



Chapter 6

DESIGN

This section outlines design standards and guidelines that are recommended for use when constructing the Community Path. The Field Projects team considered these standards when designing the Path and determining where to site it. The goal of following these standards is to help ensure that the Path is safe for pedestrians and bicyclists alike.

The following standards come from several local, regional and national sources. Specifically, those for multi-use paths are from American Association of State Highway and Transportation Officials' (AASHTO) 1999 *Guide for the Development of Bicycle Facilities*. The design standards for cycle tracks are from Northeastern University Transportation Engineer professor Peter Furth, the City of Portland Bureau of Transportation's 2010 report *Bikeway Facility Design: Survey of Best Practices*, and Alta Planning and Design's 2009 report *Cycle Tracks: Lessons Learned*.

Multi-Use Path Widths

The recommended width for a two-way, paved multi-use path – also called a shared use path – is 10 feet.¹ The width can be reduced to 8 feet under some circumstances, particularly when bicycle and pedestrian use is expected to be low and grades are relatively flat. When use is expected to be high or grades are steep, paths may be as wide as 12 to 14 feet.

Multi-Use Path Grades

Multi-use paths should have grades of no more than 5 percent.² Grades can be steeper for short sections when necessary, though it is recommended that paths be widened by 4 to 6 feet where grades are steep. AASHTO's *Design for the Development of Bicycle Facilities* provides the guide for grade restrictions and lengths:

Grade Restriction	Lengths
5-6%	for up to 800 ft
7%	for up to 400 ft
8%	for up to 300 ft
9%	for up to 200 ft
10%	for up to 100 ft
11+%	for up to 50 ft

Most of the Watertown Community Path is expected to run along a relatively flat corridor, though there is a gentle slope on Arsenal Street toward Watertown Square. There is at least one area – the section around the Patton Street bridge – that may require a steep grade. If the properties on either side of the bridge are made into graded slopes or hills to accommodate the Path, the grade would be about 5.5 percent (for up to about 200 feet on either side).

Cycle Track Separation Devices and Widths

Cycle tracks are bicycle paths that are separated from pedestrian and vehicular traffic by a physical barrier, such as on-street parking, curbs, planting buffers, or bollards. They can also be grade-separated from roadways and sidewalks. The photos in Figures 6.1 and 6.2 show different types of barriers or separation devices.

Figure 6.1

Vasser Street Cycletrack in Cambridge, MA;
Source: Kris Carter



Figure 6.2

Kent Street Cycletrack in New York City;
Source: Seth Holladay



Cycle tracks are best suited for arterial roadways with higher motor vehicle speeds and volumes and roads with longer blocks and fewer cross-streets.³ To show that cycle tracks are intended for bicyclists, pavement markings or different textures or colors should be used.⁴

A two-way cycle track should be at least 7.5 feet wide, with about 3.75 feet for each “lane.”⁵ Wider is typically better, though recommended widths tend to vary depending on the bicyclist traffic volumes.

Centerlines

A 4-inch painted centerline is recommended for cycle tracks that are more than 6.5 feet wide.⁶ Similarly, a 4-inch yellow centerline is suggested for multi-use paths to separate opposite directions of travel.⁷

Cycle Track Intersections

At intersections with driveways and low-volume cross streets, bicyclists in a cycle track should have the right-of-way.⁸ At these crossings, the cycle track could have markings or a different coloration or texture to indicate that motor vehicles entering or exiting the driveways and cross streets are expected to yield. The grade of the cycle track should remain the same throughout the crossings. This applies to cycle tracks that are already at a higher grade than the roadway; the cycle tracks become “raised sidewalks” at the crossings.⁹ The photo below shows an example of this.

At signalized intersections – like the one at Irving and Arsenal streets – several treatments or techniques can be used to improve safety conditions for bicyclists. The following examples are from Alta Planning and Design as well as Dr. Furth’s cycle track presentation.¹⁰

Figure 6.3

Raised crosswalks provide safer crossings
Source: Washingtonpost.com



- Move the stop line for motor vehicles about 16 feet back, while allowing cyclists to wait closer to the intersection;
- Drop into a bicycle lane about 16 feet from the intersection;
- Remove parking within 16 feet of the intersection;
- Paint the cycle track or put down bike markings through the intersection;
- Only allow motor vehicles to turn left across a cycle track on a green arrow (protected left);
- Use a leading “thru” arrow, which allows bikes to cross the intersection before allowing motor vehicles to turn left across a cycle track;
- Use separate signal phases for motorists from signal phases for bicyclists, and use a bicycle signal head;
- Install a pedestrian/bicyclist-actuated signal button.

Multi-Use Path Intersections

There are several improvements that can be made to intersections where a multi-use path crosses through an existing intersection like the one at Irving and Mount Auburn streets. AASHTO’s *Design for the Development of Bicycle Facilities* provides several suggestions, including the installation of a signal.¹¹ This could include a bicyclist/pedestrian-actuated signal button, which should be placed about 4 feet high. Another option, particularly for roads with high volumes of traffic, is to provide a refuge island to make a two-step crossing for path users. In addition, crossing distances can be shortened by using bump-outs.

Pavement markings should also be used at the crossing to clearly indicate to motorists the presence of the Path. Other options include raised crosswalks and colorized pavement crosswalks.

Sidewalks and Curbs

An ordinance adopted by the Watertown Town Council in February 2010 sets out standards and requirements for curbs and sidewalks in town. It also outlines adequate widths for travel and parking lanes for different roadway classifications.¹²

- Travel lane width: 11 feet on principal arterials (Arsenal, Main, Mount Auburn and Pleasant streets) and minor arterials, and 10 feet for collectors and local roads; and
- Parking lane width: 7 feet in residential areas and 8 feet in commercial areas.

Under the ordinance, sidewalks are to have a “preferred clear walking surface of 5 feet, not including curbing with a minimum of 4 feet.”¹³ They are to conform to the Americans with Disabilities Act and Massachusetts Architectural Access Board guidelines unless exempted by Watertown’s Superintendent of Public Works. In addition, at least 3 feet of clearance must be provided around obstructions like utility poles.

6.2 Cross Sections

Figure 6.4 depict cross sections for Arsenal Street between School Street and Irving Street and between School Street and Louise Street. They show existing conditions on Arsenal Street between School and Louise streets (with bike lanes) and Arsenal Street east of Louise Street (no bike lanes). Also shown is the recommended cross section, which includes a cycle track and extended sidewalk.

Figure 6.4
 Cross sections along Arsenal Street
 Source: Eunice Kim

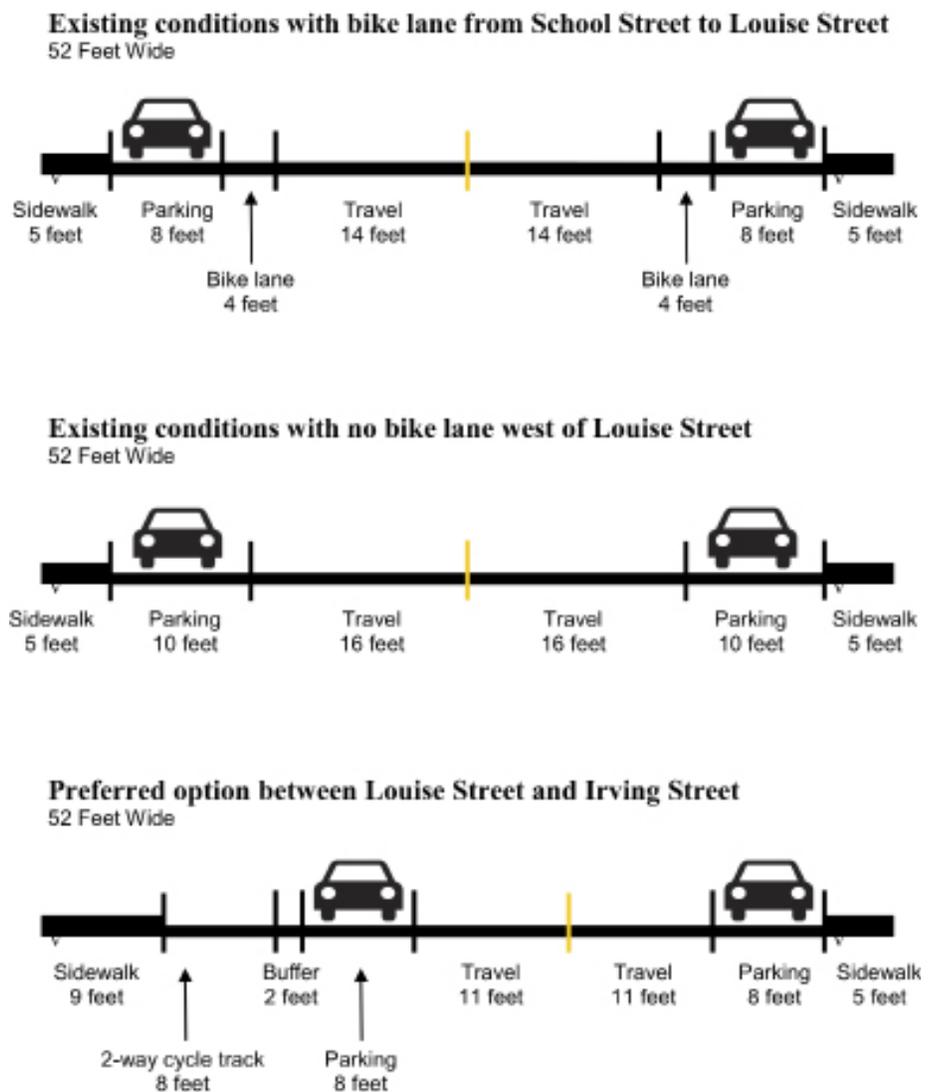
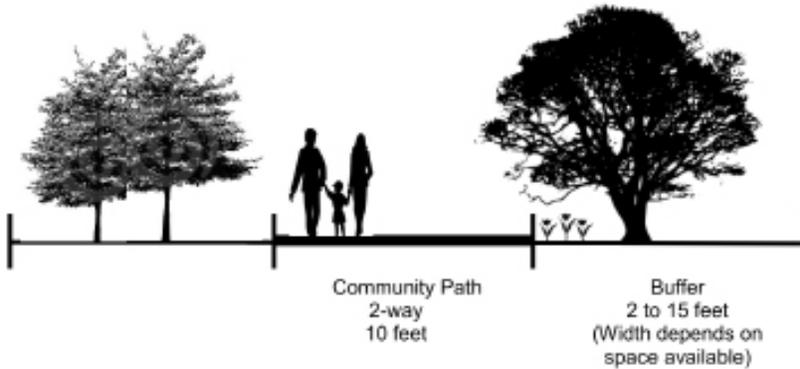


Figure 6.5 shows recommended cross sections for the existing Linear Park path and the municipal parking lots. In both areas, the team recommends that the proposed Community Path be 10 feet wide. The width of the vegetation will differ.

Proposed conditions for Linear Park path



Community Path – Preferred Option for Parking Lots

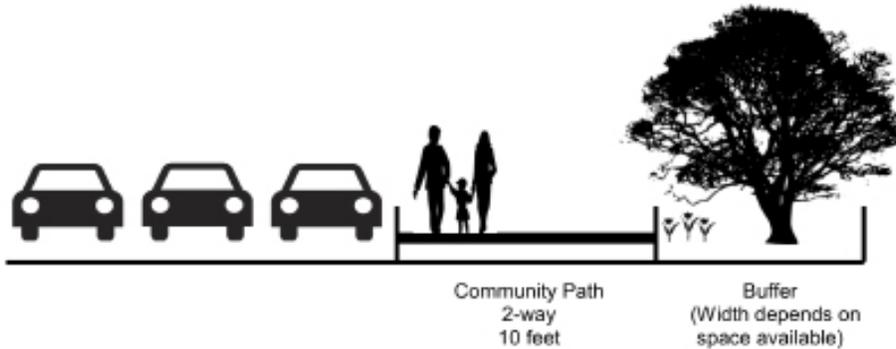


Figure 6.5

Cross sections for multi-use paths

Source: Michelle Moon

6.3 Conceptual Drawings

The Field Projects team developed conceptual drawings to help illustrate what different sections of the Community Path could look like. The drawings consist of three scenarios: a cycle track along Arsenal Street, a shared use path through the municipal parking lot behind the library in Watertown Square, and the existing Linear Park path.

Cycle Track

The Field Projects team has recommended that a cycle track be constructed on Arsenal Street from School Street to Irving Street as part of the preferred route discussed in Section A.1 of Chapter 5. A cycle track is also recommended as an alternative route between Irving and Taylor streets. Figures 6.6 and 6.7 show a conceptual design of a cycle track on Arsenal Street.

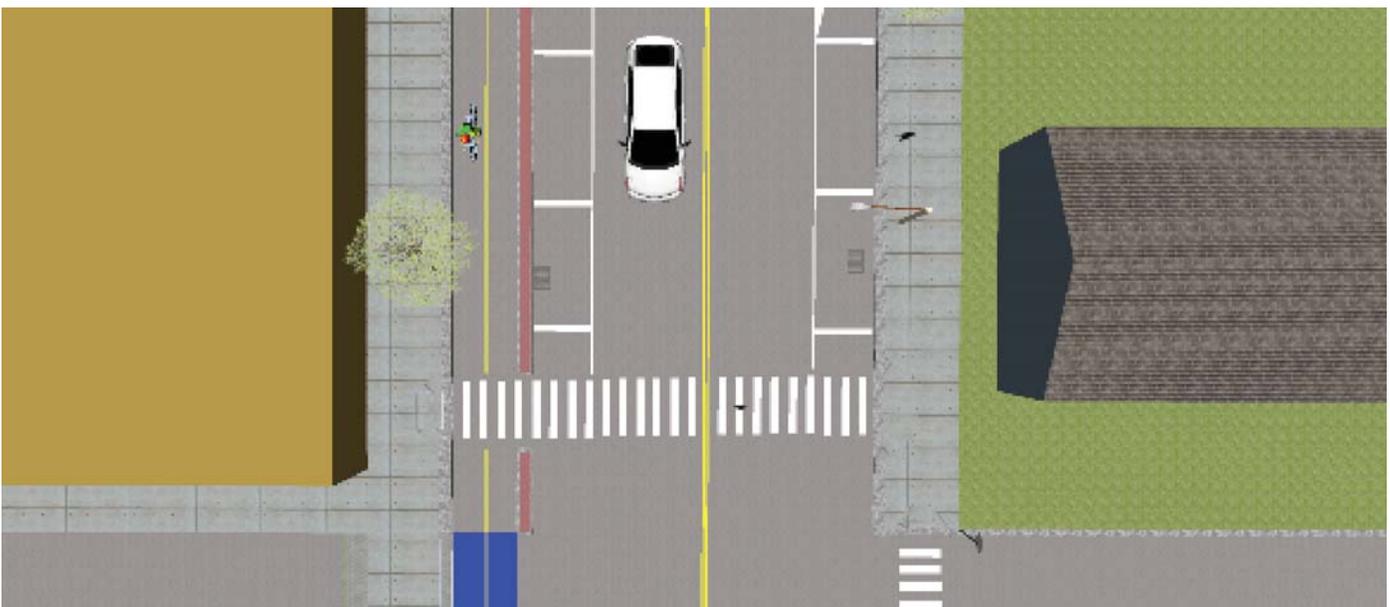
Figure 6.6

View of an 8-foot-wide cycle track on Arsenal Street with a 2-foot-wide curb to act as a buffer from the parked cars;
Source: Michelle Moon



Figure 6.7

Plan view of cycle track along Arsenal Street;
Source: Michelle Moon



Municipal Parking Lot

Figures 6.8. and 6.9 show conceptual designs for the Community Path through the municipal parking lot behind the Watertown Free Public Library. That portion of the Path is explained in Section B.1 of Chapter 5. The conceptual designs include wide vegetative buffers, raised crosswalks, benches and additional lighting. There may only be a few opportunities to realize this ideal scenario, but modifications can be made where space is limited. For example, the width of the vegetative buffers can be reduced.

Figure 6.8

*View of the Path passing through municipal parking lots in Watertown Square;
Source: Michelle Moon*



Figure 6.9

*Plan view of the Path in the municipal parking lots;
Source: Michelle Moon*



Shared Use Path

Figures 6.10 and 6.11 show conceptual designs of the existing Linear Park path, which is discussed in Section B.2 of Chapter 5. The designs include improvements to the existing path.

Figure 6.10

Plan view of Linear Park path entrance

Source: Michelle Moon



Figure 6.11

Linear Park path entrance

Source: Michelle Moon



6.4 Amenities

There are a number of amenities that would help make the Community Path safer and more attractive. They could also be used to improve the existing Linear Park path. Many of the amenities, which are listed below, are depicted in the conceptual designs and are merely suggestions.

Convenience Amenities

- Benches
- Garbage cans
- Bike racks
- Picnic tables
- Drinking water fountains
- Educational signage
- Doggy bag stations

Other Amenities

- Landscaping
- Bird box
- Community art
- Storage facilities

Navigation

- Bicycle and pedestrian signs
- Pavement markings
- Directional signage
- Intersection signage for Path users

Safety

- Bollards
- Gates
- Lights
- Signs with emergency call numbers
- Emergency phones

Figure 6.12

*Seating and brickwork along the Somerville Community Path;
Source: Michelle Moon*



Recommended Plants

There are many horticultural opportunities along the Path corridor. Because shared use paths and bike paths are linear, they have the tendency to only include a few species of plants. However, to make the Path more visually interesting, it is important to use a variety of plants. This would also increase the biodiversity in Watertown and create four seasons of interest. Perennials and annuals would provide color during the summer months, while magnolia trees, tulips and daffodils would provide color in the spring. Figures 6.13 and 6.14 show an example of this plant variety. A list of plants is also provided in Appendix D.

Figure 6.13

*Example of diverse plantings;
Source: Michelle Moon*

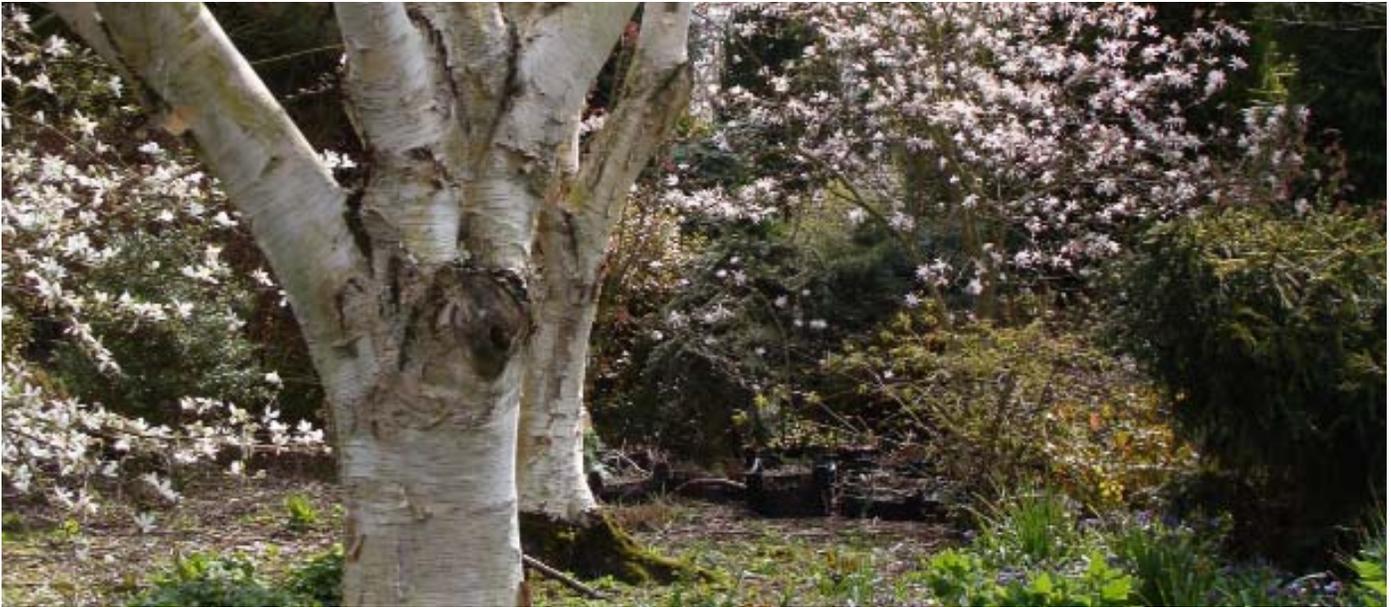


Figure 6.14

*Colorful perennial garden;
Source: Michelle Moon*



Additional Design Elements

This section provides several ideas about how to design the Community Path and its corridor in a more interesting, bio-diverse and environmentally-friendly way. The following elements are suggestions.

- ▶ **Rain Gardens:** The municipal parking lot scenario in Chapter 6.3 offers environmental opportunities to address the issue of stormwater run-off through low impact design. The impervious surfaces of parking lots do not allow for stormwater run-off to infiltrate into the soil, instead directing the water to the sewer system. Installing rain gardens alongside the Community Path would allow for this stormwater to infiltrate the soil, thus alleviating pressure on the sewer system and providing natural irrigation.
- ▶ **Edible Plants:** There are opportunities to plant edible plants like blueberries and apple trees along the Path corridor in Sections B.2 and B.3. It is important to purchase grafted trees to ensure they are small and to help reduce the time it takes for a tree to start producing edible fruit. Educational signs should also be installed alongside the plants to inform Path users about the specific plants and which ones are safe to eat.
- ▶ **Habitat Areas:** Vegetation along the Path will help provide habitat for animals. For community or school projects, bird houses and feeders could be installed along the Path to help attract a greater diversity of wildlife.
- ▶ **Educational and Directional Signage:** Signs are an important element to direct and educate users and to help visually unify the Path. Maps depicting distances and places of interest would also help users navigate the Path. Educational signs could include information about historic Watertown.

Figure 6.15

*Example of a rain garden;
Source: Pararie Restorations Inc.*



Educational and Community Opportunities

There are many opportunities for the Town to partner with other organizations or public schools. Local garden clubs and community groups could help create the text for the signs or information kiosks along the Path. This would be a way to help engage local youth and help reduce Path-related costs. School groups of all ages could be invited to learn about horticulture and environmental science along the Path. Students could help with the maintenance of the Community Path during the summer. This would help meet several goals, including continued engagement of the community and proper maintenance of the Path.

The concrete wall that separates the Linear Park path from the Whitney Towers could be used for a community art project, which would result in a permanent mural. Various issues would need to be addressed, including artist choice and payment, necessary approvals, community involvement, long-term maintenance plans and support from abutters. Some community groups, including the Watertown Middle School Community Mural Club, have already expressed an interest in seeing this mural become a reality. This wall is approximately 210 feet long, 7 feet high and 1,470 square feet in size.

Endnotes

- 1 American Association of State Highway and Transportation Officials. "Guide for the Development of Bicycle Facilities." http://safety.fhwa.dot.gov/ped_bike/docs/b_aashtobik.pdf.
- 2 Ibid, page 39.
- 3 City of Portland Bureau of Transportation. "Bikeway Facility Design: Survey of Best Practices." <http://www.portlandonline.com/transportation/index.cfm?c=44674&a=266116>.
- 4 Alta Planning and Design. "Cycle Tracks: Lessons Learned." http://www.altaplanning.com/App_Content/files/pres_stud_docs/Cycle%20Track%20lessons%20learned.pdf.
- 5 Peter Furth. "Cycle Tracks: Concepts and Design Practices; Part 1: General Design, Intersection Safety Treatments and Safety Studies." http://www.apbp.org/resource/resmgr/webinars/ada_tp_3-17-10_full_slide_se.pdf.
- 6 Alta Planning and Design. "Cycle Tracks: Lessons Learned." page 12.
- 7 American Association of State Highway and Transportation Officials. "Guide for the Development of Bicycle Facilities."
- 8 Alta Planning and Design. "Cycle Tracks: Lessons Learned." page 6.
- 9 Peter Furth. "Cycle Tracks: Concepts and Design Practices; Part 1: General Design, Intersection Safety Treatments and Safety Studies."
- 10 Peter Furth. "Cycle Tracks: Concepts and Design Practices; Part 1: General Design, Intersection Safety Treatments and Safety Studies;" American Association of State Highway and Transportation Officials. "Guide for the Development of Bicycle Facilities." page 7-9.
- 11 American Association of State Highway and Transportation Officials. "Guide for the Development of Bicycle Facilities." page 49.
- 12 Watertown Town Council. "An Ordinance Governing the General Standards and Requirements for Curbs and Sidewalks."
- 13 Ibid.

