**

- **Designed to Meet ADA standards (5% Maximum)**
- **Slopes should be kept to a minimum**

□ **Drainage**

- **Should be designed to adequately direct rainfall away from shared use path**
- **Use a minimum slope of 1% in any direction to prevent water from ponding.**
- **Use of drainage ditches along the path are typical**

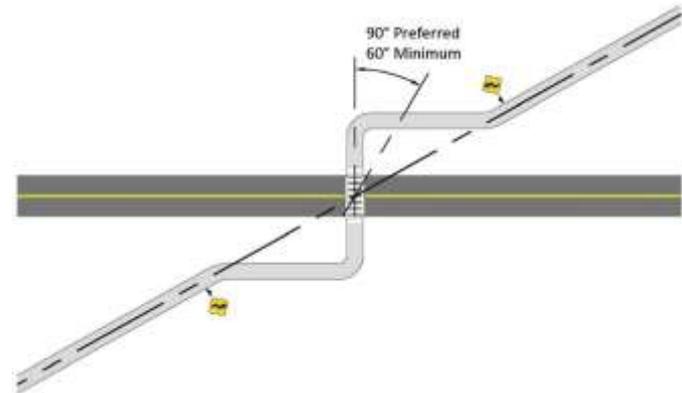
□ **Lighting**

- **Typically only used on paths where high nighttime use is expected**
- **Should be evaluated in high risk areas such as roadway crossing, bridges, or tunnels.**

Roadway Crossing

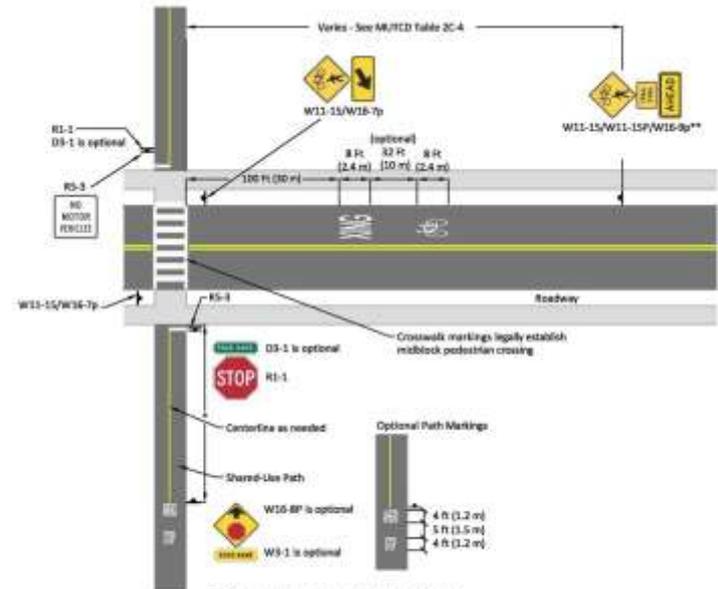
□ Path Alignment

- Best to realign the path to alert users of the upcoming roadway crossing



□ Mid-Block Crossing

- Designs should be apparent to both the user and vehicles
- Sight distance is especially critical
- May be stop controlled, yield controlled, and even Signal controlled
- Proper Signage is important



* Advance warning signs and solid centerline striping should be placed at the required stopping sight distance from the roadway edge but not less than 50 feet (15m).

**W11 series sign is required, supplemental plaques are optional.

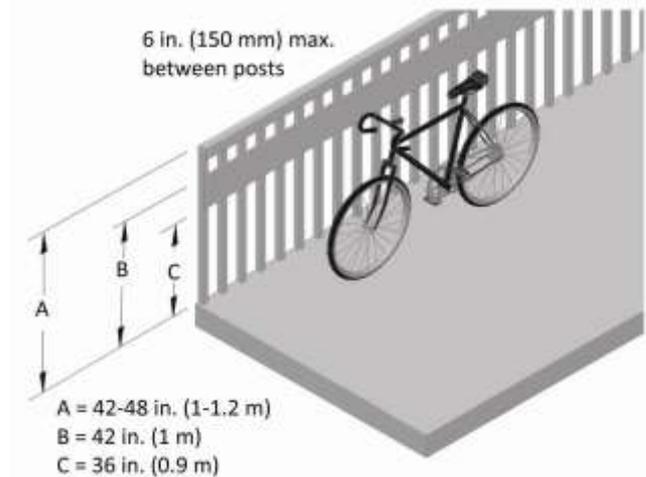
Infrastructure

❑ Bridges and Tunnels

- Designed for pedestrian and emergency vehicle loading
- Should have smooth transitions from path to structure

❑ Railings

- Can be used to protect a steep side slope or a bridge railing
- Must be designed with a bicycle “rub-rail”
- Openings must be a maximum of 6-inch
- Railing height can range from 42” – 48”



Norwottuck Rail Trail Rehabilitation



November
2007

- Project Initiated

January
2013

- Design Completed

November
2014

- Under Construction
- To be Completed in Spring

Purpose & Need

□ Project Purpose

- 18 year old trail requiring extensive repairs and upgrades

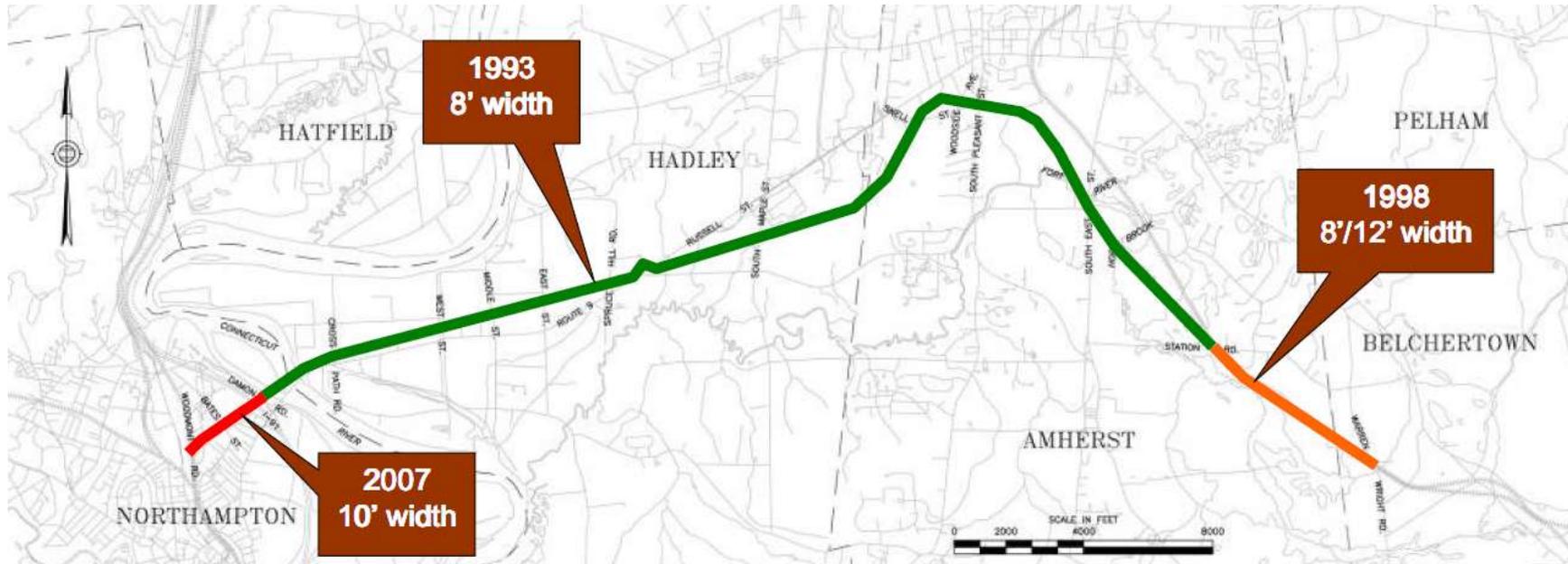
□ Project Need

- Project required safety improvements to riding surface, bridge decks and road crossings
- Heavy use required potential widening of path
- Path required upgrades to meet accessibility requirements

Scope of Work

- ❑ Assessment of existing conditions and natural resources
- ❑ Replacement of existing trail surface
- ❑ Trail widening up to 10-feet where possible
- ❑ Public safety and Universal Access improvements
- ❑ Identification and resolution of drainage, erosion, and tree root problems
- ❑ Upgrades to trail signage
- ❑ Improvements to bridge decks and parking lots

Norwottuck Rail Trail Rehabilitation



- ❑ 1993 – Northampton to Amherst
 - 8.5 miles from Damon Road to Station Road built in 1993
- ❑ 1998 – Amherst/Belchertown
 - 1.5 miles extension from Station Road to Warren Wright Road
- ❑ 2007 – Northampton
 - 0.74 mile extension from Woodmont Road to Damon Road

Design Components



A diagram illustrating the design components for the Norwottuck Rail Trail Rehabilitation. It features a large blue rounded rectangle with the word "Safety" written in white text in the center. This rectangle is connected to a larger, empty blue-outlined rectangle on the right by a horizontal line. A vertical line extends downwards from the left side of the "Safety" box, and another vertical line extends downwards from the bottom of the empty box, with a horizontal line connecting them at the bottom, forming a U-shaped frame around the "Safety" component.

Safety

Glass Aggregate

□ Issue:

- Pavement contains recycled glass aggregate
- Tire punctures



Glass Aggregate

□ Solution:

- Remove and replace pavement



Root Damage

□ Issue:

- Systemic root damage
- Main Culprit: Black Locust and other select species



Root Damage

□ Solution:

- Remove roots as part of path rehabilitation and remove selected trees causing damage



Heavy/Mixed Use

□ Issue:

- Congestion
- Existing 8' width substandard

□ Solution:

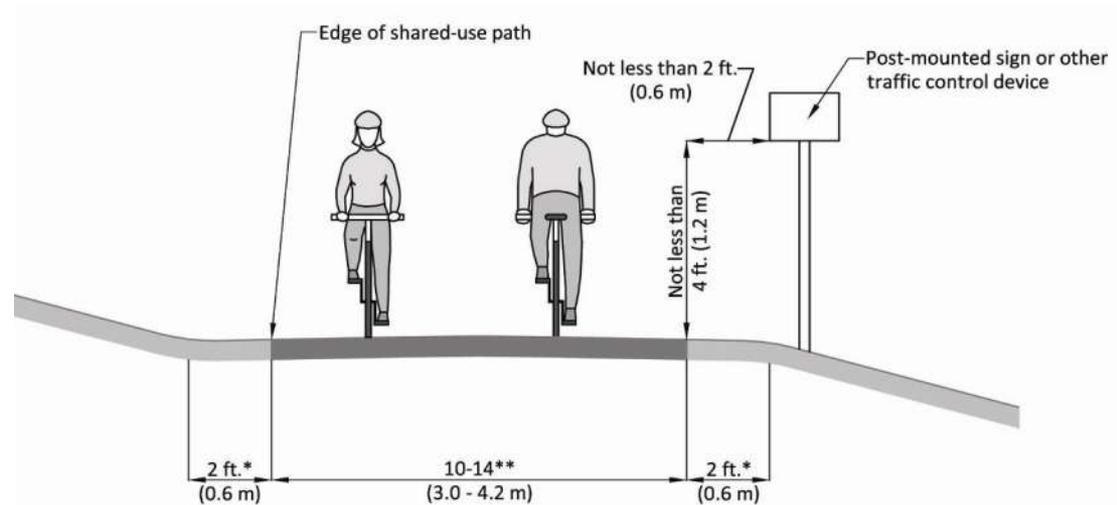
- Widen path where feasible



Trail Widening

□ Issue

- 8' path width is considered substandard for trails with high volume and mixed use. 10' minimum and in many cases 12'-14' are considered more desirable.



*6:1 Maximum Slope (typ.)

** More if necessary to meet anticipated volumes and mix of users, per the Shared Use Path Level of Service Calculator (4)

Trail Widening

❑ Concerns:

- Wetland Impacts
- Tree Cutting

❑ Solutions:

- Widening only in areas where impacts can be avoided
- The path will be rehabilitated at its current width where widening is not possible
- Variable width that minimizes wetland impacts and improves the capacity of the trail (8.33, 9, 9.5, 10 feet)

Proposed 10 FT Path



Cross Path Road



Grampa's Bench

Note: Widening only in areas where impacts can be avoided.

Proposed 9.5 FT Path



East of Route 9 tunnel



Near Wal-Mart

Note: The section from Route 9 tunnel to Wal-Mart is only widening to 9.5 ft to avoid wetland impact.

Maintain Current Width



Spruce Hill Road



Hop Brook

Note: The path will be rehabilitated at its current width where widening is not possible.

Design Components



Path/Infrastructure Repairs

Major Elements

- ❑ **Trail**
 - 11 miles of path
- ❑ **Bridge**
 - 5 major bridges
- ❑ **Tunnels**
 - 3 box culverts



Bridge Work

❑ Bridges:

- Old Cattle Pass
- Fort River
- Southeast Street
- Hop Brook



❑ Issues:

- Old wood railings and decking
- Narrow 10' width



Bridge Work

□ Solutions:

- Replace wood decking and wood railing
- Widen Bridges (10ft exist.)
 - Cattle Pass (13 Feet)
 - Fort River (12 Feet)
 - S. East St. (12 Feet)
 - Hop Brook (13 Feet)



Tunnel Lighting

□ Issue:

- Tunnels are poorly lit
- Old Fixtures w/ poor efficiency



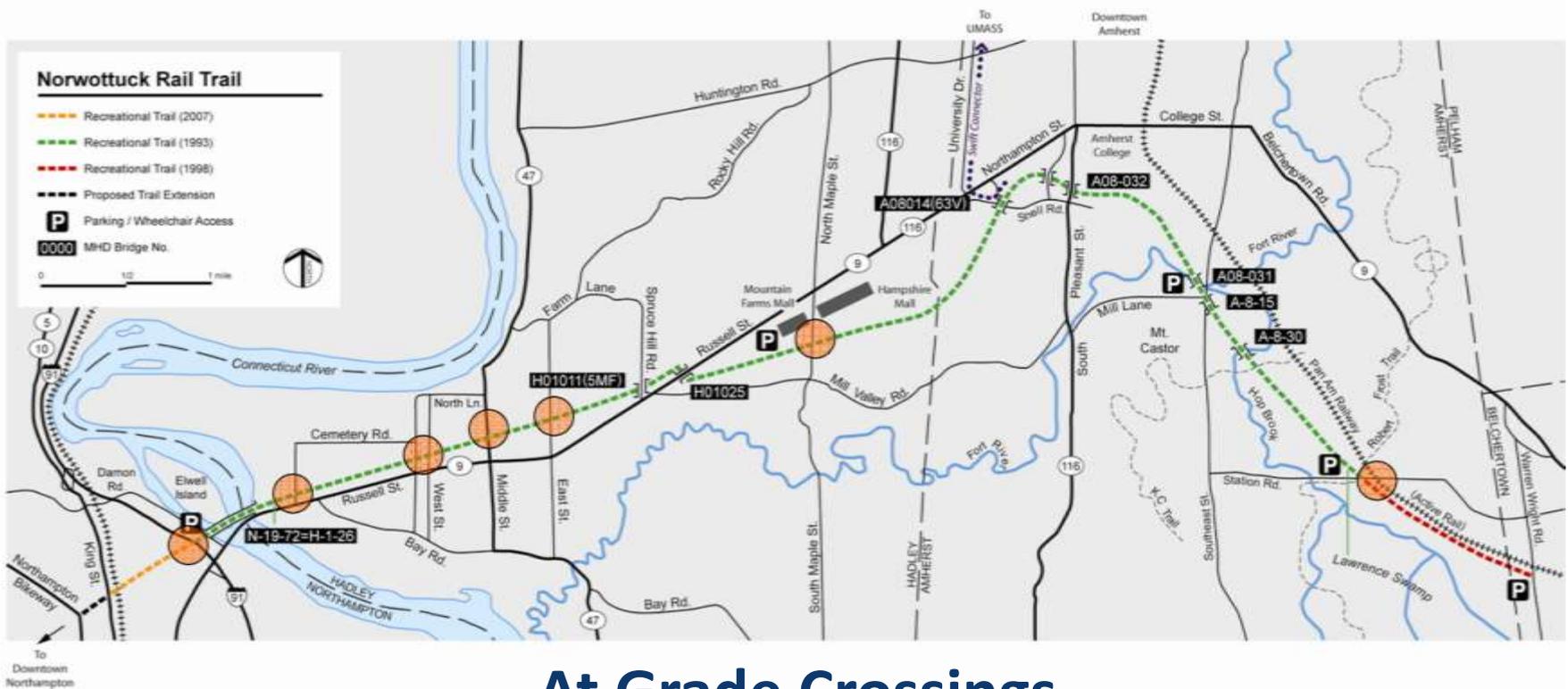
Tunnel Lighting

□ Solution:

- Install new LED high efficiency fixtures
- Add additional fixtures to improve lighting



Norwottuck Rail Trail Rehabilitation



At Grade Crossings

- Damon Road
- Cross Path Road
- West Street
- Middle Street
- East Street
- South Maple Street
- Station Road

Street Crossing

❑ Issue:

- Faded old signs
- Poorly Marked



Street Crossing

□ Solution:

- Improved Signage
- Pavement Markings
- Splitter Islands

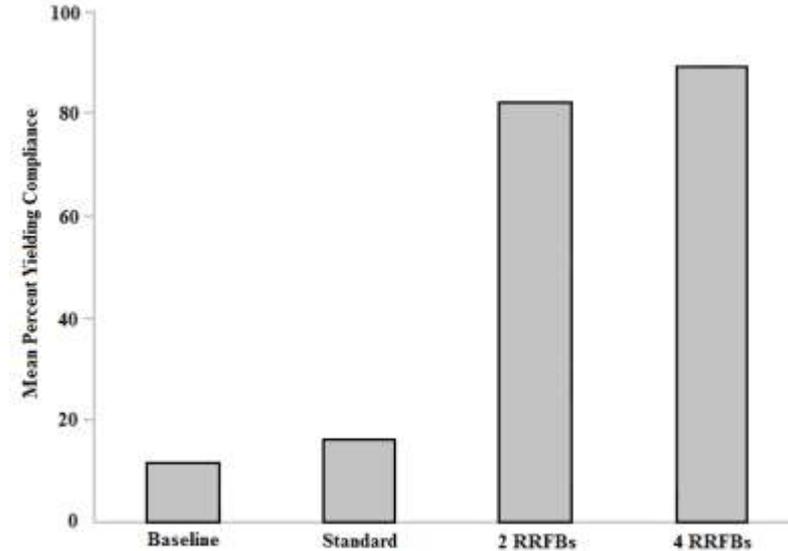


South Maple Street



Rectangular Rapid Flashing Beacon

RRFB's are user-activated amber flashing LED's to supplement warning signs at mid-block crossings. They will be activated manually by a push-button. (MUTCD 2009)



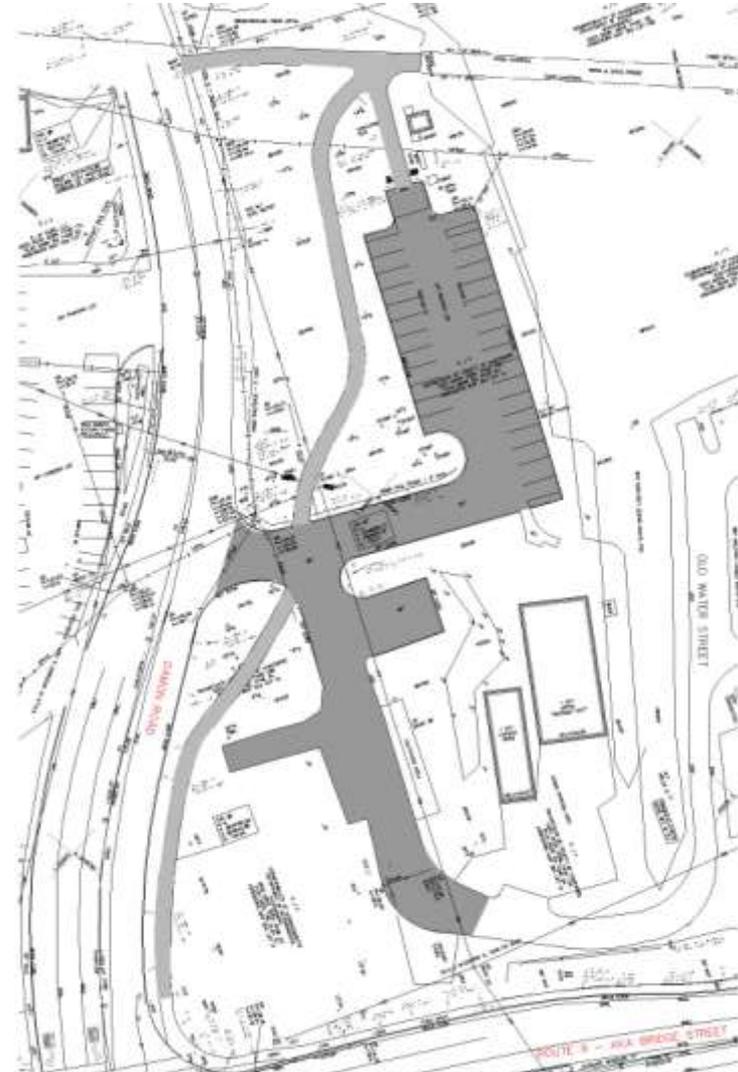
South Maple Street



Parking

□ Issue:

- Damon Road often full

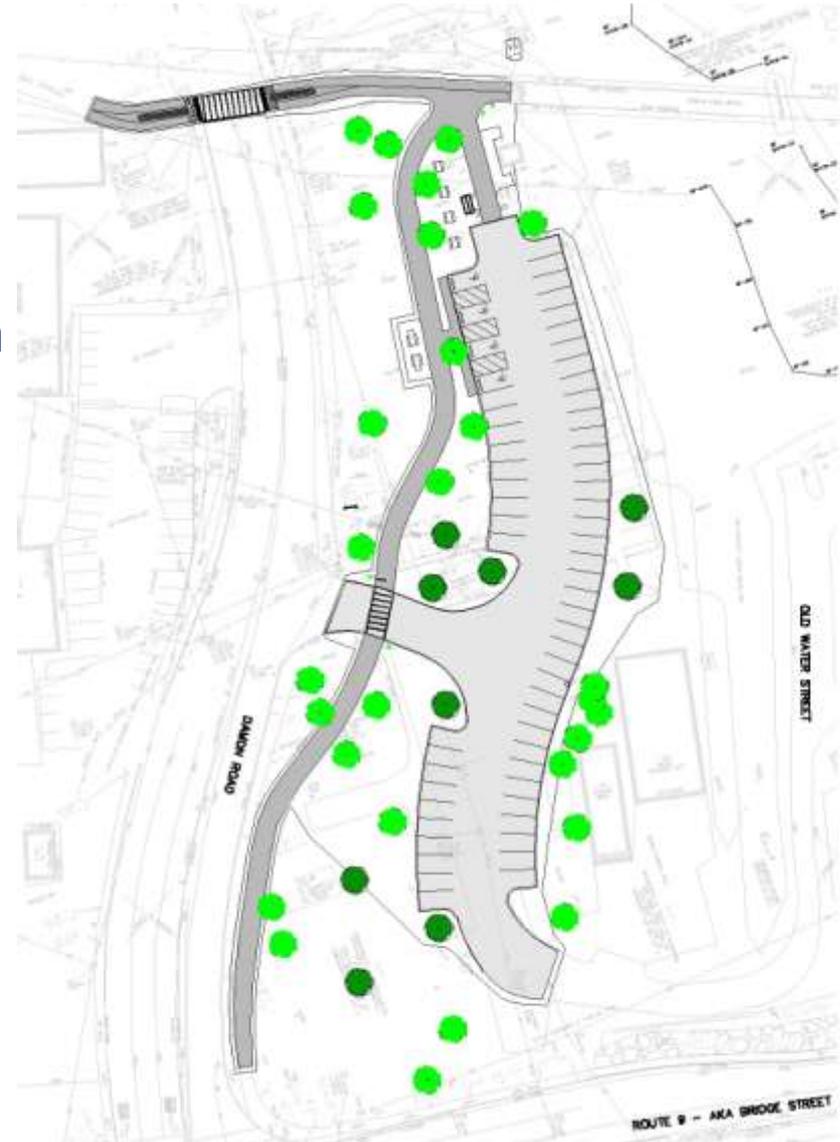


Norwottuck Rail Trail Rehabilitation

Parking

□ Solution:

- Parking Lot Reconstruction



Proposed Parking Lot

- ❑ **Location: Along Railroad Street**
- ❑ **Proposed 18 Spaces**
(2 Accessible)



- ❑ **Railroad Street will remain a two-way street**

Trail Signage

❑ Issue:

- Faded
- Outdated
- Missing signs



Trail Signage

□ Solution:

- Upgrade existing signs
- Additional Way-point Signage
- New granite trail markings and waypoints



Route 9 Tunnel

❑ Issue:

- Sharp Curve
- Limited Sight Distance



Route 9 Tunnel

□ Solution:

- Re-alignment of north side approach
- A pre-cast concrete boardwalk to reduce wetland impacts



Accessibility

❑ Issue:

- Some areas of path do not meet current ADA/AAB requirements
- Add provisions of access for:
 - People with disabilities
 - Elderly
 - Adults with strollers
 - Small children
 - Rollerbladers
 - Other



Accessibility

□ Solution:

- Rehabilitate path to meet ADA requirements



Enhancement of Corridor Views

□ Issue:

- Numerous views along corridor of adjacent fields, farms and of significant landscape features such as the Holyoke Range

□ Solutions

- Preserve and enhance views
- Add Scenic Rest Stops



Pull-Off and Turnaround Areas



Open Space

❑ Issue:

- Rail Trail adjoins numerous open space and conservation areas

❑ Solutions

- Integrate existing connections into trail design
- Incorporate signage



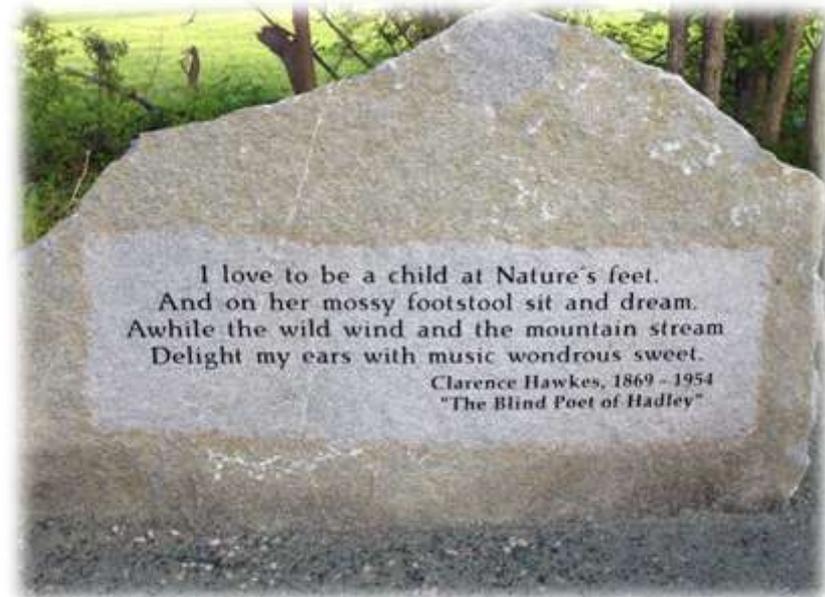
New Display Boards

- ❑ Replace outdated display boards with updated information.



New Interpretive Elements

- Engraved Boulders – to provide users with enjoyable and informative images of local wildlife





Thank You!!

Contact Information

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