Feasibility Study for the

Belmont Community Path

Submitted to:
Belmont's Community Path
Implementation Advisory Committee

Prepared November 2017 by

PARE CORPORATION

k3 LANDSCAPE ARCHITECTURE, LLC

Appendices

The Town of Belmont, a densely settled urban area, strives to improve mobility to destinations and amenities, limit its environmental impacts and foster healthy lifestyles. A multi-use path will provide opportunities for active recreation, an alternate mode of transportation for short commutes and great connections to existing transit stations for longer commutes.

After 25 years of pursuing a multi-use path, the Town of Belmont has procured a professional feasibility study aimed at identifying a recommended route for the path to move forward to design and construction. The following represents an account of the process and findings of this Feasibility Study.

The essence of the proposed multi-use path is to create a designated space for non-motorized activity along an alignment that meets the Americans with Disabilities Act (ADA) guidelines for access and use. The project limits extend over two miles from the border with Waltham to the border with Cambridge, running adjacent or in close proximity to the active Fitchburg commuter rail line operated by the Massachusetts Bay Transportation Authority (MBTA). While many potential routes advanced from efforts of the antecedent Community Path Advisory Committee (CPAC), additional routes were added as part of this feasibility study, particularly in areas where previously defined alignments were likely infeasible based on state, MBTA or ADA requirements.

To ensure the proposed path could serve the greatest user base, potential users needed to be identified. As noted, the path is intended for recreational use as well as commuting. Thus, potential users include all Belmont residents as well as residents and users from adjacent or connected communities. The path will immediately connect to the existing Fitchburg Cutoff path in Cambridge, providing access to the Alewife Station and points beyond along the Minuteman Bikeway and Alewife Greenway Path. It is likely that upon opening the path would connect to points westward as well, including portions of the Mass Central Rail Trail (MCRT) in Waltham and Weston, which are currently in the design phases.

Primary components of the multi-use path include connections to major town amenities, other recreational uses and transit. More specifically, key points identified for connection within town include the Beaver Brook Reservation, Waverley Square, Belmont Center, Waverley Station, Belmont Center Station, schools and amenities along Concord Avenue such as the library, pool and music school.

To advance from the various potential alternatives to a single recommended route, a process was established to identify and rank the feasibility of each alternative and to justify the combination of alternatives into an overall route. The process included:

- site understanding, using a combination of GIS mapping and field visits;
- public engagement, to elicit and consider input from the town and all potential users;
- design, to provide conceptual representation of what each alternative would entail;
- evaluation, via a matrix style approach that evolved with the project;

- cost, to provide anticipated construction costs in current dollars for each alternative;
- funding, to identify potential sources and establish a path forward; and
- recommendations, for the primary path route and contingency routes, as well as future funding, phasing and spurs.

Ultimately, the recommended route would: begin on the north side of the rail at the Waltham/Belmont town line; continue along the north side of the rail to the Waverley Square station, where a "box-over" park would be constructed; continue along the south side of the rail, through the DPW site, to the west side of the Housing Authority office building; cross the rail on a bridge structure; continue along the north side of the rail to Alexander Avenue, utilizing the existing Concord Avenue overpass structure; cross under the rail at Alexander Avenue via a depressed, retained path; and then proceed along the south side of the rail on the Belmont High School property, and subsequently the Purecoat North/Crate Escape property, to an at-grade crossing of Brighton Street and the Fitchburg Line.

This route carries a total estimated construction cost of $27.9 Million, not inclusive of right-of-way costs that will be required for agreements and/or partial acquisitions. This route utilizes the greatest extent of town owned and operated property, and would allow for future spur connections to all identified points not included within the initial route. It is also the most direct route, which has been identified as ideal for maximizing state funding. While this is the recommended route, deemed most feasible by the study, there are a few obstacles that the town will need to work out internally in order to implement. Should any of these obstacles become insurmountable, contingent routes have been identified.

Ideally, the recommended route would be endorsed by the Community Path Implementation Advisory Committee (CPIAC) and relayed to the Board of Selectmen (BOS), who will make the final decision on the path route. Following the BOS decision, the project can proceed to design, permitting, funding and right-of-way (ROW) agreements and acquisitions, as necessary. If all elements continue to move forward with minimal delay, the proposed path could be constructed as early as 2022.

The Belmont Community Path is envisioned to be a shared-use resource for basic modes of transportation like walking, jogging, bicycling, in-line skating, and other non-motorized forms of mobility. This Community Path would connect Belmont into a growing network of walking and cycling routes present and developing in the nearby communities, including the existing Fitchburg Cutoff and Minuteman paths, and the planned Mass Central Rail Trail (MCRT). A Community Path offers a wide range of possible benefits, such as providing a safe place for healthy activities by people of all ages and abilities, improving air quality, helping to relieve traffic congestion, stimulating local businesses, and enhancing Belmont as a place where people want to live, work and shop.

This proposed path is a key component of the Town's future economic and transportation viability as outlined in Belmont's 2010 "Comprehensive Plan." The development of a multi-use path through Town, with immediate connections eastward towards Boston and surrounding communities, and additional planned connections to the west, as well as connections to Belmont's bus and commuter rail stations, will provide opportunity for those travelling within or commuting through Belmont to seek an alternate transportation mode, reducing vehicular use within Town. Identified as a priority by both the Town and the regional planning agencies, including the Metropolitan Area Planning Council (MAPC) and the Central Transportation Planning Staff (CTPS) of the Boston Region Metropolitan Planning Organization (MPO), this piece of the MCRT is a critical link to connecting all areas outside of District 6 with the Boston area.

PROJECT HISTORY

This feasibility study is the culmination of over 20 years of studies and planning associated with the Belmont Community Path. Below is a brief summation of the key components of the path's history:

- 1994: With potential for federal funding, the Town's Board of Selectmen (BOS) formed the Bikeway Planning Committee.
- 1997: Proposal for a multi-use path through Belmont started to advance as part of the Mass Central Rail Trail (MCRT) planning process. Belmont was included (at the Town's request) in the 1997 CTPS MCRT feasibility study.
- 1997: The Wallace Floyd Group prepared the Belmont Bikeway Preliminary Feasibility Analysis.
- 1998: MCRT progression stalled due to lack of funding and lack of participation from some communities along the route; a few communities, including Cambridge, proceeded independently.

- 2010: Construction began on the Fitchburg Cutoff Path, which stretches from the east side of Brighton Street in Belmont to the Massachusetts Bay Transportation Authority's (MBTA) Alewife Station in Cambridge.
- 2010: DCR signed a 99-year lease for the abandoned Central Massachusetts Railroad (CMRR) corridor from Beaver Street in Waltham westward to Berlin.
- 2012: The "Belmont/Waltham Community Trail Alignment Study" was published by the Metropolitan Area Planning Council (MAPC).
- 2012: The BOS appointed a Community Path Advisory Committee (CPAC), consisting of volunteer Belmont residents and a local business owner, to review previous efforts, obtain public input and recommend alignments (below) for the Community Path.

ROUTES ADVANCING FROM CPAC

- 2014: CPAC delivered its final report and recommendations to the Town.
- 2015: BOS appointed the Community Path Implementation Advisory Committee (CPIAC), consisting of volunteer residents and one local business owner, to prepare a request for proposals (RFP) and select a qualified consultant to identify and evaluate feasible routes for a Belmont Community Path, including evaluation of the 2014 CPAC recommendations.

PURPOSE

The purpose of the Belmont Community Path Feasibility Study is to: recommend to the Community Path Implementation Advisory Committee (CPIAC) a preferred alternative for a

non-motorized, multi-use community path through Belmont that will serve the Town's residents as well as "fill the gap" along the Mass Central Rail Trail (MCRT) between Waltham and Cambridge, using the alignments from the Community Path Advisory Committee (CPAC) as a base, while also considering new solutions to the most vexing path segments; develop, with public input, an evaluation process that ensures the selected alternative is justified; develop all alternatives and associated cost estimates to a conceptual level; and begin coordination regarding funding of the path to enable the Town to continue moving forward efficiently through design and construction.

PROCESS

The feasibility study for the Belmont Community Path included several important phases, namely: site understanding; public engagement; design; evaluation, including cost estimating and funding; and recommendations. These stages were not exclusively independent, and frequently overlapped.

The **site understanding** phase consisted of extensive field walks, a compilation of information from GIS databases, data collection and review, as well as the assessment of existing conditions from both an engineering and landscape architecture perspective. Inherent in the data collection and review portion of this stage was a thorough review of all previous documentation related to the path, as well as ongoing coordination with the Town regarding Town characteristics that may impact any given alternative.

The **public engagement** phase was initiated by determining the entirety of stakeholders, including Town departments and committees, the Town's residents, the potential path users from neighboring communities, local businesses and state agencies such as the MBTA and DCR. This phase also entailed defining for the project the level of collaboration anticipated for the identified stakeholders as well as presenting information to and obtaining feedback from the stakeholders through the development and implementation of a robust public engagement plan.

Design for all alternatives of the path, both carried forward from CPAC and developed as alternates, was done preliminarily with AutoCAD Civil 3D software. This allowed the design to evolve in a manner that accounted for compliance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). With many of the alignments under consideration being rail-with-trail, where the path will abut the Fitchburg line of the active MBTA commuter rail, the design also accommodated appropriate setbacks from the rail, as established through review of Massachusetts' guidelines, including the MassDOT Project Development and Design Guide (PDDG), as well as coordination with the MBTA.

The design of each alternative was completed to a conceptual level that would allow for the **evaluation** and comparison of each alternative. A matrix, containing 23 criteria, was developed, iterated and utilized as the primary evaluation tool. These criteria stemmed from

a combination of experience on similar feasibility and/or path projects and stakeholder input. Two key criteria included in the matrix, and essentially sub-phases in the process, were construction cost and potential for funding.

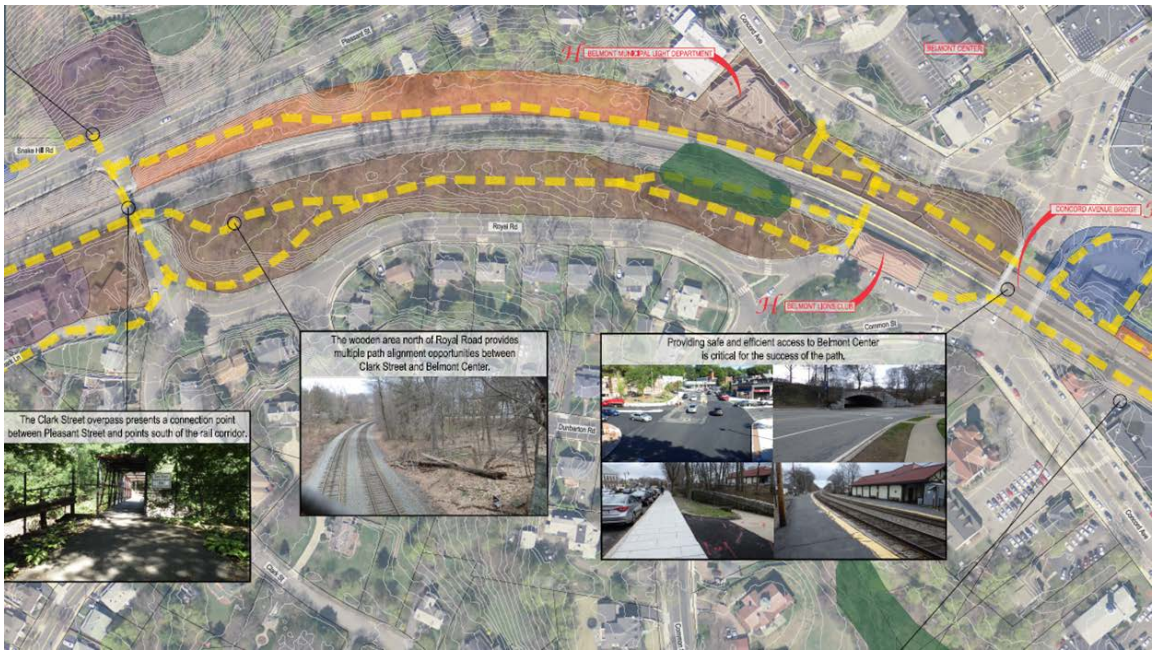
The **cost estimating** for each alternative consisted of, to the extent possible, unit costs based on typical cross sections. However, many structural and landscape components required more detailed analysis and quantification.

The potential to garner **funding** was initially assessed within the matrix based on previous experience, focusing primarily on the type of property each alternative traversed, its level of consistency with the alignment planned for the MCRT and its potential for positive impacts on existing traffic congestion. As the study progressed, conversations were initiated with the state agencies most likely to contribute or administer funding, including MassDOT, MBTA and the MPO/MAPC. These conversations led to the **recommendations** for the Town.

All potential path routes through Belmont will require impacts, temporary and permanent, to residents and/or privately owned commercial entities within Town, as well as to Town owned parcels. An initial inventory was completed of all existing land uses along the previously established alignments. In addition, a base map was developed using a combination of GIS and field collected data.

To ensure the study results were as accurate as possible, for the goal of enabling the Town to move forward expeditiously with design, the first imperative of the project was to develop an encompassing base map. This base map was compiled using a combination of GIS data from both Town and State databases, field collected data as well as information gathered from the public via the Workshop.

GIS data extracted included: topography, allowing for the extraction of 2-foot contours; historical properties and structures; wetland limits; property, street and building boundaries; assessor's information, focusing on property owner type; and rail lines.



SAMPLE GIS MAPPING

Field data collected over the course of several field walks, both with and without the public, were added to the GIS base map to expand the level of understanding. Elements added from field work included: Town resources and amenities, such as recreational areas and facilities, schools and restaurants; Town owned facilities, such as the DPW, Police Station and Light Building; and measurements in key locations, both vertical and horizontal, for verification of GIS data.

Following completion of the initial base map, it was presented to the public at the Kick-Off meeting, as well as reproduced for online consumption. Input gathered from all interested

stakeholders regarding constraints and opportunities were adjusted within the mapping as necessary and/or considered during the subsequent alternative development.

With the base map developed to this level, the alternative development was able to utilize AutoCAD Civil 3D to create alignments, profiles and cross sections. These computer-drafted objects became the foundation for all typical sections, running grade and cross slope production and assessment to analyze offsets, impacts and ADA compliance.

In addition to providing information for verifying and expanding upon the base map, the field visits were used to gather the existing conditions of the landscape in the areas proposed for the various path alignments. The landscape of Belmont includes significant changes in elevation resulting in some relatively steep slopes, most of which are wooded. The areas along the proposed alignments that are currently open consist of both park lawn spaces and more commonly low-value natural landscape.

SAFETY REVIEW

To assist in comparing various alignments, crash data was extracted from the MassDOT Crash Portal for the most recent five (5) year period available, from January 2010 through December 2014. This data was assessed with regard to crash frequency and incident type. This assessment assisted in the comparison of alternatives, particularly with respect to identifying areas of existing safety concerns that may be worsened by the path's development. Mitigation, such as signalization or traffic calming, was considered, as appropriate, based on the safety analysis.

In general, the data showed a high frequency of incidents over the five (5) year period: along Trapelo Road, with 161 incidents between Waverley Oaks Road and Lexington Street; and along Concord Avenue, with 91 incidents between Common Street and Underwood Street. The majority of incidents were angle and rear-end, which tend to be less severe in nature than other crash types. A summary of the crash data and location diagrams can be found in Appendix A.

To initiate this study, a scoping meeting was held with the Town's Planning Department and the CPIAC to identify the overall approach and assessment for the project as well as to establish the level of coordination and participation required for the project by key stakeholders and the general public. The level of engagement for key stakeholders, including town departments and committees, the MBTA and the general public, was deemed to be collaborative, meaning the study would work directly with all stakeholders throughout the process to ensure that perspectives were consistently understood, considered and reflected in project decisions. To do so, a robust Public Engagement Plan (PEP) was developed, including: 10 public meetings; three (3) intercept events, consisting of attendance and interaction at the Meet Belmont event and two (2) public field walks of the study alignments; meetings with Town departments and committees, as necessary; and ongoing coordination with the MBTA to establish design guidelines and maintain communication regarding design progress.

In accordance with state open meeting laws, all public meetings, as well as meetings with entities of the Town and/or the CPIAC, were conducted in accessible venues with notice to the public made available in advance. Below is a list of meetings held as part of the study. The full PEP plan and all formal presentations are included in Appendix B.

Public Engagement Schedule

Intercept Event #1: Meet Belmont – August 30,2016

Public Meeting #1: Kick-off/Workshop – September 21, 2016

Intercept Event #2: Walk the Trail (West End to Downtown) – October 15, 2016

Public Meeting # 2: Alternative Development (Western End) – October 26, 2016

Intercept Event #3: Walk the Trail (East End to Downtown) – October 29, 2016

Public Meeting # 3: Alternative Development (Central Area) – November 9, 2016

Public Meeting # 4: Alternative Development (Eastern End) – November 16, 2016

Public Meeting #5: Hot Topics/Matrix (From Meetings 2 to 4) – December 7, 2016

Public Meeting #6: Alignment Costs and Matrix (Western End) – February 8, 2017

Public Meeting #7: Alignment Costs and Matrix (Central Area) – February 15, 2017

Public Meeting #8: Alignment Costs and Matrix (Eastern End) – March 8, 2017

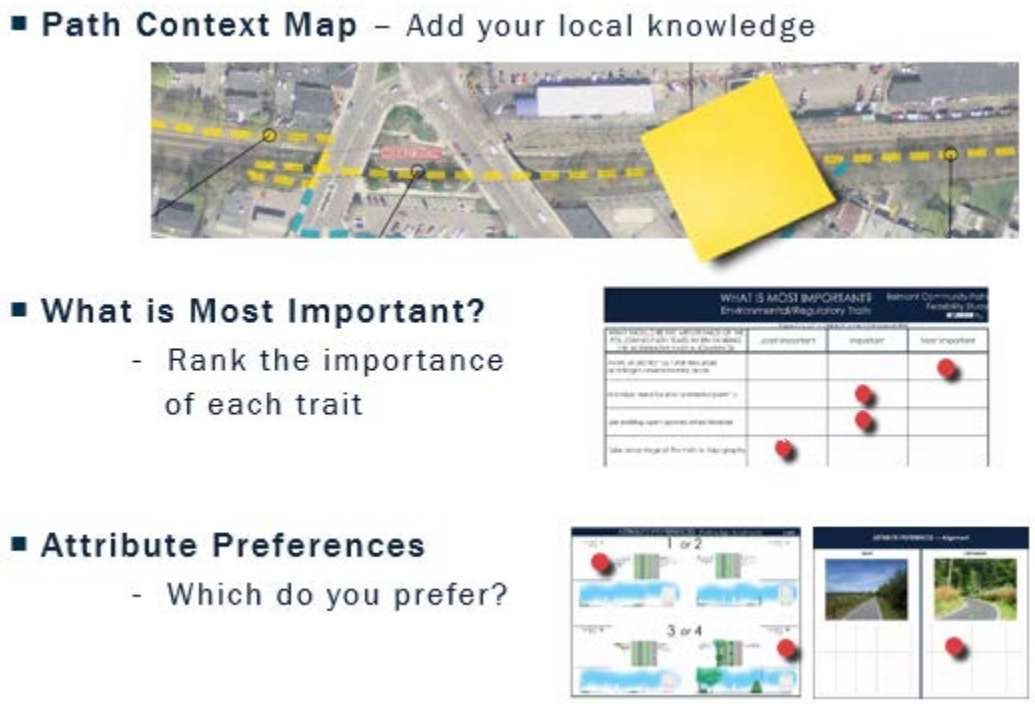
Public Meeting #9: Routes/Costs/Funding (From Meetings 6 to 8) – April 26, 2017

Public Meeting #10: Formal Recommendation – November 2, 2017

All meetings began at 7:00 p.m., with materials available 30 minutes prior.

PUBLIC INPUT

The first public meeting commenced with a short presentation by the study team, followed by an interactive workshop consisting of three (3) stations for the public to review and provide input. The first station focused on the existing conditions and constraints along the potential path routes. At this station, individuals were asked to review the GIS based mapping developed for the project, as well as the callouts and images compiled by the study team, and note any areas that they felt required further investigation or attention. Preliminary concerns were also noted on this base map. The second station focused on the importance of various assessment criteria, with public participants indicating the level of importance to them of 45 potential elements. The third station focused on design preferences, seeking to identify the intended uses of the path, as well as the desired design and aesthetics of the path.



WORKSHOP STATIONS AT KICK-OFF PUBLIC MEETING

Following the workshop, the materials of all three stations were replicated and made available online through SurveyMonkey. This allowed those who missed the meeting to provide the same input sought for consideration in this study. Initial feedback was collected for two weeks following the kick-off meeting; however, the online feedback collector remained live until two weeks after Public Meeting #9, which was the last meeting that elicited public feedback pertaining to the design and evaluation of alternatives. The results of the workshop, received in person and online, can be found in Appendix C.

At all subsequent public meetings, the agenda ended with open discussion, encouraging those present to provide feedback and input on the progression of the alternatives' design and evaluation. All individuals who were unable to attend meetings, as well as those in attendance who preferred not to speak in public, were asked to email their feedback and input to Jeffrey

Wheeler, Town Planner and Project Manager. This information was forwarded to the design team for review. Meeting memos summarizing the discussion from Public Meetings #2 through #10, along with the feedback received via email are also included in Appendix C.

Public input received throughout the study was used to inform its advancement. Many elements included in the conceptual design stemmed from this input, as outlined below.

DESIGN GUIDELINES

The multi-use path through Belmont was defined from the outset as an ADA compliant, paved path. These decisions were made with long-term funding in mind. The MassDOT, which is anticipated to be the primary funding source for construction, has these set requirements for the construction of any multi-use path. The design guidelines that were established, in part, from the outcome of the workshop and public input are the elements of the design that go above and beyond these rudimentary characteristics.

Path Width - The first notable design guideline that stemmed from the workshop and survey results, as well as continued public input, was the path width. Originally recommended to be a 14-foot minimum based on anticipated user volumes, this was increased to a 16-foot minimum. The increase in a recommended minimum width was due to extensive public input that the only drawback to the existing Fitchburg Cut-off path to Alewife is the lack of separation of avid cyclists and slower-paced users. A 16-foot width allows for an 8-foot wide, two-way cycle track, delineated from an 8-foot wide pedestrian space.

Lighting - The next element of design that is recommended for consideration based on the workshop and survey results is potential path lighting. This feature continues to be an ongoing discussion for the Town, but results showed a clear intention of users to be on the path before dawn and after dusk, particularly in the winter months. This study has identified lighting as an extra cost, not inherent within any individual alternative, but for the length of the overall route. Wired and solar options were investigated, the latter being slightly more cost effective than the prior, for both installation and maintenance costs. Discussion also arose, and needs to be considered if the Town does opt to light the path, as to whether lighting should be motion-activated.

Parks versus Parking - It was important to stakeholders for available space to be utilized primarily for parks, not parking.

Structures – It became preferable that structures be designed based on grade, in other words driven by the elevation of properties adjacent to the rail compared to the rail itself, with underpasses proposed where abutting properties sit below the rail and overpasses used where abutting properties are above the rail bed. In addition to minimizing visual impact of structures, this approach minimizes length and therefore cost.

Alignment – The path is preferred to meander where possible within given constraints, rather than developing a completely straight alignment, and should seek connectivity to neighborhoods and resources.

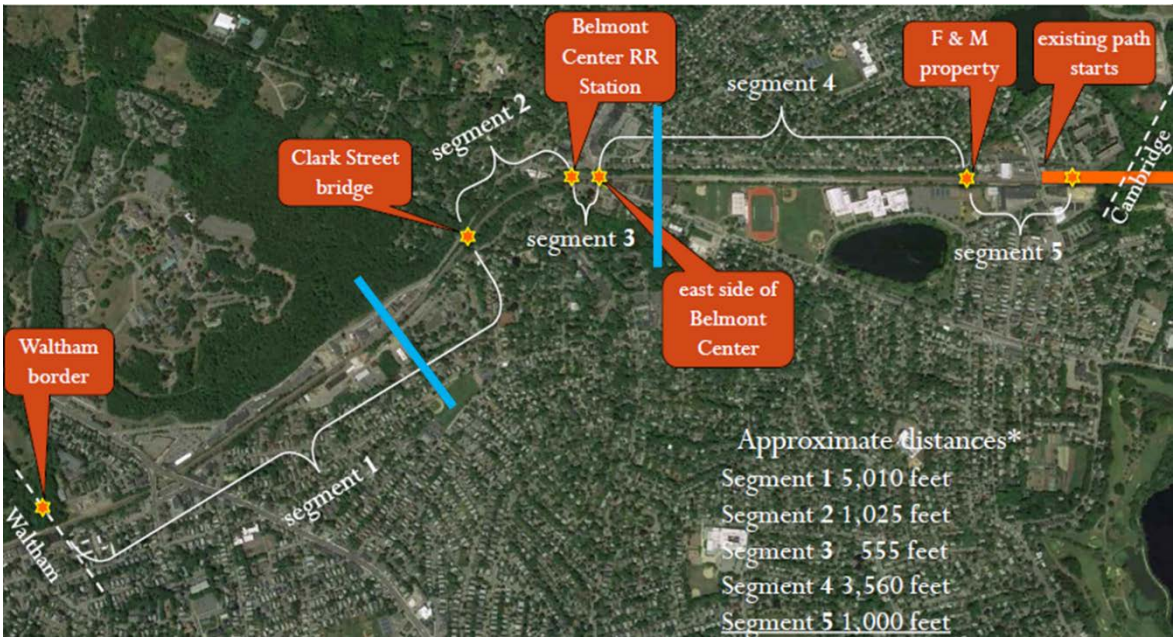
Buffers – The public generally indicated a taller chain link fence, or similar, be included on the side of the rail tracks. Preference was shown to use a split-rail or wood fence of a shorter height in some locations along private properties. The preferred preference of all fencing was to be located near the property line and not directly adjacent to the path. The preference for the use of berms for separation was not significant. In certain residential areas, some neighbors expressed interest in walls between the path and private property.

Planting – There was a strong preference for planting along the path. The landscape design should include shade trees at regular intervals for respite; plants kept low in height for clear sight-lines and to avoid hidey-holes; and vertical plantings (trees) kept at a distance from the path to avoid dangerous conditions should a fast-moving bicycle leave the path. Additionally, all plantings should be chosen from a list of native, non-invasive species, be hardy in nature and be easily maintained.

Wayfinding – The need for adequate signage is apparent, with opportunities to enrich the community path experience with kiosks and interpretive signs. There was a strong interest from the pubic to include additional elements to aid in wayfinding that are of particular assistance to those of varying age and abilities. These include, but are not limited to: striping along the path in a contrasting color from the paving material; the inclusion of vertical elements that indicate entrances/exits along the path; mile markers; and potentially signs for nearby streets and iconic destinations for orientation. At crossings, the inclusion of specialty pavement crosswalks, low plantings for good sightlines, preceding rumble strips, and in-road pedestrian-crossing pylons were all recommended to increase awareness and security.

Other – Additional path features that were desired include emergency call stations, frequently spaced benches and shade and drinking fountains with bottle fillers.

An array of alternatives developed by the CPAC were further evaluated in this study. Additionally, variations of those alternatives, as necessary, were developed by this study. To maintain a reasonable duration of public meetings, the full extent of alternatives could not be discussed in detail at one time. Therefore, the project was divided into three distinct areas: the Western End, the Central Area and the Eastern End.



REVISED AREAS ESTABLISHED FOR FEASIBILITY STUDY

As recommended by the consultant team, it was agreed that each previously established segment would be divided into reasonable break points based on typical cross section, resulting in a series of alternatives. Each alternative would be conceptually designed to depict a typical cross section, necessary structures (i.e. boardwalks, bridges, underpasses and retaining walls) and extent of landscaping. In any location where the previously established alignment seemed infeasible, due to topographical constraints, inability to meet MassDOT/MBTA required offsets/criteria (next page) or extent of impacts, the consultant team would seek additional alternatives for the same relative location, making the same end connections back to the original alignment. All topography, obstacles and impacts were to be assessed using the GIS produced base map.

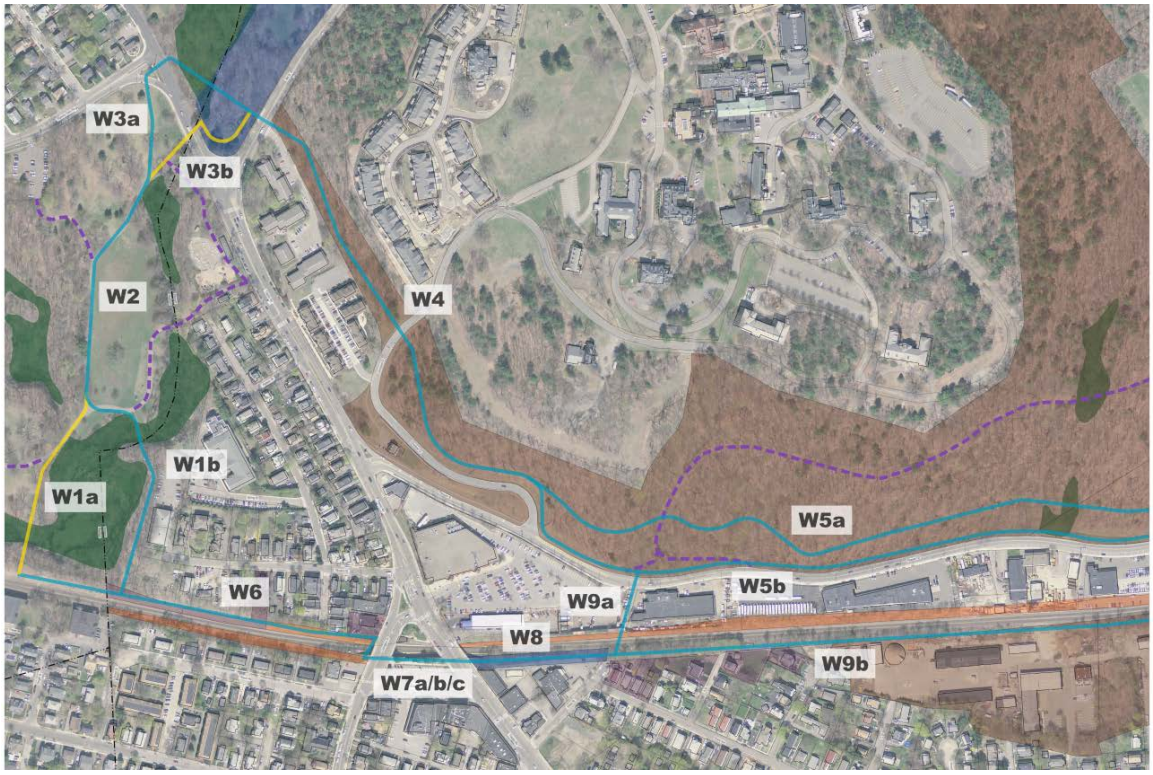
Another element of the alternatives that should be defined is the difference between lengths and links. As part of the public process, these were explained as follows: length, an alternative that stretches for several hundred feet with the same typical section; and link, a short alternative that functions to connect two adjacent lengths. The distinction between these is important, because links are required to form the seam between lengths. As anticipated, the links within the potential routes became more costly than many of the lengths, even though they cover a much shorter distance, due to the structural components included.

MassDOT/MBTA Design Criteria

- Max speed through Belmont – >45 mph
- Required running offset – 25' with fence
- Allowed minimum at pinch – 15' with barrier
- Required vertical clearance – 22'-6" top of rail to bottom of structure
- Ability to tunnel under? – Yes, currently do culvert work; cut and cover on weekends
- Required tunnel depth – Location specific due to presence of underground utilities, power lines, other buried apparatus
- Ability to cover over station – Not opposed if done properly (ventilation/lighting)

Finally, the level of detail for the alternatives development effort was identified for the project as conceptual. All alternatives were deigned to a level that would allow for estimation of costs and impacts necessary to evaluate and vet the range of alternatives.

Western End Alignments

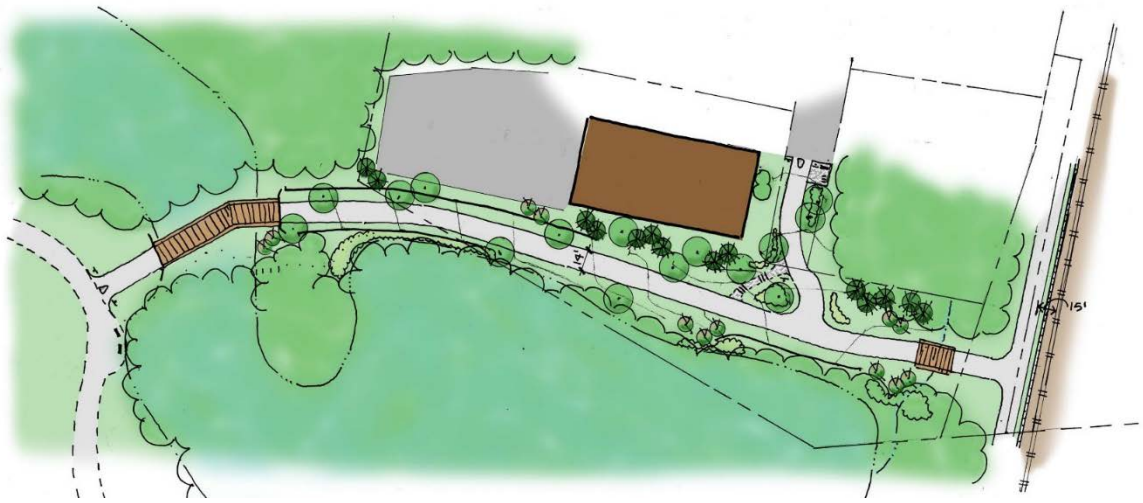


Alternative W1a – one of the original CPAC alignments, this alternative spans approximately 700 feet from the northern side of the MBTA Fitchburg rail line northward, making a connection to the existing walking paths within the Beaver Brook Reservation. The alignment is technically west of the Waltham/Belmont town line, and requires a fairly extensive wetland crossing.

ALTERNATIVE W1A WETLAND CROSSING

ALTERNATIVE W1B WETLAND CROSSING

Alternative W1b – due to the extensive wetland crossing required for alternative W1a, combined with the fact that it technically lies outside of Belmont, this alignment was developed as an alternate. Similarly, this alternative spans approximately 700 feet from the northern side of the MBTA Fitchburg rail line northward, making a connection to the existing walking paths within the Beaver Brook Reservation. However, this alternative is just east of the Waltham/Belmont town line and requires a shorter wetland crossing. This alternative also lies closer to the Agassiz residential neighborhood, allowing for a direct connection between the community and the path via Moraine Street.



CONNECTION TO MORAINE STREET/AGASSIZ NEIGHBORHOOD

Throughout the study, this connection from the north side of the rail at the Waltham/Belmont town line to the Beaver Brook Reservation was identified as a potential element that would

benefit the Town, even if the ultimate path route does not itself continue through the Beaver Brook Reservation. This would be the first potential spur of the path.

Alternative W2 – one of the original CPAC alignments, this alternative spans approximately 1,100 feet from the northern end of either W1a or W1b northward through the Beaver Brook Reservation towards Trapelo Road. This alternative would most likely widen the existing paved walkway through the reservation land. There was public concern about this alternative crossing park space that is frequently used as an unleashed dog park.

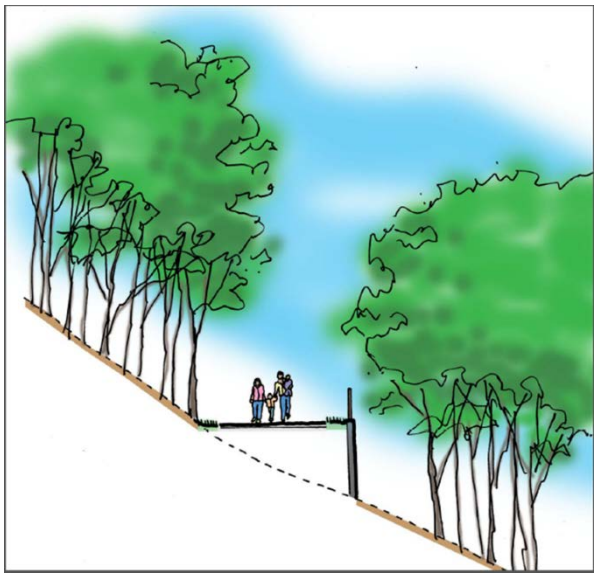
Alternative W3a – an alternate to the CPAC alignment W3b, this alternative would remain in the Beaver Brook Reservation until reaching the signalized intersection of Trapelo Road with Waverley Oaks Road (Route 60). The signal phasing and timing would be modified to accommodate a signalized pedestrian movement across the southern leg of the intersection. This would provide a highly visible and safe crossing for path users, with controllable impact on traffic operations. This alternative does require a short boardwalk over Beaver Brook on the east side of Trapelo Road.

SAMPLE OF SIGNALIZED CROSSING FEATURES

Alternative W3b – one of the original CPAC alignments, this alternative crosses Trapelo Road midblock (not at an intersection) between Mill Street and Waverley Oaks Road (Route 60). As indicated at public meetings, this location has poor sight lines due to vertical curvature of the roadway. This is also a low point in Trapelo Road, leading to drainage issues. Some mention was made by the Town of putting the path under the roadway, by reconstructing the existing culvert for Beaver Brook to be wide enough to accommodate the path. However, as the culvert fills with water, so would the path unless extensive and costly measures were taken to drain the path portion of the culvert.

Alternative W4 – one of the original CPAC alignments, this alternative extends approximately 1,750 feet southeasterly from the existing Mill Street crosswalk to the eastern end of Olmstead Drive. This alternative would pass between the Waverley Woods Apartments and the Woodlands at Belmont Hill Condos, and then run parallel to Olmstead Drive on the north side. This alternative would require knee walls between Mill Street and its crossing with

Olmstead Drive. The topography as the alternative continues along Olmstead Drive would require retaining walls, increasing in height to an approximate 8-foot maximum.



ALTERNATIVE W5A CROSS SECTION

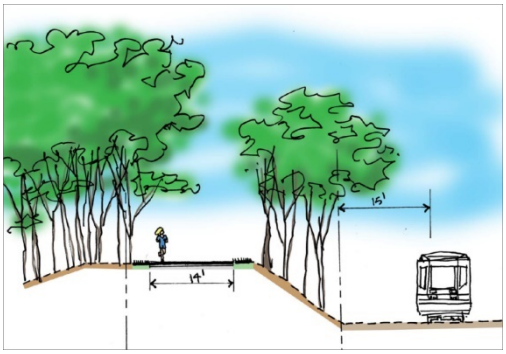
Alternative W5a – one of the original CPAC alignments, this alternative continues approximately 2,350 feet through the Lone Tree Hill forested area, a few hundred feet north of Pleasant Street. Though it follows the general alignment depicted by CPAC, it has been modified, based on assessment of the existing ground profile, to maintain ADA acceptable running slopes of no more than 5 percent. This alternative requires an approximate 30-foot swath removal of mature woodland to accommodate a retained path. It is recommended that a path in this area contain one wall on the southern edge of the path and tie into the existing forested landscape at the northern edge of the path. In addition to mature tree removal, this alternative would impede existing wildlife movement, as well as carry a considerable cost for the construction of a 12-foot retaining wall for an approximate half mile distance. Further, this alternative raised concern with the Town's fire and safety departments, due to the limited/difficult access. In addition to being relatively difficult to access the path, its location in the middle of the forested slope could impede fire hose access from Pleasant Street to points farther up the embankment. If carried forward into design, this alternative would likely require the installation of a water line under or along the path itself.

Alternative W5b – as an alternate to W5a, this alternative was developed to move the alignment along the east side of Olmstead Drive and then along the north side of Pleasant Street. This alternative would maintain the existing knee wall that exists off Pleasant Street. The path in this location would have less impact to mature woodlands, would likely not impede any wildlife movement and would carry a much lower cost compared to alternative W5a. This alternative was identified as needing further

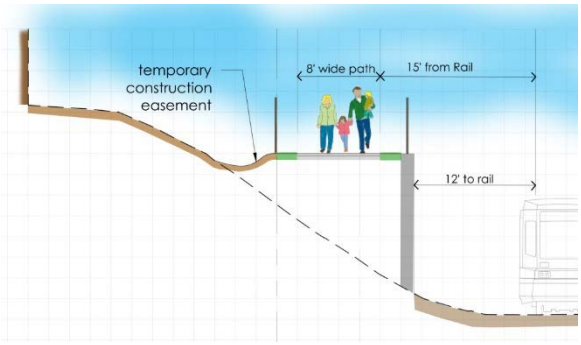
ALTERNATIVE W5B CROSS SECTION

drainage assessment if it moves into design, since the knee wall currently assists in the overall drainage of the area.

Alternative W6 – one of the original CPAC alignments, this alternative would continue eastward approximately 900 feet from the Waltham/Belmont town Line along the north side of the Fitchburg rail line and connect directly to the Waverley station. This alternative would require some retaining wall as the path approaches the station. It is recommended that this alternative provide a split ramp that ascends to Lexington Street and descends to meet the outbound station platform. This alternative would provide an accessible connection from the Lexington Street elevation to the outbound platform. This alternative crosses a portion of unused land on one private property.

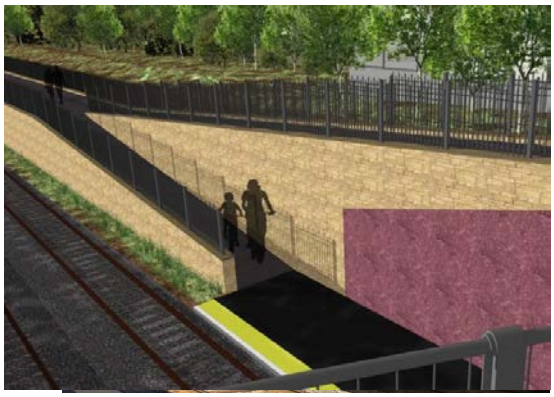


ALTERNATIVE W6 CROSS SECTION: WALTHAM LINE



ALTERNATIVE W6 CROSS SECTION: NEARING STATION

ALTERNATIVE W6 SPLIT: LOOKING EAST



ALTERNATIVE W6 SPLIT: LOOKING NORTHWEST

Alternative W7a – one of the original CPAC alignments, this alternate would carry the path from where alternative W6 meets Lexington Street, parallel to the existing Lexington Street bridge over the Fitchburg rail line, descend via a switchback ramp to an elevated platform over the existing inbound station platform and then ascend back to grade on the south side of rail on the east side of Trapelo Road. This alternative could only accommodate a 10-foot wide path inside the depressed Waverley station box. Additionally, it would require solid separation between the path and the station space. These constraints were identified as great concern to the Town's fire and safety departments. This alternative may also be infeasible if MBTA elects full-high platforms when making the station accessible.

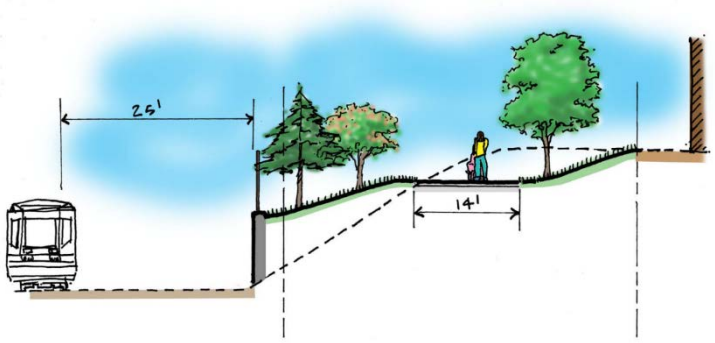
ALTERNATIVE W7A:
ELEVATED PATH OVER PLATFORM

ALTERNATIVE W7B: BOX OVER

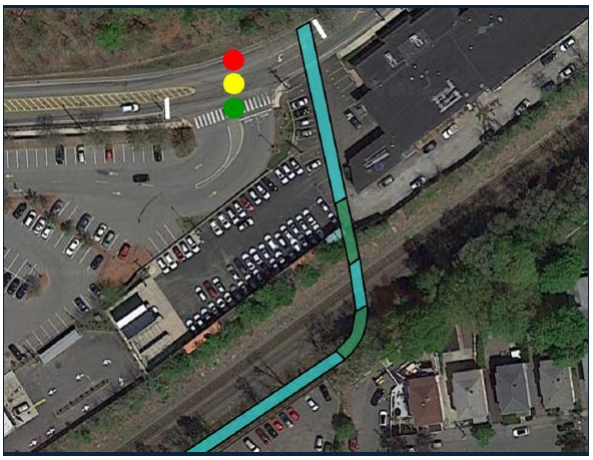
Alternative W7b – since alternative W7a may be infeasible due to MBTA constraints with potential conversion to full-high platforms, alternates were considered that could cross Waverley square at grade. This alternative would utilize the ramp-up to Lexington Street, develop a box over the existing Waverley station and create a parks space atop that box. Pedestrian crosswalks with bump-out treatments and signalization would be developed at Lexington Street and Trapelo Road. To avoid an increase in the number of signals along each of these streets, the adjacent existing crosswalk to the south would be shifted to these locations. This alternative would continue to the east on the south side of the rail. This alternative includes access to the station platforms, specifically elevators to both the inbound and outbound platforms, as well as various amenities. Also possible with this alternative is conversion to one-way traffic along Church Street, which would allow for maintenance of the number of spaces currently in the Waverley station parking lot, but with closer proximity to the Waverley Square retailers. This alternative, though costly, is considered a great value added to the Town, as well as a benefit to the MBTA station.

Alternative W7c – this second alternate to alternative W7a is developed as a lower-cost option compared to W7b. Bump-outs and signalized crossings would still be developed at Lexington Street and Trapelo Road; however, the Waverley station box would remain open-air as it is today, and the path would utilize a shared space with the existing sidewalks, crossing at a perpendicular the pedestrian movement between the Waverley station the existing parking lot. Though a much lower cost option, this alternative had great concerns for safety as the pedestrian crossing space may be less visible and the shared space presents additional conflicts.

Alternative W8 – one of the original CPAC alignments, this alternative spans approximately 500 feet from the east side of the Waverley Square station along the south side of the Fitchburg rail line, with terminus near the end of White Street. This alternative does require an approximate 10-foot high retaining wall to maintain a level path area adjacent to the commercial property east of Waverley station. This alternative is favorable to the commercial property owner east of Waverley station who may seek connection to the path with the future development of the parcel.



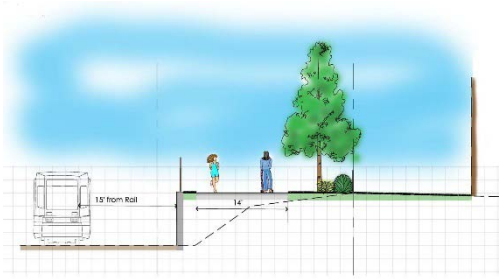
ALTERNATIVE W8 CROSS SECTION



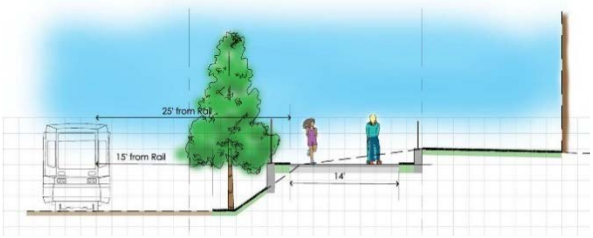
ALTERNATIVE W9A PLAN VIEW

Alternative W9a – developed as an alternate to the CPAC alignment, this alternative would utilize a paper Street on the north side of the Fitchburg rail line, constructing a short bridge, approximately 60 foot span, over the rail, touching down near the parking lot for Star Market, crossing Pleasant Street with a new fully-signalized traffic and pedestrian controlled intersection and continuing to run along the north side of Pleasant Street connecting to the previously defined alternative W5b. This alternative has concern due to the location of the required Pleasant Street crossing being on a horizontal curve. Additional advanced signage and/or signalization may be needed if this alternative continues to design.

Alternative W9b – one of the original CPAC alignments, this alternative would span approximately 2,000 feet from White Street to the eastern end of the Town's DPW lot along the south side of the Fitchburg rail line. Similar to alternative W8, this alternative would require an approximate 6-foot high retaining wall to maintain the path area level with the abutting properties, including residential parcels along Grant Avenue and at the ends of A Street and B Street.



ALTERNATIVE W9B CROSS SECTION:
SINGLE WALL

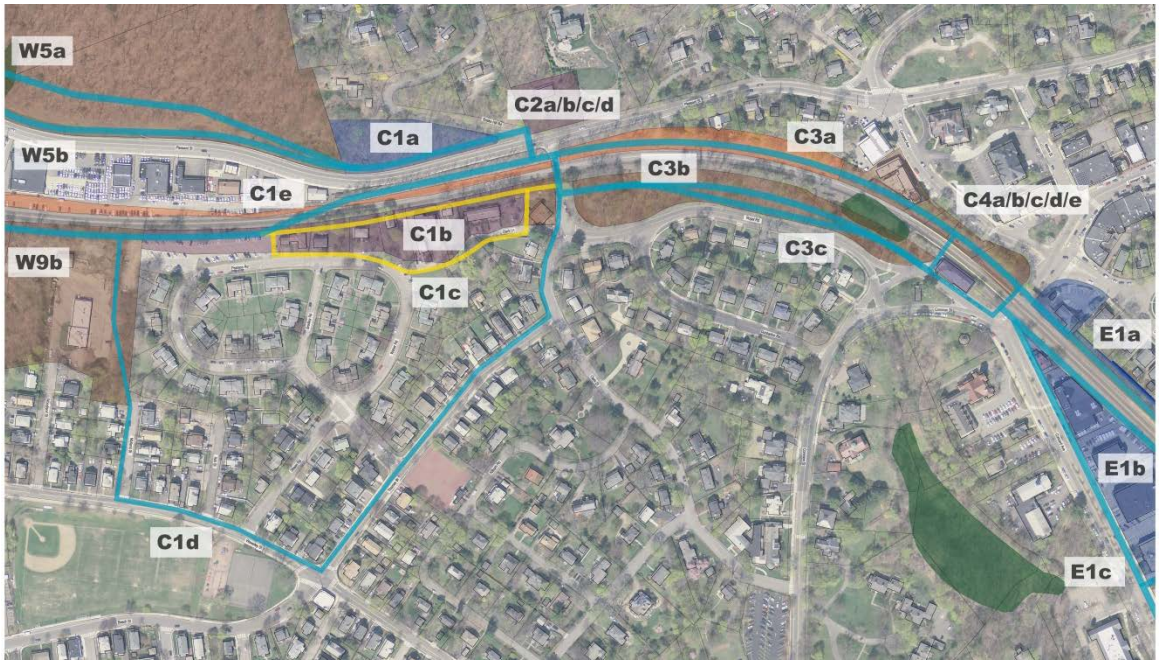


ALTERNATIVE W9B CROSS SECTION:
DOUBLE KNEE-WALL

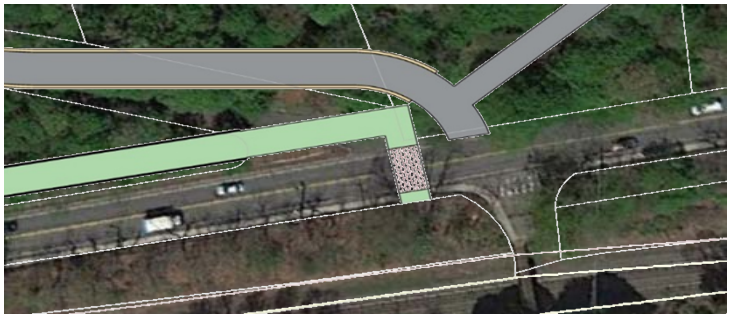
In addition to pursuing this path, the town is also planning to redevelopment or rehabilitate building on the DPW parcel, which may involve a reconfigured layout. As the reconfiguration of the site is still to be determined, the Town will need to give priority to the path to move forward at this point or quickly determine the space needs for the DPW site and assess the remaining available space for the path.

In this western section there are essentially two independent routes, which traverse very different terrain and do not connect: one to the north of the rail, stringing together some combination of alternatives W1 through W5; and the other predominantly along the rail, stringing together some combination of alternatives W6 through W9. Input from the public, as well as state agencies, specified a preference for directness. This preference coincides with experience that the most direct route is the most used route, and therefore the most feasible from a cost/benefit perspective.

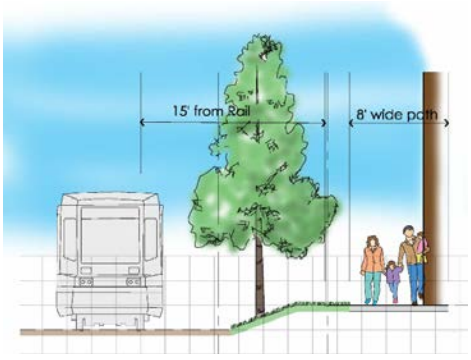
Central Area Alignments



Alternative C1a – one of the original CPAC alignments, this alternative extends eastward approximately 1,000 feet to the existing Clark Street pedestrian bridge. This alternative could extend from either W5a or W5b. The 500 feet at the west end would match whichever alternative is stemmed from, while the 500 feet at the east end would utilize a knee-wall along the north side of Pleasant Street, similar to alternative W5b. At the eastern terminus, this alternative requires a signalized crossing of Pleasant Street. It is recommended that the signalized crossing include modifications to the Snake Hill Road alignment, providing more of a perpendicular intersection with Pleasant Street and decreasing the approach grade of Snake Hill Road from approximately 20 percent to approximately 12 percent. This crossing would be on a tangent section of Pleasant Street, and therefore does not carry the same concerns as the crossing near the Star Market.



ALTERNATIVE C1A PLAN VIEW



ALTERNATIVE C1B CROSS SECTION

Alternative C1b – one of the original CPAC alignments, this alternative would span approximately 1,150 feet from the east end of the DPW site to the Clark Street pedestrian bridge along the south side of the rail. This alternative would run along the Housing Authority parking lot and office building, as well as residential properties on Clark Lane. Implementing the MBTA defined minimum offset of 15 feet, combined with a minimum acceptable path width of 8 feet, results in direct impacts to existing residential dwellings.

Alternative C1c – one of the original CPAC alignments, this alternative would span approximately 1,350 feet from the east end of the DPW site to the Clark Street pedestrian bridge by traversing the Housing Authority parking lot and then running along the north side of Pearson Road and the south side of Clark Lane. The path along Pearson Road and Clark Lane would consist of a 14-foot and 10-foot sidewalk respectively. At the eastern end of the alternative, the Clark Lane grade approaching Clark Street is approximately 12 percent, which cannot accommodate an ADA accessible path without the construction of a switchback ramp. Due to limited width along Clark Lane itself, this ramp system would be constructed at the rear of the 104 Clark Street property.

ALTERNATIVE C1C CROSS SECTIONS

This alternative raised several concerns, specifically: the Housing Authority was not amenable to a path impacting the number of spaces in the existing parking lot; private property owners were opposed to loss or significant impact to residential dwellings; Clark Lane is currently a private road and would require variance in use as well as property acquisition to be used for the path; and the enhanced sidewalks directly abutting roadways were viewed as being less safe than a path route that would be more separated from vehicular traffic.

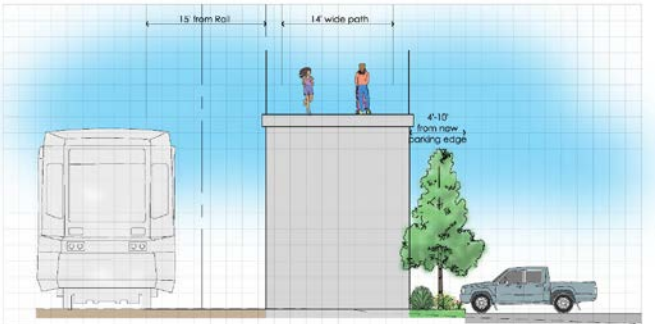
Alternative C1d – developed as an alternate to alternatives C1b and C1c, this alternative seeks to avoid impacts to residential dwellings and private property takes by following a more circuitous route around the Housing Authority to the south. This alternative would continue down the eastern edge of the DPW site, connecting to the end of Midland Street; it would then proceed as a widened, approximately 12-foot wide sidewalk along the west side of Midland Street. Once intersecting with Waverley Street, it would continue eastward along the north side of Waverley Street and then northward along the west side of Thomas Street and Clark Street, all as widened, approximately 11-foot wide sidewalks. A second option was developed for this alternative, which would convert Waverley Street and Beech Street to a one-way couplet, with Beech Street running eastbound and Waverley Street running westbound. This option would allow for additional street plantings, or possibly on street parking.

ALTERNATIVE C1D PLAN VIEW

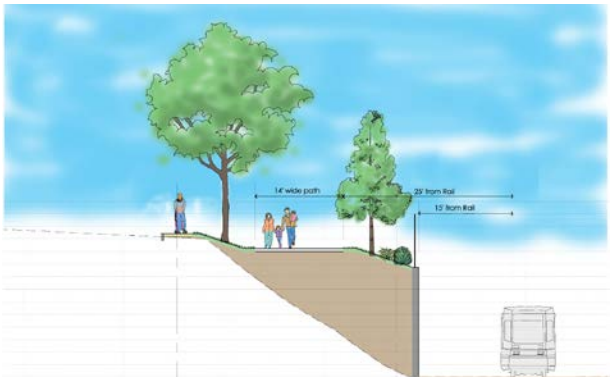
ALTERNATIVE C1D CROSS SECTION

This alternative, though opposed by some due to its circuitous and indirect nature, as well as close proximity to the front of several residential dwellings, simultaneously gained interest due to its potential community connections. On the south side of Waverley Street, just across from Midland Street, are the Beech Street Community Center and Town Field. If not selected as the primary route for the path itself, the component of this alternative traversing along the east side of the DPW site and west side of Midland Street was identified as the second potential spur for increasing access to the path.

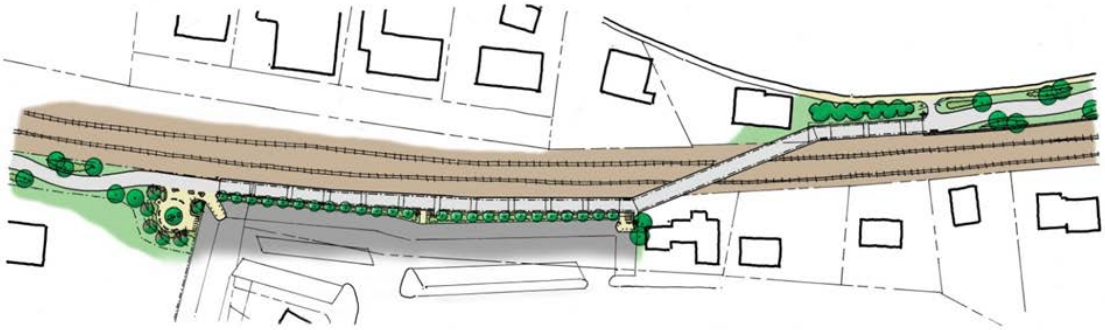
Alternative C1e – developed as another alternate to alternatives C1b and C1c, this alternative seeks to avoid impacts to residential dwellings and private property by bypassing the Housing Authority to the north. This alternative would run along the north side of the Housing Authority parking lot between the DPW site and the Housing Authority office building, would then cross over the Fitchburg rail line and touch down along the south side of Pleasant Street to the east of the existing commercial properties; it would then continue to run along the south side of Pleasant Street to the existing Clark Street pedestrian bridge. Though more costly than alternative C1d this alternative continues to hug the rail line, providing the most direct route without impacts to private property. This alternative also allows for future connections to Town Field and the Beech Street Center, as well as potential future development on Pleasant Street.



ALTERNATIVE C1E CROSS SECTION:
BHA PARKING LOT



ALTERNATIVE C1E CROSS SECTION:
SOUTH SIDE PLEASANT STREET



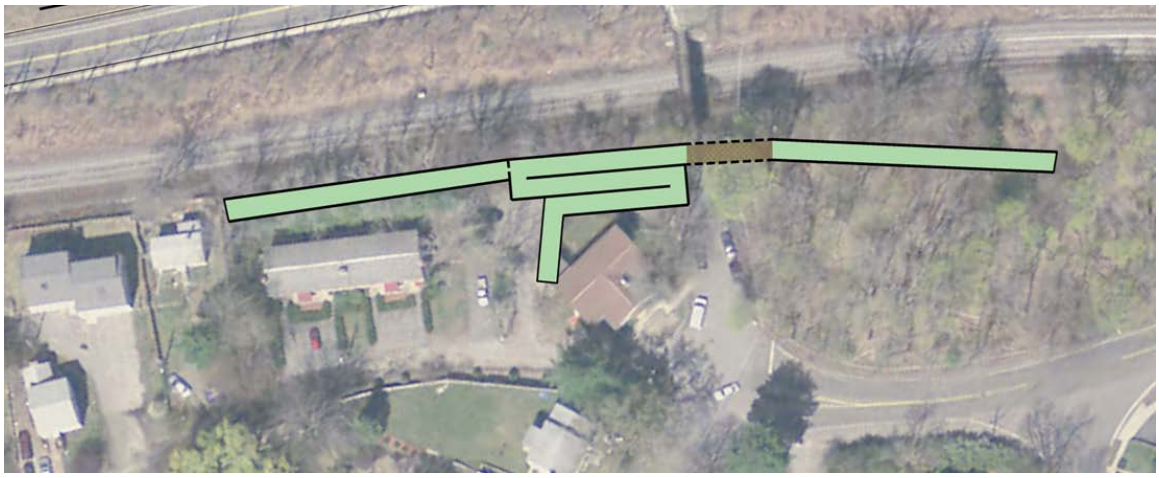
ALTERNATIVE C1E PLAN VIEW

Alternative C2a – one of the original CPAC alignments, this alternative connects alternatives on the north side of the rail west of the Clark Street pedestrian bridge to alternatives on the north side of the rail east of the bridge; therefore, this alternative can only be considered in conjunction with alternatives C1a and C1e, as previously defined. This alternative would construct the path on an approximately 12-foot high retaining wall adjacent to the existing sidewalk on the south side of Pleasant Street, and would cross the northern approach to the Clark Street pedestrian bridge.

Alternative C2b – one of the original CPAC alignments, this alternative would enable the path to cross the rail from the north side to the south side or vice versa by reconstructing the existing Clark Street pedestrian bridge. This alternative would need to raise the existing structure by approximately 5 feet to meet the MBTA defined vertical clearance of 22 feet 6 inches from top of rail to bottom of structure. This elevation change could be made up on the north side of the structure with the distance between the bridge and Pleasant Street; however, it cannot be made up on the south side of the bridge, leaving a 4-foot elevation differential between the structure and Clark Street. This differential would be overcome with the construction of a retaining wall, which would then allow for a few parking spaces, which could prove beneficial to the path, but would primarily be intended to maintain access to 104 Clark Street, needed for disabled residents.

ALTERNATIVE C2B PLAN VIEW

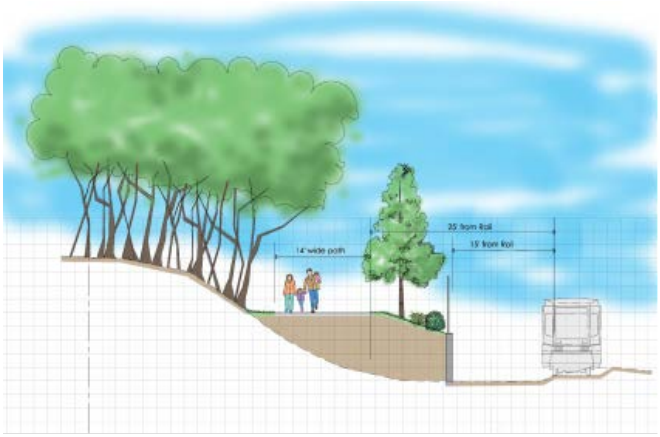
Alternative C2c – one of the original CPAC alignments, this alternative would connect alignments on the south side of the rail west of the Clark Street pedestrian bridge with alignments on the south side of the rail east of the Clark Street pedestrian bridge. This alternative would do so utilizing an underpass, tunneled behind the existing abutment of the Clark Street Bridge. Though it was CPAC's original intention to abut the rail bed on the northern side of the abutment, this would not meet the MBTA required minimum offset.



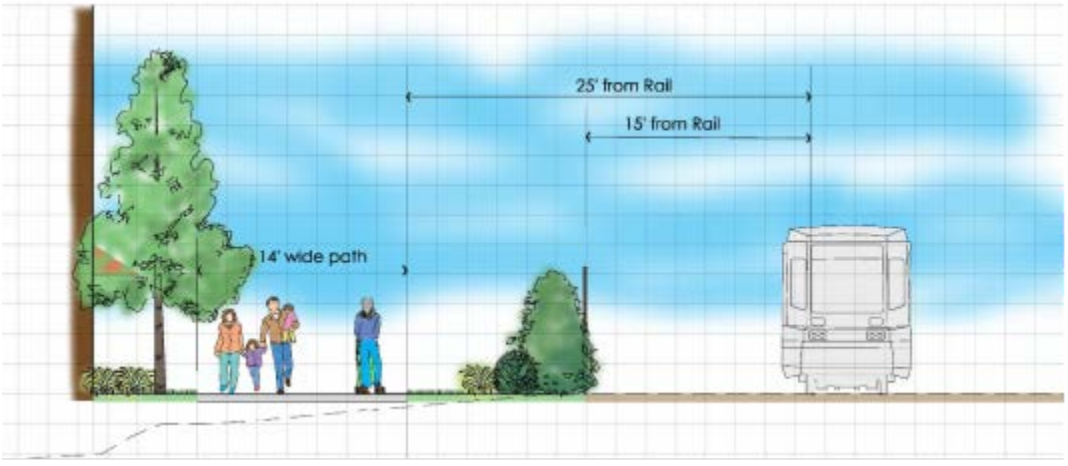
ALTERNATIVE C2C/C2D PLAN VIEW

Alternative C2d – a variation of alternative C2c, this alternative would similarly connect from the south side of the rail west of the Clark Street Bridge to the south side of the rail east of the Clark Street Bridge. However, this alternative would make the connection across the Clark Street Bridge by constructing ramps from the parking lot grade behind 104 Clark Street up to the Clark Street pedestrian bridge elevation, crossing the southern approach to the Clark Street bridge, and then constructing a ramp back down to grade on the east side of the Clark Street Bridge.

Alternative C3a – one of the original CPAC alignments, this alternative spans approximately 1,150 feet from the Clark Street pedestrian bridge to the Belmont Center station along the north side of the rail. As such, this alternative must continue from alternative C2a or C2b only, and connects to alternative C4a and C4b only. This alternative runs adjacent to three residential properties on the south side of Pleasant Street before passing behind the Police Station and the Municipal Light Building parcels. Through future development and reconstruction of these latter two sites, there is potential for direct community connections to the path.

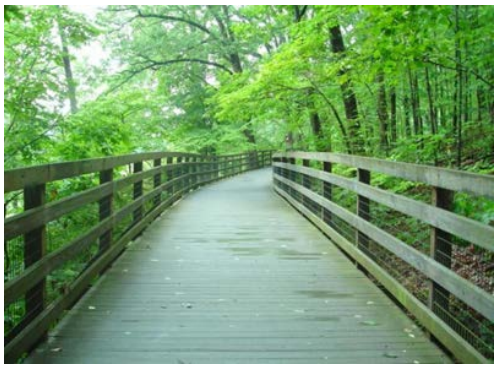


ALTERNATIVE C3A CROSS SECTION:
EAST OF CLARK STREET

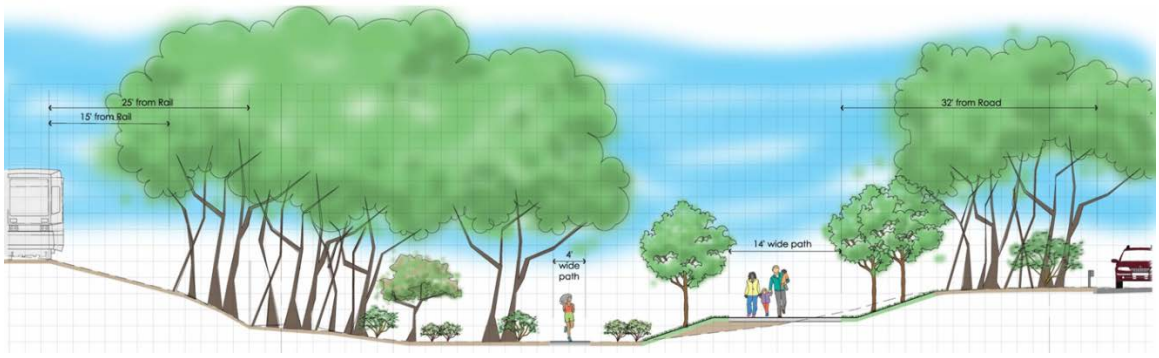


ALTERNATIVE C3A CROSS SECTION:
POLICE STATION/LIGHT BUILDING

Alternative C3b – one of the original CPAC alignments, this alternative spans approximately 1,200 feet from the east side of the Clark Street pedestrian bridge to the Belmont Center Station via the Royal Road Woods. Due to the presence of wetlands within the Royal Road Woods this alternative would require some extent of boardwalk structure, to be determined in the design phase. This alternative would have impacts on mature woodlands and potentially existing wildlife movement.



SAMPLE BOARDWALK THROUGH WOODED AREA



ALTERNATIVE C3B CROSS SECTION

Alternative C3c – developed as an alternate to alternative C3b, this alternative spans approximately 1,200 feet from the east side of the Clark Street bridge to the Belmont Center station along the south side of the Royal Road Woods, slightly offset from the northern edge of Royal Road. This alternative would have less impact on mature woodland and wildlife and may not require the construction of boardwalk structures.

ALTERNATIVE C4A PLAN VIEW

Alternative C4a – this alternative connects to C3a and runs along the north side of the rail across the existing Concord Avenue bridge in the space where the previous Central Massachusetts Railroad right-of-way still exists.

This alternative would make direct connection to the Belmont Center Station outbound platform. It is also recommended that this alternative include park space in the Belmont Center area with ADA accessible ramps to and from Leonard Street and Concord Avenue. This would provide compatible access to the Belmont Center Station that does not currently exist. It would also provide a safe pedestrian crossing of Leonard Street and Concord Avenue grade-separated from vehicular traffic.

Alternative C4b – this alternative connects C3a to the southern side of the rail, either along the rail bed itself or along Concord Avenue. This is accomplished by utilizing ramps down from the outbound platform to the Belmont Center area and then widening the existing sidewalk under the Concord Avenue bridge to accommodate both pedestrians and bicyclists.

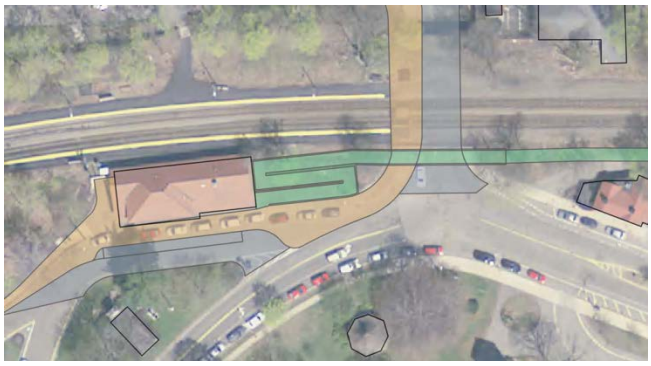
Alternative C4c – one of the original CPAC alignments, this alternative would connect from the south side of the rail to Concord Avenue via a signalized crossing at the intersection of Royal Road, Common Street and Concord Avenue. Signalization of this intersection has been considered various times in the past for previous projects and was always considered an infeasible solution. Concern regarding this alternative was also raised by the public with respect to conflicts with the heavily trafficked and congested intersection, combined with health and comfort concerns associated with the close proximity to fumes and noise.

ALTERNATIVE C4C PLAN VIEW

Alternative C4d – one of the original CPAC alignments, this alternative would make a connection from either alternative C3b or C3c to the north side of the rail by widening and reconstructing the existing pedestrian underpass located at the Belmont Center Station. After passing under the active rail line, a ramp would ascend to the level of the existing Concord Avenue bridge, and cross the existing structure similar to alternative C4a. In reconstructing the pedestrian

ALTERNATIVE C4D PLAN VIEW

underpass, it is also recommended that it be shortened considerably at the north end, since it no longer needs to extend under the area previously occupied by the abandoned railroad.



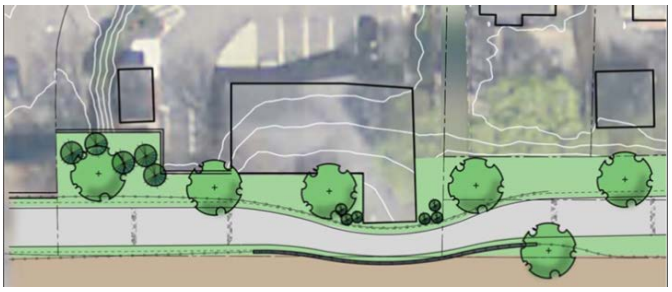
ALTERNATIVE C4E PLAN VIEW

Alternative C4e – one of the original CPAC alignments, this alternative would continue from either alternative C3b or C3c and proceed to the south side of the rail. To do so, a double switch back would need to be constructed directly east of the Belmont Center Station/Lions' Club building. A new bridge structure would need to be built parallel to the existing Concord Avenue bridge due to the historic character and classification of that existing structure. This alternative is still considered to have negative impacts on historic elements because it would obstruct views of the existing bridge. The double switchback would also utilize the space currently used by the Belmont Lions Club, a local non-profit, for its annual Christmas tree sale and therefore also has a private impact.

Unlike the western end, the central area does not have any distinct route. At both link locations, C2 and C4, the path could either continue on one side of the rail or switch to the alternate side of the rail. Therefore, the number of potential routes increases significantly in this section.

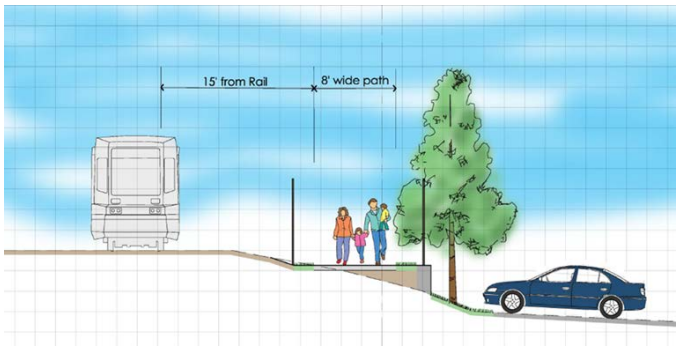
Eastern End Alignments

Alternative E1a – one of the original CPAC alignments, this alternative spans 800 feet from the east side of the Concord Avenue bridge to Alexander Avenue along the north side of the rail. This alternative requires a short, approximately 25-foot long pinch to a 15-foot offset and an 8-foot minimum acceptable path width to skirt past the existing Coldwell Banker building on the east side of the Concord Avenue overpass. This alternative then utilizes the Belmont Citizens Forum property, an approximately 3,500-foot long by 70-foot wide parcel of former Central Massachusetts Railroad right-of-way, for the rest of the distance to Alexander Avenue. Through the public engagement process a few options were developed for this alternative, showing either retention of the existing embankment with a non-retained path along the elevation of the rail, or a combination of retaining and privacy walls along the abutting property side of the path.



ALTERNATIVE E1A PLAN VIEW:
BEHIND COLDWELL BANKER BUILDING

Alternative E1b – one of the original CPAC alignments, this alternative spans 800 feet from the east side of the Concord Avenue underpass to the east side of the High School football field along the south side of the rail. This alternative passes behind the back side of a local business building and the post office,



ALTERNATIVE E1B CROSS SECTION

as well as three commercial properties, before entering the high school property. This alternative would have a minimum 15-foot offset for 400 feet, followed by a minimum 15-foot offset and minimum 8-foot path width for 450 feet; in total, creating an 850-foot long pinch point compared to the proposed typical section. A short knee wall would be needed along the commercial properties to maintain the existing parking spaces, which are typically at capacity during business hours. This alternative raised concern with the public due to its close proximity to and lack of grade separation from the rail.

Alternative E1c – one of the original CPAC alignments, this alternative spans 1,000 feet between Belmont Center and the east side of the football field along the north side of Concord Avenue. Two options were developed for this alternative. The first option is intended to be a temporary low-cost option to be used if the recommended alternative needs to be phased into construction. This temporary alternative would reverse the location of the existing on-street bike lane and on-street parking to give more separation and protection to the biking location. Due to the number of driveways along the north side of Concord Avenue, and the number of cars entering and exiting those driveways, this option raised concern because of the potential for path-automobile conflicts and the limited visibility of path users to vehicles turning on and off of Concord Avenue. The second option, carrying a higher cost and the recommended option if this alignment is selected to move forward to design, includes reconstruction of the entire roadway to place all vehicular needs on the south side of the existing median, including one travel lane and one parking lane per direction. It would then utilize the remaining space on the north side of the existing median to create a linear park, within which the path could meander.

SAMPLE BIKE LANE BUFFERED BY PARKING

ALTERNATIVE E1C PLAN VIEW

Alternative E2a – one of the original CPAC alignments, this alternative connects alternative E1a to either alternative E3a or E3b. This alternative is recommended to depress to the depth required to pass under the active rail line, creating a safe, grade-separated crossing from the north side of the rail to the south side of the rail. This underpass would provide access to the path from the south side of the rail as well as access to the high school and Concord Avenue amenities for the Winn Brook neighborhood residents on the north side of the rail. This is a crossing that the Town has sought for over 30 years. Bridge loading, specifically Cooper E80, MBTA maintenance drive requirements and drainage were all considered in the conceptual design of the underpass. Through coordination it was noted by MassDOT personnel that the underpass in this alternative is not as beneficial to the path as it is to the high school unless the path itself crosses under the rail at this location, which could impact availability of MassDOT funding for this feature.

ALTERNATIVE E2A PLAN VIEW

ALTERNATIVE E2A RENDERING

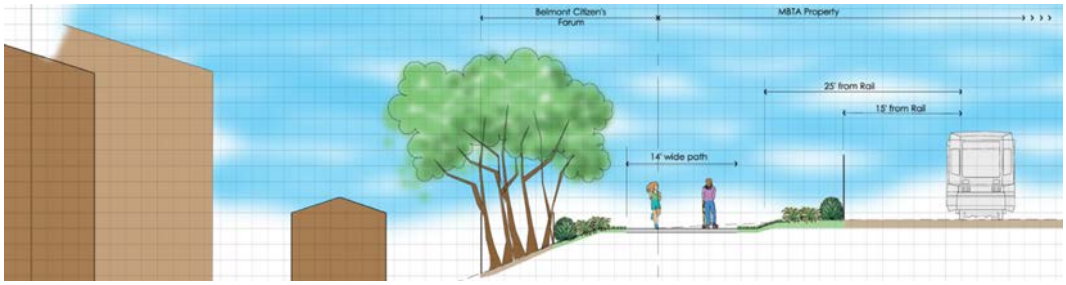
E2b – this alternative was developed as an alternate to E2a, with the purpose of reducing the length of retaining walls as a cost-saving measure. This alternative includes a switchback ramp depressed to the depth required for the underpass under the rail line. This alternative allows the path to continue along the north side of the rail, bypassing the underpass. Concerns were raised regarding this alternative with respect to the relative confinement and reduced visibility compared to alternative E2a.

Alternative E2c – this alternative connects alternative E1c to the north side of the rail. This alternative would require a minor depression of the high school property on the east side of the football field as well as along the Alexander Avenue extension on the north side of the rail within the approach to the underpass. Both depressions would require minor retaining walls to access the short, approximately 50-foot span, underpass.

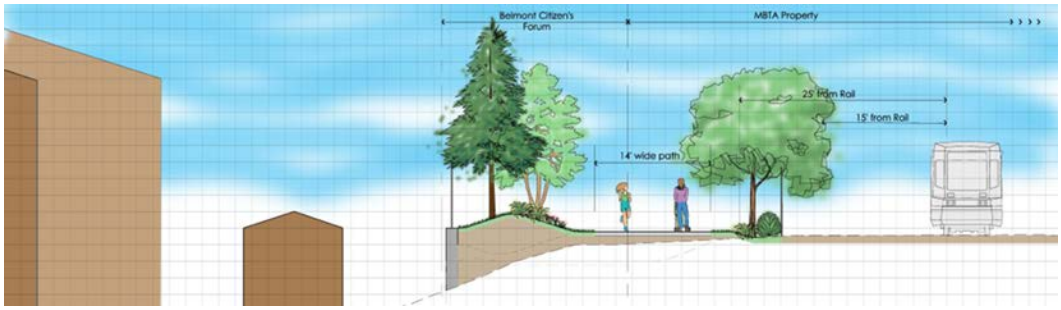
In addition to the underpass itself, it is recommended that a link be made across the high school campus from the underpass to Concord Avenue, as well as the development of bump outs to enhance the visibility and reduce the distance of a Concord Avenue crossing, which would connect the path to other Town amenities on the south side of Concord Avenue, including the library, pool, playground, Powers Music School, Chenery Middle School and more.

CONNECTION FROM UNDERPASS TO CONCORD AVENUE

Alternative E3a – similar to Alternative E1a, this alternative would span approximately 2,600 feet from Alexander Avenue to Brighton Street along the north side of the rail. As with alternative E1a, this alternative has a variety of options that could be implemented; the two predominant ones shown in public presentation were maintenance of the existing embankment with the path constructed level with the rail line, and the second option showing construction of a retaining wall and privacy wall along the abutting property line. At the Eastern end of this alternative the path would utilize the existing easement on the French and Mahoney property which allows for the minimum offset to rail and minimum path width adjacent to the building.



ALTERNATIVE E3A CROSS SECTION: MAINTAIN EXISTING EMBANKMENT

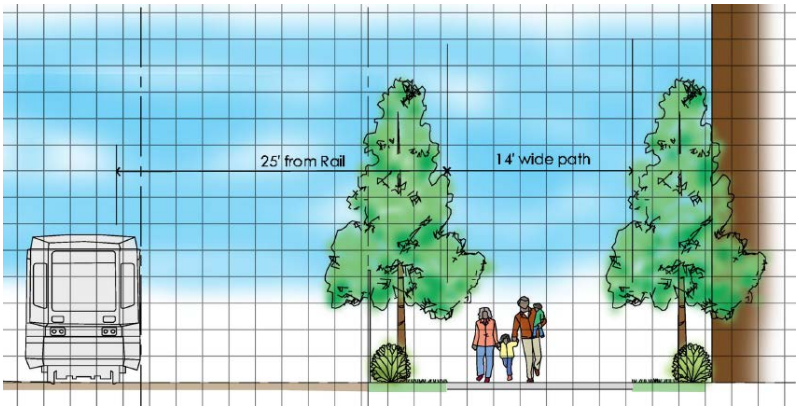


ALTERNATIVE E3A CROSS SECTION: LEVEL WITH RAIL

This alternative raised concerns with some local residents along Channing Road whose properties would abut the path in this location. Concerns were primarily related to assumptions that the path would bring more vandalism and crime to the area. Since this study stemmed from and followed the CPAC study completed for the Town, which provided in great detail results from around the country with relation to these concerns, this topic was not investigated further as part of this study; rather, reference continues to be made to the relevant section, Chapter 6, of the CPAC Final Report, dated June 7, 2014. Considered such an extensive and thorough resource, this chapter is included as Appendix D.

This alternative initially also raised concern with the local fire and safety. The primary concerns were visibility and access. Though the specific design of the typical section, inclusive of any retaining walls, will not be determined until the project enters preliminary and final design, it was agreed that any such element implemented would need to be approved by the police with regard to patrol and by the fire. The fire department noted that access should be permitted or accommodated every 300 feet.

Alternative E3b – similar to Alternative E1b, this alternative would span approximately 2,600 feet from the east side of the High School football field to Brighton Street along the south side of the rail. This alternative would: pass behind the current high school building, with maintenance of the existing fire lane drive isle, requiring a small knee wall through this stretch of the path; run along the north side of the tennis courts; and then proceed along the north side of the Purecoat North/Crate Escape building. This alternative would have minimal, if any, impact on the existing utilized space of the high school property.



ALTERNATIVE E3B CROSS SECTION

The northern edge of the Crate Escape building is currently less than 23 feet away from the outer edge of the rail line and therefore cannot fit even the minimum width offset and minimum path width without impacts to the existing structure. Historically, the portion of this building that juts out closer to the tracks was a loading dock bay that accommodated trains via a spur off the eastbound rail line. Subsequently, the building accommodated multiple tenants, with the jut-out area accommodating a single tenant segmented from the remainder of the building. Construction of the path in this area would assume removal of the loading dock bay. With the removal of the loading bay, a recommended offset and path width of approximately 14 feet could be accommodated.

While it seems from preliminary review that the Purecoat North/Crate Escape building could undergo limited impact, by eliminating the area previously used as a rail spur loading dock bay and individual tenancy, this will need to be further assessed and negotiated during design. Or, alternately, if this property is acquired as part of the advancement of the high school property reconstruction, the proximity of the existing building to the rail and the current layout are moot. Should the Purecoat North/Crate Escape property be deemed unusable, the path can remain on the south side of the rail east of Alexander Avenue by traversing the eastern edge of the high school property and continuing along Hittinger Street to complete the connection to Brighton Street. This variation can also be implemented temporarily if the advancement of the alignment along the north side of the Purecoat North/Crate Escape parcel becomes a lengthy endeavor.

The school committee raised concerns that this alternative may not be favorable, because a path behind the school building would have limited visibility. However, this alternative is designed to maintain the existing drive aisle behind the school, if the school remains in its current location, which keeps the path open, visible and able to be patrolled by public safety. Additionally, as the high school property is currently undergoing reconstruction through the Massachusetts School Building Authority (MSBA) program, it is very likely that the school building will be relocated on the property. In upwards of 95% of MSBA projects, the new school cannot be constructed in the same location as the existing building. Therefore, the path could likely enter the school campus east of a new building, adjacent to fields and/or parking, which would be both visible and accessible, as well as share a recreational use.

Alternative E3c – developed as an alternate route south of the Fitchburg Line, this alignment meanders through the high school campus, which will be redesigned (and the high school either renovated or demolished and rebuilt) as determined by an ongoing feasibility study funded by Belmont and the Massachusetts School Building Authority (MSBA). The available land for placement of the path is unknown due to the current feasibility phase of the high school study; however, assumptions were made regarding the maintenance of, at a minimum, as much building and field square footage as exists on the site today. Though this alternative is appealing due to being farther away from the active rail line, it is largely speculative. Particularly, the high school property may, through the MSBA process, be converted to a 7 to 12 or 8 to 12 grade school structure, which would require a larger building to accommodate the increased enrollment.

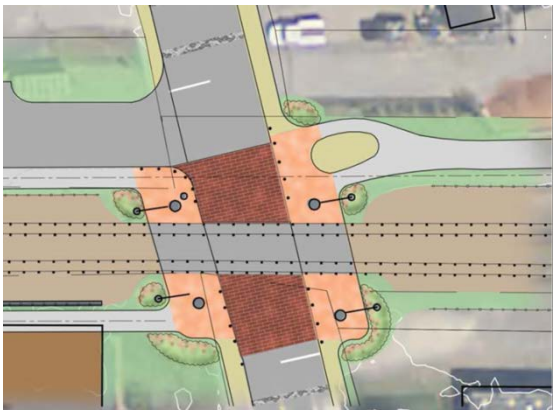
ALTERNATIVE E3C PLAN VIEW

Alternative E3d – similar to Alternative E1c, this alternative would span 3,650 feet in total from the east side of the football field to Underwood Street along Concord Avenue, via temporary reversal of the parking and bike lanes, or permanent conversion of the north side of the existing median into a linear park, and then continue along Underwood Street and Hittinger Street to Brighton Street and the existing Fitchburg Cut-off path. Though this alternative does not face the same number of driveway openings as alternative E1c, the only way to access this alternative is to utilize a combination of alternatives C4e and E1b, then continue along the west side of the high school property. This becomes a rather circuitous route, as the path would only travel along Concord Avenue for a few hundred feet before returning northward towards the rail line. Additionally, any alternative running along Concord Avenue was viewed by the public as being significantly less safe and uninviting due to the high volume of vehicular traffic along the corridor.

ALTERNATIVE E3D PLAN VIEW

Alternative E3e – this alternative was developed as an alternate to alternative E3a with the goal of minimizing concerns of Channing Road abutters while trying to make another connection to Town resources. This alternative would span in total 4,250 feet along Sherman Street from Alexander Avenue to Brighton Street, making a connection to the Winn Brook Elementary School, then proceed down the east side of Brighton Street, connecting directly to the existing Fitchburg cutoff path. This alternative was not well received by the public due to its circuitous nature, adding undo length to the path. Additionally, it would still run along residential properties, and would have no separation from traffic along Sherman Street, as this section would be a widened sidewalk approximately 14 feet in width.

ALTERNATIVE E3E CROSS SECTION



ALTERNATIVE E4A PLAN VIEW

Alternative E4a – one of the original CPAC alignments, this alternative would cross Brighton Street at grade connecting alternative E3a, E3b or E3c to the existing Fitchburg Cutoff path on the east side of Brighton Street, which continues to run along the north side of the railroad. An additional benefit of this alternative is that it would immediately connect to the existing cut-off path, but does not preclude future extension of a path along the south side of the rail east of Brighton Street, which is currently being planned by the City of Cambridge, including a new pedestrian/bicycle bridge over the railroad. This alternative would include highly-visible crossings, such as stamped pavement, bump-outs to the extent possible and full signalization to enhance the existing roadway at-grade crossing with the Fitchburg rail line, as well as provide the safest at-grade crossing possible for the path.

Alternative E4b – developed as an alternate to Alternative E4a, this alternative entails a pedestrian/bicycle bridge over Brighton Street connecting to alternative E3a on the west side of Brighton Street and touching down along the existing Fitchburg Cutoff path on the east side of Brighton Street. Due to offset requirements from the MBTA, this alternative would require the path to elevate west of the French and Mahoney building and then run at full elevation,

approximately 16 feet above grade, past the French and Mahoney building, across Brighton Street and a few hundred feet east of Brighton Street to accommodate maintenance of the existing cutoff path connection to Brighton Street under the new elevated structure.

Alternative E4c – developed as another alternate to alternative E4a, this alternative spans over the Fitchburg rail line and Brighton Street simultaneously, connecting alternative E3b or E3c on the west side of Brighton Street to the existing cut-off path on the east side of Brighton Street, again allowing for the existing, path connection to Brighton Street to remain under the elevated path. Though this alternative would not need to elevate early, as alternative E4b would, the additional height requirement of crossing over the rail line with a 22-foot 6-inch clearance results in this structure being almost equivalent in length as a structure defined by alternative E4b.

ALTERNATIVE E4C RENDERING

The public, as well as the Town's fire and safety departments, had concerns with both alternatives E4b and E4c due to limited accessibility, overall length and difficulty of prolonged grade differential or graded slope. These alternatives would also be more costly and more circuitous than alternative E4a.

Similar to the central area, the eastern end has a variety of potential route combinations, with the link at E2 allowing the path to continue on one side of the rail or switch to the alternate side of the rail. Further, Alternative E4a could serve as a link between the Belmont Community Path and both existing and future paths in Cambridge and points farther east.

A matrix tool was determined to be the best approach to assessing and ranking each alternative. The matrix for this study was developed based on a series of 45 questions asked during the workshop session of Public Meeting #1. The questionnaire stemmed from experience on previous projects combined with familiarity with the character, constraints and concerns pertaining to this particular path, including: user experience; compliance with regional plans; ease of fire and safety access/response; and rail conflicts/proximity.

From the results of the questionnaire, both in person the evening of the meeting as well as gathered through online responses, a preliminary matrix was drafted which consisted of five (5) primary evaluation categories, as shown below.

1= least feasible, 3=most feasible Highest Total = BEST

West Segment Stretch/Link	Access and Connectivity	Environmental Impacts	Property Impacts	Sense of Security/ Comfort	Relative Cost	Total
W7-a Waverley	2	3	3	2	2	12
W7-b.i Waverley	3	3	3	3	1	13
W7-b.ii Waverley	3	3	3	3	1	13
W7-c Waverley	3	3	3	3	3	15


W7-a


W7-b.i


W-7b.ii


W-7c

Through the course of the study, by means of public input received at various meetings and intercept events, as well as Town input including all relevant departments and committees, particularly the planning department, the CPIAC and the BOS, the matrix evolved over the course of the study. In its final version, the matrix was expanded to include a total of five (5) major categories, consisting of 23 criteria. Further, the discussion at many meetings focused on whether or not elements within the matrix should be weighted evenly, or if priority should be given to any primary category or individual criteria. Ultimately, the primary category of User Experience, which encompasses level of comfort, ease of use and desirability of each alternative, was weighted two-times the value of all other primary categories.

CRITERIA
User Experience
Ease of Access
Aesthetics
Comfort
Directness
Vehicular conflicts
Conflicts with pedestrian way
Environmental and Cultural Impacts
Wetlands
Historic resources
Mature Woodland
Wildlife
Design Attributes
Encroachments necessary/MOU
Fire and Safety
Potential Partnerships
Distance to residential structures

Transportation
Connectivity to Destinations (Resources, Amenities and Transit)
Ease of universal public accessibility
Consistency with regional plans (MCRT/Wayside Trail)
Impact on existing traffic/transportation
Rail conflicts/proximity
Cost
Range of Construction Costs
Operations and Maintenance Costs
Qualify for Funding
Value Added

Once the percentile score of each alternative was computed, the overall range of values was determined. Then, all scores were redistributed to a 100-point scale. This redistribution made comparison of alternatives more intuitive. This approach also aided in the discussion of whether or not there should be a cut-off score, below which alternatives should no longer be considered. It was recommended by the study team that a 50-point value be defined as a minimum acceptable value. The minimum point recommendation was not enforced because, in some locations, the removal of one low ranking alternative may cause an otherwise very high-ranking route to be ruled out. It was deemed preferable to consider how alternative route options fit together in an end-to-end path than to enforce limits at the level of route segments.

In lieu of a minimum point value being used to rule out alternatives, a "fatal flaw" approach was developed. A fatal flaw is defined as an exceptional instance where a proposed alignment is incompatible with the site or defined guideline/plan for a specific reason. These typically contain design characteristics that violate a defined goal, code, initiative or requirement. Alignments with fatal flaws in select locations are included in the matrix to fully vet all alternatives; but they receive a score of 0 for the associated criteria and are not considered for a Recommended Route (combination of high-ranking alternative Alignments for the full length of the Study Area). As such, the following fatal flaws were identified:

- Direct impact to an existing residential dwelling
- Over 5,000 sf of loss to high quality wetlands (as defined in MassDEP CMR 310)

- Path location is infeasible to patrol or too difficult to access in emergency situations or impedes access to other areas under Town responsibility
- MBTA has rejected the proposed alignment or know private owner will not agree
- Alignment crosses an intersection with various negative conditions including excessive vehicular traffic volumes, multiple approaches/conflict points, poor sight lines, and lack of signal/inability to add signalization or alignment crosses 5 or more highly trafficked driveways within 500 linear feet of path

One more element was originally identified as a fatal flaw; an alternative that would require speculation about usability at the time of the BOS determination. However, this was intended to identify any alternative with a speculative or unidentifiable extent of impact at the time the BOS would need to make a decision on the selected route. As presented over the course of the study as a "?" rather than an "X", and discussed in detail at Meeting #10, this was ultimately determined to reduce the feasibility of an alternative but not classify as a fatal flaw.

Over the course of the study, this only became pertinent to Alternative E3c, that would meander through the high school campus. Since the high school campus is currently being redesigned and the future layout of the site is unknown, the location of a path through the campus is unknown and the extent of the path's impact cannot yet be measured. It is worth noting that this is unlike alternatives that hug the rail line, which have a well-defined linear impact, such as Alternative E3b. Based on the alternative's definition, one could quantify that the impact to the property should not exceed an approximate 40' width, inclusive of plantings on both sides, for the length from Alexander Avenue to the eastern end of the site.

The final matrix definitions and completed matrix for all alternatives in the study can be found in Appendix E. The results of the evaluation and fatal flaws were presented graphically at Public Meetings #9 and #10.

FINAL SCORING EXAMPLE

COST ESTIMATING

To the extent possible, unit costs were established that would apply to the majority of alternatives developed for this feasibility study. Based on previous experience, and confirmed by Town departments, it was assumed that emergency rescue vehicles as well as plow equipment will likely be traveling on the path. Though vehicular use will be relatively infrequent, the path composition developed for all cost estimates assumes 6 inches of asphalt pavement over 4 inches of aggregate base over 8 inches of gravel borrow. Path and structural unit costs were prepared for the following:

PATH DEFINITIONS

- 16' + 2' shoulders, no structure
- 10' + 2' shoulders, no structure
- 8' + 2' shoulders, no structure
- 16' on/in structure
- 10' on/in structure
- 8' Sidewalk
- 10' Sidewalk
- 11' Sidewalk
- 12' Sidewalk
- 14' Sidewalk
- 15' Sidewalk

STRUCTURES

- Walls 0-5' High
- Walls 5-10' High
- Walls 10-15' High
- Walls 15-20' High
- Walls 0-5' High w SB
- Walls 5-10' High w SB
- Walls 10-15' High w SB
- Walls 15-20' High w SB
- 11' DMSE Walls 0-5' High
- 11' DMSE Walls 5-10' High
- 11' DMSE Walls 10-15' High
- 11' DMSE Walls 15-20' High
- 16' DMSE Walls 0-5' High
- 16' DMSE Walls 5-10' High
- 16' DMSE Walls 10-15' High
- 16' DMSE Walls 15-20' High
- Walls 0-4' (Masonry)
- Walls 10' (Separation)
- Boardwalk
- Underpass
- Bridge 18" thick, abutments 16' path
- Bridge 18" thick, abutments 11' path

Several of the structures within the range of alternatives were more complex than the application of unit costs. For these unique situations, conceptual costs were developed, with consultation of typical vendors. These alternatives included W7a, W7b, C2c and E4b.

Site design elements were found to be very specific for each alternative alignment. These proposed improvements are above and beyond the path itself and any structures. Because of the detailed nature of the alignment designs, a master plan level cost estimate was developed for each potential alternative. The following list of site improvements is included, at their respective level, in the cost estimate for every alternative:

EARTHWORK

- Rough Grading
- Ordinary Borrow (Fill)

PAVING AND CURBING

- Bituminous Concrete Walk Paving 3", full depth
- Bituminous Concrete - Vehicular 3.5" full depth
- 4" Cement Concrete Pavement, full depth
- Driveway Pavers
- Granite Pavers on Concrete Base
- Brick Pavers on Concrete Base
- Concrete Stairs
- Granite setts/cobble on concrete base (2' wide warning band on Path)
- Stone Dust surfacing, full depth
- Vertical Granite Curb
- Metal Edge

SIGNAGE/WAYFINDING

- Entry Icon (sim to trellis and round bollards)
- Primary Orientation
- Path Directional Sign
- Trail blazer / Adjacent Street Name
- Vehicular Directional Sign
- Interpretive Sign
- Stop/Warning MUTCD signs (custom post)
- Granite etched bollard/mile-marker (1/10th) (urban areas)
- Granite etched flush mile-marker (1/10th) (naturalized areas)

SITE IMPROVEMENTS

- Drinking Fountain
- Bicycle Parking Post
- Trash Receptacle
- Architectural treatment for "Physical Barrier" per MBTA (character in keeping with community)
- 6' ht. Vinyl Chain Link Fence
- 6' ht. privacy fence
- 3' ht. split rail Fence

Pedestrian Guardrail
Vehicular gate
Collapsible Bollard
Ornamental bollards
Metal Handrail at Stairs/ramps
Flagpole
Trellis (15' wide)
Stone Walls 2'ht. x2'w.
Concrete retaining wall
Granite (façade, cap stones, monolithic steps, placed)
Fountain
Bench (every 300 LF minimum)
Granite block seating, type 1 (2'x2')
Granite block seating, type 2 (2'x4')
Picnic Table

PLANTING AND SEEDING

Shade Tree
Flowering Tree
Signature Tree (i.e. Multi or Columnar)
Evergreen Tree
Bare root trees (10' oc)
Plant Beds
Hose bibbs
6" Loam
Fine Grading and Lawn Seeding
Fine Grading and Meadow Seeding
Fine Grading and Restoration Seeding

Due to the conceptual level of design used to prepare the cost estimates, a contingency of 30 percent would typically be carried. However, due to the locale of this project, with close proximity to the active rail line, and resulting need for extensive MBTA coordination, rail closures and/or flagging and other potential rail mitigation, as well as potential hazardous materials and anticipated stormwater management, the contingency was conservatively increased to 40 percent.

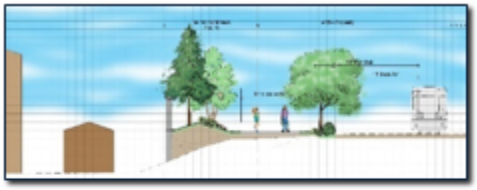
Following the initial cost estimating effort, which assumed the more costly option in all areas with various potential treatments, questions were raised about what the lower end or range of costs may be. To provide a complete picture to the Town, to assist with continuing to pursue funding to move the project forward, this requested range of costs was developed. The key adjustments were reduction in retaining walls to assume use of the current

embankments to the extent possible, as well as potential reduction in plantings of up to 25 percent. Any additional reduction in plantings would not be recommended, as it would compromise the atmosphere and visual appeal of the proposed design, which was identified as a community desire and played into the anticipated user experience.

The final range of costs for each alternative can be seen in Appendix F.

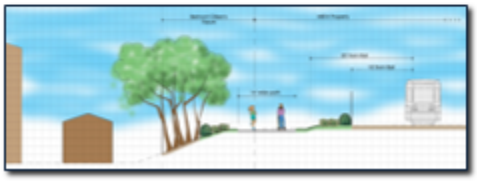
HIGHEST OPTION

PATH	$15.4 M
PLUS CROSSINGS	$12.5 M
TOTAL	$27.9 M



LOWEST RECOMMENDED

PATH	$10.6 M
PLUS CROSSINGS	$12.0 M
TOTAL	$22.6 M



In addition to providing a range of costs, the project team prepared comparative analysis to ensure the proposed construction cost was justified. The overall cost was broken out to identify structural components independent from level path segments. Finally, the total cost was compared to other rail trail projects in District 4, which includes Belmont, as well as to District 6, which directly abuts District 4 to the east and includes Cambridge and Boston.

BELMONT COMMUNITY PATH

PATH	$15.4 M
PLUS CROSSINGS	$12.5 M
TOTAL	$27.9 M

DISTRICT 4
$3 M/MILE

BELMONT PATH
$13.5M/MILE

DISTRICT 6
$20 M/MILE

RECOMMENDED ROUTE

After assessing all alternatives independently, an overall route was produced by linking the highest-ranking alternatives together. In this step, any alternative with a fatal flaw, even if it was otherwise high ranking, was not considered for the overall route of the path. The recommended path route follows the sequence W6, W7b, W8, W9b, C1e, C2a, C3a, C4a, E1a, E2a, E3b, E4a and is illustrated below.

Essentially, the path would: begin on the north side of the rail at the Waltham/Belmont town line; continue along the north side of the rail to the Waverley Square station, where a "box-over" park would be constructed; continue along the south side of the rail, along the northern edge of the DPW site, to the west side of the Housing Authority office building; cross the rail on a new pedestrian/bicycle bridge; continue along the north side of the rail to Alexander Avenue, utilizing the existing Concord Avenue bridge; cross under the rail at Alexander Avenue via a depressed, retained path; and then proceed along the south side of the rail on the edge of the Belmont High School property, and subsequently the Purecoat North/Crate Escape property, to an at-grade, signalized crossing of Brighton Street and the Fitchburg Line.

Recommended Route = Red
Spurs = Yellow

RECOMMENDED ROUTE PLUS SPURS

This route allows for the future construction of all spurs identified within this study, including: the connection to existing paths within the Beaver Brook Reservation; connection to Town Field and the Beech Street Center, via Midland Street; connection to the Winn Brook Elementary School, via Sherman Street; and connection to the Town pool, library, playground, Powers Music School, Chenery Middle School and more, via the High School property and proposed signalized crossing at Concord Avenue.

Pros – This route utilizes the greatest extent of town owned and operated property; allows for all community spurs to be implemented in future phases; incudes the Alexander Avenue underpass as part of the actual community path, thereby increasing eligibility for funding; and puts in place much of the infrastructure for future ADA upgrades of Waverley and Belmont Center Stations.

Challenges – The box-over of Waverley Station includes two at-grade signalized crossings that will need careful coordination with the recent traffic improvements in the area while accommodating the multi-modal context of the site for rail and bus access.

Though the above is considered the most feasible route, portions of it may not ultimately be achievable due to the current or anticipated site reconstruction of the DPW, the Police Station/Light Building and the High School properties. To ensure the Town has a plan for moving forward, should the recommended route become compromised, two contingent recommendations were developed. While these contingent routes identify solutions for challenges raised to date by the Town, further issues may arise during design and right-of-way negotiation. Should additional adjustments to the recommended route be needed, there is flexibility and the Town can refer back to the matrix scoring.

Contingent Route #1

Due to the ongoing nature of the Belmont High School feasibility study being conducted with the MSBA, which may or may not entail future purchase of all or part of the Purecoat North/Crate Escape parcel by the Town for school expansion purposes, there is no assurance that this site will be able to accommodate the path as recommended. Should the High School property be unusable between Alexander Avenue and Brighton Street, the route is recommended to defer to Alternative E3a in this stretch, utilizing the Belmont Citizens Forum property on the north side of the rail between Alexander Avenue and Brighton Street. This may alter the funding capability of the Alexander Avenue underpass, as described in the subsequent Funding Section of this report.

Pros – The project can move forward starting from either end and would not be contingent on the high school redevelopment schedule.

Challenges – The Alexander Avenue underpass may not qualify for path funding.

Contingent Route #2

As noted previously, the Town's DPW site is also slated for reconstruction in the near future. Current plans call for renovation of the main DPW building, and therefore would likely not interfere with the recommended route. However, if the site is ultimately altered in such a way that cannot accommodate the path, the route is recommended to defer to Alternative W9a, instead of W9b, crossing the rail on a bridge structure just east of the Waverley Square station rather than at the west side of the Housing Authority office building. This change from W9a to W9b requires the addition of two signalized crossings of Pleasant Street, one of which would be at the center of a sharp horizontal curve. This subsequent route would not allow for the future connection to the Town Field and the Beech Street Center.

Pros – Does not impede DPW plans.

Challenges – Adds two additional signalized road crossings, one in a less-than-ideal location along the highly-trafficked area of Pleasant Street.

Impacts

The recommended route, as well as both contingent routes, was assessed for the extent of impacts to private properties. Impacts were identified as temporary construction easement, permanent linear impact or permanent impact, representing the greatest extent of impact anticipated for any variation of options that may be implemented within each selected alternative. A tabulation of these impacts, including parcel ID, address, owner and the extent of impact, can be found in Appendix G. It is intended that this compilation of data be utilized by the Town as it continues to pursue the development of the community path along the recommended route.

FUNDING

The overall construction cost, not including right-of way, for the recommended route, and its two contingent options, is between $25 and $32 Million. This overall amount is expected to come from a combination of sources, including federal and state funds. Since the Town has already invested many years into the study and advancement of this path, it was deemed important to start conversations with the funding agencies most likely to contribute, to share with them the cost estimates and determine the extent of funding available, as well as the next steps the Town should take. Three (3) meetings were held with personnel from MassDOT, MBTA, the MAPC and the Boston MPO to discuss these matters.

In general, the agencies agreed that $25 to $32 Million is a considerable investment. There was also general consensus that the MCRT in Belmont is a critical component of the regional path network, and needs to continue moving forward. With regard to cost, MBTA indicated that the study estimate is reasonable given the constraints, extent of structures and proximity to railroad right-of-way. It was recommended that phasing be considered, should the need arise due to potential limitations on funding. It was also recommended that the Town proceed to the design phase, as the agencies cannot officially identify funding sources or amounts until a 25% design package is submitted for review and consideration. More extensive notes from these meetings are included in Appendix H.

Several path spurs connecting to important Town amenities and populations were identified during the design process. While these spurs may not qualify under anticipated funding sources, they are important for local community connections. Additional sources of funding may be available to the Town for the design and/or construction of these spurs, such as Safe Routes to School, Community Preservation Act, Mass Development Grant for Commonwealth Places, and other Complete Streets, Livable Communities and multi-use trail sources.

NEXT STEPS FOR BELMONT

The completion of this feasibility study marks an important point for the Town to proceed with the development of the Belmont Community Path. With a recommended route, finer detail can now be put into the design. The immediate next steps for the Town are approval of the recommended route by the BOS, efforts to secure funding for the detailed design of the path and issuance of a Request for Proposals (RFP) for the design services.

Following issuance of the RFP, the Town, preferably through an extension of the CPIAC's term, will oversee the review of proposals and select a consulting team for the preliminary and final design, similar to the CPIAC's role in recommending a consultant team for this feasibility study to the BOS. Once selected, the consulting team will begin efforts towards 25% design, in accordance with State standards.

Design/Permitting

The first phase of design will be the completion of a 25% design. This level of design includes preliminary design plans, a preliminary cost estimate, permitting efforts necessary to complete a project need form (PNF) and development of a functional design report (FDR). It will be critical in this phase to generate a detailed land survey, in accordance with MassDOT standards, including, but not limited to, wetland boundaries, edge of wooded areas, edge of rail, building edges, property lines and property ownership.

This preliminary design phase will also be the appropriate stage for addressing and finalizing details associated with plantings and buffers. Once a single route is defined, direct abutters can be identified and informed of their proximity. Abutters meetings should be included as part of a continued public engagement effort.

Upon completion of the 25% design, a submittal can be made to the State agencies, including MassDOT and the Boston MPO, for review and scoring. After approval of the 25% design, the project can advance to final design, including 75% and 100% Plan, Specification and Estimate (PS&E) milestones.

Funding Process

Funding for the design of paths is generally not borne by the state agencies that could contribute to the construction costs, including MassDOT, MBTA and the local MPO. This portion of funding, typically estimated to be approximately 10 percent of the anticipated construction cost, is commonly funded by the local municipality. However, supplemental funding can be sought through sources such as the Department of Conservation and Recreation (DCR), grants generated from political support and federal grant funding from the Transportation Investment Generating Economic Recovery (TIGER) program.

Following design, various state agencies may contribute funding for construction of the path. These agencies include MassDOT, MBTA and the Boston MPO. This was the case for much of the funding secured for the various stages of the Bruce Freeman Trail, which was allotted as part of the MassDOT Transportation Improvement Program (TIP) following such recommendation by the Boston MPO. From initial conversations with these agencies, the Belmont Community Path is expected to score well for funding, based on particular criteria including: makes connections to transit; improves roadway safety; and is identified as a high priority gap. State funding can be identified and allotted for the Belmont Community Path following formal review and scoring of the 25% design package.

While less common, and likely dependent on the anticipated cost, a municipality may opt to fund the design and construction collectively to allow for greater control. This was the decision made by Waltham for its component of the Wayside Trail, a segment within the overall MCRT.

Phasing – Phasing of the Belmont Community Path was a possible necessity introduced at the outset of the study, and therefore was considered throughout the process. Through coordination with MassDOT, MBTA and the MPO/MAPC, the overall cost of the Belmont Community Path is substantial. Though the agencies recommend that the Town pursue the full funding amount in their initial request, they have advised that a phasing plan be developed should full funding not be immediately available.

Phasing of the Belmont Community Path should be done in a justified order, with logical beginning and end points. Consideration should be given to the connections being made with each phase. It would be ideal for the first phase, and each/any subsequent phase, to begin at an existing path location, to avoid development of a disconnected section which will not produce the desired transportation mode shift.

Based on this rational, the first phase of construction should either start at the existing cut-off path on the east side of Brighton Street, or, should the design and construction of the Waltham component of the MCRT continue to advance ahead of the Belmont section, start at the Waltham/Belmont town line. While a connection to the existing cut-off path, providing immediate access towards Boston, may produce a greater volume of path users than connections westwards, both would be beneficial in connecting people to transit.

Having defined the potential start points for initial phasing, the next step is identifying the most reasonable termination of an initial phase. The terminus needs to be developed in an accessible location, and ideally would connect to Town resources and/or amenities. From either start location, the most practical terminus for an initial phase, given these criteria, is Belmont Center. This would ultimately divide the Belmont Community Path into two phases.

Determining whether to start at the east or west end of Town will likely depend on the timing of the high school property reconstruction project through the Town's collaboration with the MSBA. It will be difficult to start on the east end of Town if the school grade structure and corresponding space needs are not yet defined. Positively, if the path is phased beginning

with the segment from the Waltham/Belmont town line to Belmont Center, Concord Avenue could be used temporarily to make the connection from downtown to the existing cut-off path. This could be accomplished with the low-cost, temporary option identified in Alternatives E1c and E3d. As the intersection of Royal Road, Common Street and Concord Avenue will not be signalized, this temporary connection is expected to be used primarily by avid cyclists.

From a cost perspective, the potential phases of the recommended path, as defined above, would be: $15 Million for the west section, from Waltham to Belmont Center; $11 Million for the east section, from Belmont Center to the Fitchburg Cut-off Path; and $1.9 Million for Belmont Center (Alternative C4a), which would need to be constructed in conjunction with whichever section were selected for Phase 1.

Right-of-Way – Once a final route is decided by the BOS, the Town will need to secure the appropriate right-of-way for the construction of the path. The recommended and contingent routes identified previously each affect a different list of properties, and to different extents. The extent of construction easements and linear private impacts will be identified during the design phase of the selected route. Partial acquisitions, easements and memorandums of understanding (MOUs) will be sought following identification. The cost of securing the necessary right-of-way, both in purchase/agreement and legal fees, will be in addition to the construction costs outlined previously.

Overall Timeline

The final construction of the path, assuming all remaining phases of the design and funding continue to move with the current momentum, is expected to be complete by 2022. The breakdown of this schedule, noting the design and funding tasks, can be seen below.

- Study Recommendation Reviewed by BOS – Winter 2017
- Town Pursue Funding for Preliminary/Final Design – Spring 2018
- Town Issue RFP for Design and Select Consultant – Summer 2018
- Preliminary/Final Design with State Agency Review – 2018 & 2019
- Town Procure Funding/Property for Construction Phase – 2019
- Construction of Belmont Community Path – 2020 & 2021

FUTURE DECISIONS

In addition to the identification of a recommended route, various topics were discussed over the course of the study related to future expansion of the Town's pedestrian and bicycle network, with connections to the path, as well as operation and maintenance of the path. The following information is provided to help inform the Town on future decisions.

Spurs

As outlined within the Alternative Development section of this report, certain alignments that were not selected for the primary through route of the path itself would still greatly benefit the Town. These alignments would function better as spurs off the primary route, providing additional connections to other Town uses, including recreational, commercial and institutional. The alignments, previously identified as Alternatives W1b, C1d, E2c and E3e, include connections to: the walking paths within the Beaver Brook Reservation; Town Field and the Beech Street Center; amenities along Concord Avenue, including the library, pool, music school and more; and the Winn Brook Elementary School.

Costs – Though these alignments enhance access to and increase the extent of destinations that may be reached by the path, they are additional and secondary to the primary route. These elements have been costed separately from the total included in the recommendation for the path. These spur elements would carry additional costs of approximately $2.73 Million.

Maintenance

While there is potential some of the maintenance for the path may be adopted by other entities, such as DCR, it is most likely, based on the recent history of other similar projects, that the Town will be responsible for maintenance of the path within the Town limits. Further, accepting responsibility for the future condition and upkeep of the path has potential to aid in the funding effort, as it is favorably viewed by state agencies, particularly MassDOT.

Once constructed, the major components of the path should withstand anticipated use for at least 20 to 50 years for the pavement and structures respectively. The components that will need to be maintained by the Town on an annual basis include snow removal, if elected, and patrolling. As noted, all structures associated with the project have been designed and costed to allow for vehicular loads, including snow removal equipment. Conversations with the police department indicate that they may consider reviving previous two-wheel patrol, be it by bicycle or low speed moped.

Based on the intended uses of the path, per surveys conducted during this and previous studies, it is strongly recommended that the Town maintain a plowed path through the winter months. Agreement of the Town to plow the path helps to further support the designated use as a transportation corridor, in addition to being a recreational amenity.

Operations

The final characteristics of the path that need to be established by the Town are the operations. The operations of the path shape the function of its use. Two key items to be considered are what the hours of operation will be for the path and accordingly whether or not the path will be lit.

Hours – The surveys conducted for this and previous studies indicate a range of users, hoping to use the path for both recreation and transportation. With the average work day extending from 8 am to 5pm, with more and more people going in early and staying late, those planning to commute will be traveling along the path before dawn and after dusk during the winter months, with sunrise occurring after 7 am and sunset as early as 4 pm.

Further, those who work and intend to use the path for recreation will likely be using it earlier than the morning commute and later than the evening commute times. It is recommended that the path have liberal hours from 6 am to 10 pm, reflecting the evening cutoff identified in the Town's noise ordinance, but allowing for a slightly earlier morning start time to accommodate pre-work recreational users and potential commuters.

Lighting – Given the recommendation to establish hours of operation that extend beyond the dawn and dusk hours in the winter months, it is also recommended that the town consider lighting the path. Two types of lighting were identified for potential use along this path, including conduit-run, wired lighting and solar-powered lighting. Both power sources also have the option of being set on timers or being activated by motion sensors. The cost for lighting ranges from approximately $0.72 Million for solar power to approximately $0.94 Million for wired power, based on the length of the recommended route.