Town of Needham
Trails Master Plan

Needham Trails Advisory Committee

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"The job of recreational engineering is not one of building trails into lovely country, but of building receptivity into the yet unloving human mind."

- Aldo Leopold

Section 1.0
Introduction

1.0 INTRODUCTION

1.1 Purpose and Need

Trails and sidewalks provide places for people to walk, run, bike, and hike in Needham. They are a means for mobility to, from, and through Needham's open spaces and conservation lands. Trails are as much a resource for traveling as they are a destination for exercise, having fun, exploring nature, and observing the natural environment. Needham's citizens walk their dogs, go birding, cross-country skiing, and take time out of their daily routines to simply enjoy the community in which they live, work, and play.

Trails also serve as important alternative routes for traveling that do not require driving. Increasing the number of trails and trail connectivity between commuting destinations is an excellent way to reduce traffic on congested roadways and encourage people to walk, run, and bike. In addition to walking and jogging, Needham's trails provide year-round access to other programs and activities that promote public health, such as cross-country skiing, fit trail exercise routines, canoeing, and cycling.

Needham is a community with the benefit of having a vibrant mixed-use "main street" downtown surrounded by suburban residential neighborhoods dotted with parks and schools, and several large contiguous areas of open space and recreation land. The Trail Master Plan will play an important role in guiding the decision making that will connect the people who live in Needham to the convenient places they frequent regularly, and the open spaces that provide them with an enhanced quality of life.

1.2 Background

Needham's Open Space and Recreation Plan creates a vision for the Town's open spaces, trails, and recreation opportunities:

> *Needham has long recognized the importance of open space for conservation and recreation purposes. While the Town is a largely developed metropolitan suburb, Needham's municipal officials and residents are committed to balancing continued pressure for development with the need to protect our natural resources and to provide recreational opportunities and facilities for people of all ages. Careful planning and stewardship, along with cooperation between Town Departments and coordination with other towns and agencies, are critical to achieving an appropriate balance between competing priorities. Needham will continue to rely on these practices as it works towards a future in which:*
>
> - *The Town remains an attractive residential community with a broad mix of permanently protected open spaces that support a diversity of wildlife, protect our water supply, and provide opportunities for passive recreation.*

- *Open space and recreational opportunities exist throughout Town in every major neighborhood.*
- *Residents enjoy active recreation at a set of diverse facilities including outdoor fields and courts, indoor facilities, and well-maintained parks.*
- *Recreational resources – including playgrounds and playing fields – are maintained and expanded in a manner that is consistent with the needs and interests of the community.*
- *A well-documented, interconnected network of trails is available.*
- *The Charles River is recognized as a unique natural and recreational resource and is widely accessible for both walking and boating.*

The goals of the Open Space and Recreation Plan provide a general image of what Needham's open spaces and recreational opportunities will look like and how they will function in the future. Although the goals of the Needham Trails Advisory Committee are independent of the Open Space and Recreation Plan, they share a common vision for a network of multi-use trails linking different areas of Town, including the open spaces, park lands, and the Charles River. Needham's trails are on property under the jurisdiction of the Conservation Commission, Park and Recreation Commission, School Committee, and the Board of Selectmen, and connect with trails on State lands under the control of the Department of Conservation and Recreation (DCR) and land owned by the Trustees of Reservations, as well as trails in Wellesley.

The Needham Conservation Commission proposed to create a plan for inventorying and improving Needham's trails that would eventually become a Community Preservation Act (CPA) project. The Town of Needham, utilizing its CPA funding, voted to approve the Needham Trails Master Plan project. Beals and Thomas, Inc. was contracted to create the Trails Master Plan, which included performing a survey and evaluation of the existing trails, proposing new trails and new trail connections, creating a maintenance plan for existing trails, and generating an implementation plan.

The Board of Selectmen appointed the Needham Trails Advisory Committee to provide input to Beals and Thomas, Inc. on current trail use, existing conditions, areas of improvement, and a vision for outdoor recreation. This vision helped to create the overall goals and objectives for the Trail Master Plan. The Trails Advisory Committee was charged with:

1. Providing input to the consultant on current use of trails, existing conditions, areas for improvement, vision for outdoor recreation.

2. Providing comment and input to the consultant on draft recommendations to the Town Manager and boards and committees having jurisdiction over real property.
3. Identifying options for community/volunteer support for on-going trail maintenance and programming.

1.3 Goals and Objectives

The overall goal of the Needham Trail Master Plan is:

> ***To create a unified trail system that links conservation and recreation land within the town and to adjacent towns, and encourages and informs residents of its use.***

In order to achieve this overall goal the Committee developed six specific goals and objectives:

1. Establish a Long-Term Implementation Structure
2. Improve Trail Visibility, Access, and Use
3. Bring all Existing Trails up to Standards
4. Build New Trails on Town Lands
5. Build New Trails Connecting Existing Systems
6. Implement and Carry Out Annual Inspection and Maintenance

The Committee's goals and objectives helped to guide the development of the Trails Master Plan and will continue to be used as a gauge for determining the effectiveness of the Master Plan and its implementation.

Section 2.0
Inventory of Existing Trails

2.0 INVENTORY OF EXISTING TRAILS

2.1 Overall Trail Observations

Trails in Needham are generally associated with the largest tracts of open space, parks, schools, and other undeveloped parcels. The larger tracts of open space, which include Ridge Hill and the Town Forest, are generally located in the western half of Town. The existing land use patterns within Needham have a higher concentration of densely developed neighborhoods within the central and eastern portions of Town. Along the eastern town boundary, adjacent to the cities of Newton and Boston, trails are located within Cutler Park and Hemlock Gorge, which are managed by the Massachusetts Division of Conservation and Recreation (DCR). Charles River Peninsula is a 30-acre conservation area located in the southwestern portion of Town owned by The Trustees of Reservations. The DPW land within the westernmost portion of Town contains fire roads that provide access to the Charles River; however, these are not open to the public because the property protects existing and future public water supply wells. Trails are also located on smaller parcels within the central and south-central portions of the Town that include Rosemary Lake, Mitchell Woods, Newman School, and the Needham Reservoir.

There is a strong disconnect between the trails located in the largest contiguous parcels of open space and the densely developed residential neighborhoods located in the central and eastern portions of Town. Although sidewalks connect the Town Forest to residential neighborhoods and the Town Center, the larger Ridge Hill Reservation is accessible only to those adjacent abutters or by car. Even Cutler Park, located in eastern Needham, is somewhat inaccessible to pedestrians due to separation from Town by Interstate Route 95. Those parcels with trails that have good pedestrian access tend to be smaller and disconnected from larger trail parcels due to residential development.

There is no clear nexus for trail activities in Needham, nor is there reference to any connectivity between trails on any of the parcels. Each parcel with trails may have a separate, independently designed sign indicating its name. The Town Forest, Ridge Hill, and portions of Greendale Avenue have kiosks with trail map information; however, the location of these kiosks is not convenient to visitors at these sites. Signs and trail markers are different at each location if they are present at all. With the exception of Cutler Park, Charles River Peninsula, and other DCR-owned properties, there are few trails that provide access to the Charles River or run parallel to it.

Existing maps of the Town Forest and Ridge Hill are available from the Park and Recreation office and website. These maps have been excellent resources for walkers, hikers, and first time visitors to the properties. They are, however, outdated and do not reflect the existing conditions of the properties or the trails. These maps do not depict the same type of information for each property, nor do they provide trail slope/width information, use designations, or connectivity with other Needham trails. The ability to clearly communicate and depict the trails and open spaces in Needham is crucial to encouraging people to use the trails, garner public support for ongoing trail maintenance, and expanding trail connections and networks.

2.2 Trail Survey and Conditions Inventory

For the purposes of this master plan, only those trails located within Town-owned properties were surveyed to establish the existing trails maps and inventory. Geographic Positioning System (GPS) technology, which uses satellites to determine a position on the earth's surface, was employed to locate the trails. Trail locations within other properties, including those owned by the state and private landowners, were gathered from available resources that include the Needham Town Geographic Information System (GIS), internet trail maps, and aerial survey. The locations of these trails are depicted on the enclosed "Town of Needham Massachusetts Existing Trails" Map in Appendix A.

Trails were located in April and May of 2007 by Beals and Thomas, Inc. using a Trimble GPS receiver and TDC1 data collector. In addition to locating the trail segments, other features, such as signs, kiosks, trail connections, gates, parking areas, bridges, and boardwalks were also located.

In order to evaluate trail conditions in the national forests, the United States Department of Agriculture Forest Service uses Trail Assessment and Conditions Surveys (TRACS). TRACS include a set of adaptable standards that are used to plan, inventory, assess, prioritize, and maintain trails within the national forests. TRACS provides a standardized dictionary of terms, methodology for data collection and trail management objectives. Beals and Thomas, Inc. utilized a modified TRACS to evaluate trail conditions in Needham.

Trail assessment using the modified TRACS was performed at the same time that the trails were GPS located. Trail conditions were categorized and assigned to those trail segments where they were observed. The observations of the trail conditions include: tread width, drainage issues, maintenance needs, blaze color, trail name, trail intersections, proximity to wetlands, and proximity to abutting properties. Additional information gathered in some locations includes, boundary markers, ledge outcrops, and proximity to railroad tracks.

Tread width measurements were taken where the width changed significantly along the trail and noted at all intersections. Observations were performed in the early spring

shortly after winter runoff when drainage/flood issues were presumed to be the most pronounced. Maintenance needs were rated on a scale of 1 through 4. Trails requiring trimming or cleaning with hand loppers and hedge clippers rating at 4 and completely overgrown trails requiring significant clearing were rated at 1. These classifications were grouped into two general categories for depiction on the trail maintenance maps: light trimming and clearing (work that could be performed by volunteers) and heavy clearing and grading (work that should be performed by professional staff or contractors). Blaze colors and trail names were recorded only for those trails in the Town Forest and Ridge Hill that had either of these attributes. Many trails are unmarked or unnamed. Trail locations that pass through wet or seasonally flooded areas and where they are adjacent to potential vernal pools were recorded in order to note both seasonal drainage issues and potentially sensitive habitat. Other items, such as grass clippings/lawn debris dumping, broken or overgrown signs, and "bootleg trails" (unofficial trails created by users) that lead into abutting private property were also located.

Although an important component of the TRACS, trail slope was not recorded with GPS. Trail slope was calculated and generalized for line segments based on interpolation of the underlying topography that the trails pass over. Trail slope was placed into one of four categories: 0-5% is Category 1; 5-12% is Category 2, 12-20% is Category 3, and over 20% is Category 4. Although detailed slope information is contained within the trail GIS, this information was generalized on the public trails maps to make it a more useful gauge of trail difficulty for trail users.

A combination of tread width, maintenance, and slope were used to categorize trails into one of five different Trail Management Classes. These classes generally coincide with the National Trail Management Classes, which use a number of additional factors, including traffic flow, obstacles, and constructed features. The Trail Management Classes are ideally used in the planning/trail management process to assign trails to a hierarchy that determines their level of importance and prioritization for routine maintenance, use determination, interpretive components, amenity installation, and expansion. Class is used to establish a base ranking of existing trails in order to simplify the initial planning process in terms of which trails need immediate attention and where future trail modifications and connections should be made.

Utilizing GPS data collection permitted special features and notes to be recorded electronically and associate them with a specific geographic point. Therefore, the paper TRACS data collection sheets were not necessary, as this information was collected electronically and imported to the GIS directly. Trail information, such as tread width, length, and blaze color, are all stored in a dynamic GIS and can be queried any number of ways and displayed either by location as a map or printed as a spreadsheet. Furthermore, this electronic GIS will be integrated into the Town of Needham GIS and enable the Town to utilize, modify, and update the information.

Quick and easy access to trail conditions data via the GIS will enable the Town to update

their trail conditions survey on a regular basis, prioritize maintenance work and improvements for those trails needing immediate attention, track trail conditions over time, and modify their Trail Management Objectives.

2.3 Individual Trail Properties

Existing trails inventoried and GPS located within individual town-owned parcels are discussed in the following sections.

2.3.1 Ridge Hill

Ridge Hill Reservation is under the jurisdiction of the Conservation Commission, and occupies approximately 400 acres of land between the Charles River and the Wellesley Town Boundary.

Location and Site Conditions

Ridge Hill is located in the western portion of Town, between the Charles River in the south and the Wellesley Town Boundary in the north, crossing Charles River Street. The main portion of Ridge Hill is located north of Charles River Street, west of the Army Corps of Engineers property (east of Grove Street, and proximate to the private property located on Cartwright Road. Natural features within Ridge Hill include an esker surrounded by wetlands, a drumlin, many vernal pools, intermittent streams, and wetlands. The central portion of Ridge Hill also contains open fields and buildings. A gas easement traverses the western portion of the property from Charles River Street to Cartwright Road. There are nearly 43,000 linear feet of trails within the Ridge Hill property. The Beard Trail, maintained by the Wellesley Trails Committee, is located in the northwestern portion of Ridge Hill. Abutting residential properties, some of which share a property boundary with the town-owned parcel, are located on surrounding streets. Recreational opportunities within Ridge Hill include walking, hiking, cross-country skiing, bird watching, and a fit trail.

Natural Communities, Vistas, and Habitats

White Pine – Oak forests represent the most common vegetative community within Ridge Hill. Other tree species, including hickory, hemlock, birch, and maple are also found within different portions of the site and on the edges of fields. Ridge Hill also contains red maple swamps that include highbush blueberry, sweet pepperbush, winterberry holly, skunk cabbage, and cinnamon fern. Undulating topography, rocky drumlins and eskers, and small pocket wetlands provide a varied landscape that is geologically interesting. An interesting feature within Ridge Hill, and an excellent example of past glacial activity within the region, is the Esker Trail. The Esker Trail is located in the northeastern portion of the property and is a serpentine ridge of gravelly and sandy drift, formed by streams flowing under or in glacial ice. Although there are no areas of extremely high elevation within Ridge Hill, the top of the hill within the central portion of the property, proximate to the buildings, provides excellent

views of the surrounding fields. Oak forests and the acorns they produce, as well as other hardwood seeds, provide a valuable food source during the dormant season. White Pine – Oak forest communities are a common and demonstratively secure community associated with a variety of birds and mammals, including wild turkey, woodpecker, grey squirrel, chipmunk, mice, fox, and white tail deer. Beaver, raccoon, opossum, finch, cardinal, warbler, and duck, as well as reptiles and amphibians are associated with red maple swamp habitats.

Access, Kiosks, and Signage

Ridge Hill is accessed from Charles River Street. A quarter-mile driveway connects three parking areas containing approximately 40 spaces, as well as the parking associated with the buildings and caretaker's house. A 5-foot faded wood and metal sign located 35 feet east of the access road reads "Ridge Hill Reservation – Town of Needham – Conservation Commission, Bureau of Outdoor Recreation – Department of the Interior" and there is a Land and Water Conservation Fund insignia in the lower left-hand corner. The paved access road passes through a stone gate with an 8-inch by 16-inch brown and gold lettered "Ridge Hill Reservation" sign and passes several other signs before reaching the first parking area. These included "Dog Owners – Leash Law and Pooper Scooper Laws in Effect," "Speed Limit 25 MPH," and "No Entry After Dark." The gravel parking area to the east of the 12-foot wide paved access drive and closest to the entrance, as well as the gravel parking area on the west side of the access drive, holds approximately 10 cars each in their current configuration. The parking area located east of the access drive and south of the buildings holds approximately 20 cars in its current configuration. Room for additional parking is located proximate to the buildings at the end of the access drive and at the caretaker's house. A wooden kiosk with a map of Ridge Hill Reservation and other information (tick warning, coyote warning, rules and regulations, history, etc.) is located 35 feet east of the access drive and 35 feet south of the parking area located on the west side of the access drive. The map is almost entirely illegible due to bugs infesting the inside panel of the kiosk.

Five additional access points are located around the perimeter of the northern portion of Ridge Hill and are located on Cartwright Road, Grove Street (in Wellesley), Lehigh Road, Charles River Street, and Pine Street. There are no kiosks marking the trailheads at the other access points, with the exception of Grove Street, where there is a Wellesley Trails Committee Kiosk with a Map of the Beard Trail and information pamphlets. The access to the southern portion of Ridge Hill is an unmarked trailhead located on Charles River Street, opposite the main entrance. There is room for two or three vehicles at the end of Cartwright Road but no parking is available at any of the other access points.

Most access points have "No Trespassing from Dusk to Dawn" signs. Other signs located at the main parking area and near the kiosk include "Dog Owners – Leash

Law and Pooper Scooper Laws in Effect," "Rubbish Disposal Prohibited," and "No Trespassing After Dark." Trail signs are similar to standard USDA Forest Service trail signs in that they are brown with inlaid painted lettering. They are, however, in all cases, hung too high and in some cases do not accurately point out the trailhead because they are placed evenly between the juncture of two or more trails.

Trail Conditions, Use, and Connectivity

There are 12 major trails within Ridge Hill that include the named trails with color blazes and the Fit Trail. Not all of these trails are maintained at the same width and some are relatively short trails. The best maintained trails are the Beard Trail, Esker Trail, Fit Trail, and portions of those trails located within the gas easement that traverses the property. The other trails will require more routine maintenance to cut back many of the young tree saplings and shrubs that have overgrown the trail. Portions of the Swamp Trail pass over a boardwalk that is in a state of disrepair due to missing boards, handrails, and collapsed portions. The actual treadways (the ground's surface where the user makers contact with the trail) of the trails seem to be generally intact with only small areas containing any significant erosion. There are also relatively few areas of flooded trails, where spring snow melt creates ponded areas along those trails adjacent to low-lying wetlands.

The trails within Ridge Hill are predominantly used for walking. Runners were observed using the Esker Trail and the Fit Trail. Bicyclists (although not allowed to use the trails) were observed on the paved access drive for the Nike site in the eastern portion of the property. Additionally, BMX bike jumps were observed within the power line easement. Due to their existing condition and maintenance, the trails generally do not provide use for activities beyond walking. Portions of the trails provide the opportunity for cross-country skiing. The Charles River Trail does not go all the way down to the river and therefore, there is currently no opportunity for canoe access from the river. Part of the trail system south of Charles River Street crosses private property. Other existing uses include bird watching, nature study, and fit trail exercises.

The Ridge Hill trail network provides connections from Cartwright Road, Beard Way, and Grove Street in Wellesley to Charles River Street and Pine Street. Generally, trails run north-south within the upland portions of the site and are aligned with the natural topography. One important exception is the Swamp Trail, which provides a connection between the Chestnut Trail in the western portion of the property and the Esker Trail in the eastern portion. Otherwise, most trails begin or end proximate to the buildings and entrance drive in the south-central portion of the property. The Beard Trail, which appears on the Town of Wellesley trail maps, connects Ridge Hill with the Wellesley trail system. There is no connection (crosswalk, trailhead, or sign) between the Charles River Trail

located south of Charles River Street and the central portion of Ridge Hill. Furthermore, there are no connections with any other trails at the northernmost end of the Esker Trail or any loop trail that would direct users back to the central portion of Ridge Hill.

Maintenance Needs

Most trails require trail frame clearing (removal of overgrown pine and shrub saplings) and treadway clearing. The Swamp Trail requires repair and/or replacement of portions of the boardwalk, for which funding has been allocated for replacing the bridge. Several pieces of equipment and signs along the Fit Trail require repairing and/or replacement. Funding is included in the Parks and Recreation Department's capital plan. Maintenance recommendations, both initial and long term, for individual trails throughout Ridge Hill are depicted on the "Ridge Hill Trail Maintenance Plan" in Appendix D.

All the trailhead signs need to be either moved down to an appropriate height or replaced with new signs that clearly indicate the direction of the trail. The boardwalk on the Swamp Trail requires significant maintenance and/or replacement.

Overall, trails require initial trimming and brushing to widen the trail frame to the tread width. The main trails with names are minimally maintained and require trimming vegetation outside the tread by clearing more room for perennial and low growing groundcovers in order to significantly reduce the need for intense regular maintenance and clearing. The narrower, non-arterial trails need to be cleared of downed trees and overhanging trees limbs, including white pine saplings. Light grading, installation of check barriers, and/or shrub planting is recommended along trails with steeper slopes, such as the intersection of the Swamp Trail and the Esker Trail and a small portion of the Fit Trail. Bootleg spur trails leading to vernal pools and to abutting private properties should be barricaded to discourage trespassing on to abutting private property.

Minimal tread repair and grading is needed on portions of low-lying trails that are adjacent to wetlands and where water ponds during the early spring. Installing, cleaning or restoring drainage channels along the sides of the treadways and maintaining them regularly will reduce future flooding and potential repairs due to sitting water. Initial maintenance recommendations for individual trails throughout the Ridge Hill are depicted on the Ridge Hill Trail Maintenance Plan in Appendix D.

Other Observations

There is no clear sign indicating the entrance to Ridge Hill, and it is not apparent for the first time visitor where one should begin and/or what amenities are available at Ridge Hill. Several spur trails within the northeastern portion of

Ridge Hill lead to abutting properties where homeowners have installed "No Trespassing" signs. The Ridge Hill Horticultural Trail (comprised of the loop made by the Chestnut Trail and a portion of the North Trail, approximately 2,000 feet long), sponsored by the Needham Garden Club is overgrown with white pine saplings and most of the small plant identification tags no longer correspond to the correct species. Several pieces of trash, including abandoned furniture and a deteriorated car, were observed in the northwestern portion of the property, adjacent to the gas easement. The Fit Trail also contains two signs about RSI (Repetitive Strain Injury) that do not match the other signs on the Fit Trail, but were an approved addition installed as part of an Eagle Scout project.

2.3.2 Town Forest

The Town Forest, under the jurisdiction of the Park and Recreation Commission, occupies approximately 190 acres in the south-central portion of the Town, east of Central Avenue and south of High Rock Street.

Location and Site Conditions

The Town Forest is adjacent to Claxton Field and private property owned by the Boy Scouts. Natural features within the Town Forest include High Rock, and the Horsford Ponds, High Rock Pond, many vernal pools, intermittent streams, and wetlands. An active railroad right-of-way traverses the southern portion of the site. Abutting residential properties, some of which share a property boundary with the Town Forest, are located on surrounding streets. The Town Forest contains over 49,500 linear feet of trails. Recreational opportunities within the Town Forest include walking, hiking, mountain biking, horse riding, fishing, bird watching, and ice skating. The adjacent Claxton Field has athletic fields, a playground, and restroom facilities that are open during athletic events.

Natural Communities, Vistas, and Habitats

White pine – oak forests represent the most common vegetative community within the Town Forest. Other tree species, including hickory, hemlock, birch, and maple are also found within different portions of the site. The Town Forest also contains red maple swamps that include highbush blueberry, sweet pepperbush, winterberry holly, skunk cabbage, and cinnamon fern. Undulating topography, exposed rocks, and small pocket wetlands provide a varied landscape that is geologically interesting. One key feature within the Town forest, and an excellent example of past glacial activity within the region, is High Rock. High Rock, located in the eastern portion of the property, is a rocky outcrop of high topography that provides scenic views of the surrounding region, especially to the south and west. Two other areas of high elevation that provide vistas are located proximate to the Boy Scout property. There are additional areas that provide views; however, these are not large scenic vistas that overlook the surrounding forest canopy. These are located on the tan birdhouse trail, the red trail, and the light blue birdhouse trail and are best viewed during the early spring, prior to leaf-

out. Oak forests and the acorns they produce, as well as other hardwood seeds, provide a valuable food source during the dormant season. White pine – oak forest communities are a common and demonstratively secure community associated with a variety of birds and mammals, including wild turkey, woodpecker, grey squirrel, chipmunk, mice, fox, and white tail deer. Beaver, raccoon, opossum, finch, cardinal, warbler, and duck, as well as reptiles and amphibians are associated with red maple swamp habitats.

Access, Kiosks, and Signage

The main access for the Town Forest is the parking area located on Central Avenue. A 6-foot brown sign marks the "Gateway to the Town Forest" and the "Horsford Pond Recreation Area." The gravel drive and parking lot holds approximately 20 to 25 cars in its current configuration. A kiosk with a map of the Town Forest and the blazed trails is located at the main trailhead and the beginning of Horsford Road (White Blaze Trail). Parking for 55-70 cars is also available at the adjacent Claxton Field and a trail located on the edge of the playing field links Claxton Field to the Town Forest. Eight additional access points are located around the perimeter of the Town Forest and are located on Frances Street, Robinwood Avenue, High Rock Street, South Street, Stratford Road, Gatewood Drive, and Springdale Road. There are no kiosks marking the trailheads at the other access points. The Frances Street access, although 20 feet wide, is not distinct, and it appears that the area between the end of the street and the trail is privately owned due to landscaping and a lamp post. There is room at the end of Robinwood Avenue for two or three vehicles. There is no parking lot on High Rock Street, but there is a sidewalk on the Town Forest side of the road. There is no parking lot on South Street, but there is room for several cars to pull over on the side of the road. The access from Stratford Road passes through what appears to be private property where portions of the trail are within landscaping and maintained lawn. In addition to these access points, the Boy Scout property is also accessible from property located on South Street with a trail that leads north through the transmission line easement and over the railroad tracks, connecting it to the trail system.

Most access points have "No Trespassing from Dusk to Dawn" signs. Other signs located at the main parking area and near the kiosk include "Dog Owners – Leash Law and Pooper Scooper Laws in Effect," "Rubbish Disposal Prohibited," and "No Trespassing After Dark." There are several rubbish barrels, picnic tables and benches located proximate to the parking area within the Horsford Recreation Area. Smaller trails within the Town Forest are either marked with small (1.5-inch by 2.5-inch) white birdhouses with different colored roofs nailed to trails or unmarked. User-initiated trail maintenance, besides the birdhouses, is also evidenced by bootleg trails leading to ponds and handcrafted signs. Two handcrafted signs labeled "Pooh Corner" are located on the trail proximate to Stratford Road. Several bootleg trails are also located around the perimeter of the

Town Forest that provide access from private property, but these are namely small trails leading to individual backyards.

Trail Conditions, Use, and Connectivity

The widest and longest trail within the Town Forest is Horsford Road, which is blazed with white markers and acts as the backbone to the trail system by connecting the parking area in the northern portion of the site with High Rock in the southeastern portion. The other major trails that are blazed within the Town Forest branch off from Horsford Road and include the red trail, the yellow trails, the green trail, and the blue trail. These trails are generally the widest and best maintained within the Town Forest. Another major trail that is unmarked connects Horsford Road with Gatewood Drive, passing through the Boy Scout property. Generally, trails are narrower and more likely to be overgrown the further they are from Horsford Road and the steeper the elevations they cross. Trails observed to be the least navigable are the spur trails and bootleg trails leading to abutting properties and ponds.

Trails were observed to be used for walking/hiking and jogging. Evidence of horse riding and mountain biking were also observed. One unmarked trail connects the light blue birdhouse trail north of the railroad tracks with South Street, proximate to Farley Pond. Another trail that crosses the railroad tracks is located within the Boy Scout property and passes through the power line easement, connecting to private property on South Street.

Maintenance Needs

Most trails are in fair condition with no extensive degradation; however, trail structures and stream crossings are either too small or nonexistent along portions of trails. Trails requiring stream or wetland crossing improvements include the red trail, the northernmost yellow trail, the blue trail, the green trail, the orange birdhouse trail, the tan birdhouse trail, the trail proximate to High Rock Pond, the Farley Pond trail, the Springdale Road trail, and the Claxton Field-red trail connector. Although there is a relatively new stream/wetland crossing structure on the blue trail, portions of the trail leading to and from the structure are flooded during the early spring and the structure is elevated, but lacks hand rails. As an example, initial maintenance of this crossing could either involve adjusting the stone stepping stones and trail locations leading to the crossing such that they avoid the flooded areas and/or replacing the wooden bridge with a longer and wider bridge or a bog bridge. Maintenance recommendations, both initial and long term, for individual crossings throughout the Town Forest are depicted within the Town Forest Trail Maintenance Plan in Appendix D.

Minor tread repair and grading is needed on a portion of Horsford Road where a slope is degrading due to runoff. Cleaning or restoring the trails drainage channels and maintaining them regularly will reduce future tread grading and

more substantial repairs due to runoff.

Overall, trails require initial trimming and brushing to widen the trail frame to the tread width. The arterial trails are generally well maintained: however, layering vegetation heights outside the tread by clearing more room for perennial and low growing groundcovers would significantly reduce the need for regular maintenance of clearing the trail frame. The narrower, non-arterial trails need to be cleared of downed trees and overhanging trees limbs, including white pine saplings. Rocky areas along the red trail, light blue birdhouse trail, tan birdhouse trail, orange birdhouse trail, and trails circling High Rock should be clearly demarcated to ensure users stay on the trails. Light grading, installation of steps, and/or shrub planting is recommended along trails leading to High Rock where bootleg trails have been created and where additional erosion is occurring. Bootleg spur trails leading to vernal pools and small rocky plateaus should be barricaded to discourage use.

Contacting and educating abutters about dumping lawn clippings and yard waste within the Town Forest, as well as correcting encroachment issues, would improve the ongoing maintenance of trails and boundaries at the Town Forest (see the Town Forest Trail Maintenance Plan for a complete description of maintenance needs in Appendix D).

Other Observations

A stone fire place with a plaque reading "Erected by the Rotary Club of Needham 1949" is located in the southeast portion of the Town Forest, proximate to the 4-foot wide trail leading from High Rock Street. Abutters may be encroaching on portions of the Town Forest, especially proximate to the access points on Frances Street and Springdale Road. Several trail users were observed during the site visits. Users included dog walkers, hikers, a mountain biker, and a person in a wheelchair. The users were a range of ages from small children to seniors and included professionals on a lunch-time walk. Several abutters to the Boy Scout property using the trails commented that, although they have come across people who are lost or on the wrong trail, they think that adding additional signage or blazing would detract from the quality and ambiance of walking in the woods. A blazed trail (grey-green birdhouse trail) leads to an abutting private property where a landscaped trail leads through the abutter's backyard to their back door. Several small campfire pits were observed within the Town Forest and may be evidence of potential sources of forest fire. Graffiti and broken glass were observed on High Rock.

2.3.3 Farley Pond

The Farley Pond Reservation, on South Street, occupies approximately 25 acres and is under the jurisdiction of the Conservation Commission.

Location and Site Conditions
The Farley Pond Reservation is located on South Street and is bounded by Farley Pond Lane, Richardson Drive, the railroad right-of-way, and adjacent private property. Farley Pond is accessed from a trailhead located on South Street where there is space for cars to park on the side of the road. A single trail traverses the Farley Pond reservation, connecting South Street with the trails within the Town Forest. Recreational opportunities within the Farley Pond reservation include walking, hiking, fishing, bird watching, and ice skating.

Natural Communities, Vistas, and Habitats
A majority of the Farley Pond Reservation consists of a red maple swamp vegetative community. A white pine – oak forest vegetative community is also present within the upland portions of the property. The vegetative community includes red maple, highbush blueberry, sweet pepperbush, winterberry holly, skunk cabbage, and cinnamon fern. Undulating topography, exposed rocks, and wetlands provide a varied landscape. An old stone wall and log bridge are also located within the Farley Pond Reservation.

Access, Kiosks, and Signage
Access to Farley Pond is off South Street, or from an unmarked path that leads from the Town Forest, over the railroad right-of-way. There are no signs indicating that the trail leaves the Town Forest, nor is there any warning sign that the railroad is active. There are no kiosks or signs marking the trailhead, however, there is a wooden post proximate to South Street that may have been a sign post in the past. One internal sign approximately 150 feet from South Street directs users to a side trail leading to Farley Pond.

Trail Conditions, Use, and Connectivity
The main trail is approximately 2,000 linear feet and 2 to 3 feet wide. Portions of the trail proximate to the railroad right-of-way have a treadway that is 1 foot wide and overgrown with shrubs and small saplings. A side trail branches off the main trail within the electrical utility easement. Two additional bootleg side trails located midway down the main trail lead into private backyards. One log bridge passes over a wetland. Portions of the trail adjacent to the bridge show signs of erosion, collect water, and flood during the spring. The widest portions of the trail is six to eight feet wide and located within the first 150 feet off South Street, proximate to Farley Pond. The trails are not marked or blazed.

Maintenance Needs
Trail tread repair and grading is needed proximate to the log bridge wetland crossing. The log bridge, although structurally sound, may require updating to improve accessibility and to add a handrail. Portions of the trail leading from Farley Pond to the Town Forest should be brushed and the trail frame cleared of overhanging tree limbs. The bootleg trails leading to private property should be

closed. A kiosk should be installed on South Street and additional signage installed at the railroad crossing and to indicate the trails destination from the Town Forest (See the Town Forest Trail Maintenance Plan in Appendix D).

2.3.4 Rosemary Lake

Rosemary Lake is under the jurisdiction of the Park and Recreation Commission, and occupies approximately 37 acres between Rosemary Street, Nehoiden Street, and May Street.

Location and Site Conditions

The Rosemary Lake parcel includes a public swimming facility, camp, and pedestrian trail linking the two. Parking is located at the pool facility where several gravel lots are located on Rosemary Street, including a small lot on the opposite side of Rosemary Lake from the pool. Abutting residential properties are located on Rosemary Street, Nehoiden Street, Pennsylvania Avenue, Lake Drive, and Garden Street, some of which share a property boundary with the Town-owned parcel. Potential encroachments from abutters are located proximate to the portion of the trail off Nehoiden Street, Rosemary Street, and Pennsylvania Avenue.

Natural Communities, Vistas, and Habitats

White Pine – Oak forests represent the most common vegetative community within the Rosemary Lake parcel. Other mixed hardwood species, including birch, poplar, and maple are also found along the banks of Rosemary Lake, stream banks, and edges of open fields. The southern and western portions of the site also contain red maple swamps that include highbush blueberry, skunk cabbage, and cinnamon fern. The high topography within the Rosemary Lake parcel is forested and does not provide vistas or open views of the lake. However, there are a few small viewing areas that provide views from the trail along the banks of the lake and from the camp area. Oak forests and the acorns they produce, as well as other hardwood seeds, provide a valuable food source during the dormant season. White Pine – Oak forest communities are a common and demonstratively secure community associated with a variety of birds and mammals, including wild turkey, woodpecker, grey squirrel, mice, fox, and white tail deer. Beaver, raccoon, opossum, finch, cardinal, warbler, and duck, as well as reptiles and amphibians are associated with red maple swamp habitats.

Access, Kiosks, and Signage

There are four access points: the swimming facility parking lot on Rosemary Street: on Garden Street: at the end of Pennsylvania Avenue: and on Nehoiden Street. There are no kiosks or signs marking the trailheads. There are no internal signs or blazes within the Rosemary Lake parcel. Parking is available at the swimming pool lot and at the Town Library. A small parking lot on Rosemary

Street is used by daily visitors and model boat sailors, but does not provide trail access.

Trail Conditions, Use, and Connectivity

The trail between the swimming pool facility and the Pennsylvania Avenue trail is approximately 3 to 4 feet wide. Several fallen trees block the trail and brushing is needed along the edges. Erosion due to runoff from the adjacent parking lot was also observed near the trailhead at the pool facility. A small spur trail leads from Garden Street up a very steep portion of the hillside. This trail is not suitable for road bicycle use due to steep slopes, or for mountain bikes, as the wooden bridge has steps on both sides. The Pennsylvania Avenue trail is between 10 and 14 feet wide and leads to the camp buildings within the parcel. This access crosses private property and is open to foot traffic only. There is no barricade preventing unauthorized vehicles from entering the camp area. There are no clear indicators that the trail continues through the clearing adjacent to the camp buildings and connects to Nehoiden Street. The concrete bridge crossing Meadow Brook and other old dams or locks are interesting features, but there is no signage to describe what they are or how they may have been historically significant. The loop trail that connects the open field east of the camp back to the bridge south of Rosemary Lake traverses a wetland that may be saturated in the early spring or fall. Trails total over 4,000 linear feet within the Rosemary Lake property.

Maintenance Needs

Trail tread repair and grading is needed proximate to the trailhead at the swimming facility parking lot due to poor drainage. Logs with a 24-30-inch diameter blocking the trail will require a chainsaw to cut and remove. The wooden bridge located south of Rosemary Lake, although structurally sound, may require updating to improve accessibility and to add a handrail. Portions of the trail leading to Pennsylvania Avenue should be brushed and the trail frame cleared of overhanging tree limbs. The trail leading to Nehoiden Street requires significant brushing and trimming to widen the trail frame to the tread width. The rocky area leading to and from the concrete bridge over Meadow Brook may be dangerous when raining or wet. Portions of the loop trail require brushing and defining the trail tread. (See the Rosemary Lake Trail Maintenance Plan in Appendix D).

Other Observations

Abutters may be encroaching on the Rosemary Lake Parcel proximate to Meadow Brook. A trail heading north from the camp building leads to a wooden bridge (in a state of slight disrepair) located over Meadow Brook and is adjacent to abutting private property. No trail users were observed during the site visit.

2.3.5 Greendale Avenue

The Greendale Avenue Parcels are located in the eastern portion of Town, between Kendrick Street, Interstate Route 95 (Route 128), the MBTA railroad tracks, and Greendale Avenue, and are under the jurisdiction of the Park and Recreation Commission. These parcels total approximately 39 acres.

Location and Site Conditions

Three distinct and non-contiguous Town-owned parcels are separated by land owned by the Commonwealth of Massachusetts and private landowners. A gravel pit located in the southern portion of the southernmost parcel, adjacent to the MBTA railroad tracks, was filled and is now an open field area. Abutting residential properties are located on Greendale Avenue, some of which share a property boundary with the Town-owned parcel. Grass clippings and yard waste dumping from adjacent residential properties was observed west of the open field area in the southernmost parcel. Other yard wastes and lawn clipping piles are located within the northern parcel, proximate to where a bootleg trail intersects the main trail, across from Brookline Street. Dumped trash was also observed adjacent to the wooden kiosk located on the Valley Road cul-de-sac located south of the MBTA railroad tracks.

Natural Communities, Vistas, and Habitats

White Pine – Oak forests represent the most common vegetative community within the Greendale Avenue parcels. Hemlock and other mixed hardwood species, including birch and maple are also found along the banks of intermittent streams and edges of open fields. Undulating topography, even-aged forest canopy, and close proximity to Interstate 95 limit the opportunity for vistas. Oak forests and the acorns they produce, as well as other hardwood seeds, provide a valuable food source during the dormant season. White Pine – Oak forest communities are a common and demonstratively secure community associated with a variety of birds and mammals, including wild turkey, woodpecker, pine warbler, sparrow, grey squirrel, mice, fox, and white tail deer.

Access, Kiosks, and Signage

The Greendale Avenue Trail (called the Greenway Trail on the wooden kiosks) is accessed from three trailheads located on Cheney Street, Greendale Avenue, and Valley Road. Parking for three vehicles is available at the end of Cheney Street and parking for six or seven vehicles is available at the end of Valley Road. Each trailhead has a 6.5-foot wooden kiosk with a Plexiglas cover containing a trail map depicting the entire trail from Cheney Street to Valley Road. The kiosk on Valley Road was vandalized and requires replacement. Three additional bootleg trails or access trails are located on Greendale Avenue and connect with the main trail within the northernmost parcel. The northernmost of these trails is a maintained access route to a sewer line. A few small orange reflector blazes are nailed to trees along portions of the easternmost loop of the main trail in the

southern parcel, east of Old Greendale Avenue. "Rubbish Disposal Prohibited" and "Keep Out" signs are posted proximate to Old Greendale Avenue.

Trail Conditions

There are over 12,000 linear feet of trails within the Greendale Avenue property. The main trail connects Cheney Street with Valley Road and includes two small loops within the southern parcel. From Cheney Street extending south toward Old Greendale Avenue, the main trail is generally 1.5 to 2 feet wide with a discernable tread. This portion of the trail, although somewhat clear in the winter, becomes obscured during the summer due to overgrown limbs and branches. Several intermittent streams, less than 2 feet wide, cross the trail within the northern parcels, but do not impede trail traffic. BMX bike obstacles, ramps, and ladders are located proximate to the trail, but no evidence of trail deterioration due to mountain bike use was observed. The trail connecting the trailhead on Greendale Avenue with the main trail is nearly indistinguishable and should be widened and brushed. A portion of the trail also passes through private property between the middle and southernmost parcels. The main trail is between 8 and 14 feet wide between Old Greendale Avenue and the open field. This portion of the trail can accommodate vehicles, however is barricaded by a locked metal gate. Portions of the 14-foot wide trail lead from Old Greendale Avenue to the open field and also contain a sewer easement. Most portions of the trail are suitable for pedestrian use, however, would require widening and maintenance for bicycle use. The wider portions of the trail proximate to Old Greendale Avenue are suitable for pedestrian and bicycle use.

Maintenance Needs

Bootleg trails leading to the MBTA railroad tracks from the main trail, one just north of the railroad tunnel, and the other from the open field should be barricaded and screened to deter users from walking on the railroad tracks. Abutters need to be notified that dumping lawn clippings and yard wastes within Town property is prohibited and these waste piles, along with the trash, need to be cleaned. Wooden trailhead kiosks need to be updated and made weather-tight. The kiosk on the Valley Road cul-de-sac was vandalized and needs replacement. Narrower portions of the trail would benefit from widening to make the trail width consistent for the portion of trail between Cheney Street and Old Greendale Avenue. The intermittent stream crossing the main trail between Valley Road and the MBTA railroad tunnel should have a wooden footbridge to prevent further deterioration of the stream bank and facilitate stream crossing. Internal streams appear to be dry for most of the year and composed of solid gravel and rock banks that do not require a structured crossing at this time. Two bootleg trails no more than 30 feet long leading from the main trail to Interstate 95 should be barricaded and screened to deter users from entering the highway. The trail should be thoroughly brushed and cleared of all debris. An easement of right of way should be sought for the portions of trail located on private property, or they should be

moved to public land. Generally, there is only one trail within the three parcels and blazing is not a maintenance priority, although the trail is difficult to find in some places. (See the Greendale Avenue Trail Maintenance Plan in Appendix D).

Other Observations

The Greendale Avenue Parcel located south of Valley Road was also investigated for trails, however, steep slopes, wetlands, and close proximity to private property do not make new trails viable in this area. No trail users were observed during the site visit.

2.3.6 Needham Reservoir

The Needham Reservoir is located in the southern portion of Needham between Dedham Avenue, South Street, and Livingston Circle. It includes approximately 12 acres, and is under the jurisdiction of the Board of Selectmen.

Location and Site conditions

The Reservoir is adjacent to DeFazio Park, the Needham Golf Club, the DPW Building and DPW storage facilities. Parking is located adjacent to the Reservoir (the name dates from a historic use, and the pond is no longer used as a public water supply) at the DPW building. These parking spaces are generally full of employee and DPW visitor vehicles during business hours. In addition to the DPW facilities, several former water/well buildings are also located within the parcel. Active recreational uses for the Reservoir include walking, fishing, ice-skating and model-boat sailing. Cross-country skiing is permitted during the winter and is available on the adjacent golf club. A public canoe/kayak launch on the Charles River is located on South Street and connected to the Reservoir via a small spur trail. Trails total over 4,000 linear feet within the Reservoir property.

Natural Communities, Vistas, and Habitats

The Reservoir contains a White pine – oak forest vegetative community that is similar to portions of those communities found on Greendale Avenue and Rosemary Lake. Similar food sources and habitats for birds, small mammals, and reptiles and amphibians are associated with these vegetative communities. Adjacent red maple wetlands are located within the Needham Reservoir and provide a contrast to the surrounding upland vegetative communities. The pond is regularly stocked for recreational fishing. The canoe launch located south of South Street, as well as the adjacent trail provide views out to the Charles River.

Access, Kiosks, and Signage

The Reservoir is accessible from Dedham Avenue where parking is provided at the DPW facilities and DeFazio Park. A sign located on the southwestern berm of the Reservoir designates the area as the "Roland G. Johnson Fishing, Sailing, and Recreation Area." A gravel drive is located on South Street that provides parking for three or four vehicles and access to the canoe/kayak launch in the Charles

River. The launch is barricaded from the gravel drive by large stone boulders that prevent vehicles from accessing the river. Signs at the launch site include "No Littering" and "Let's Keep the Charles River Clean" hanging from trees as well as two bat boxes.

Trail Conditions

The main trail loops around the Reservoir, starting at the parking area north of the DPW building and ending on the earthen berm southwest of the Reservoir, proximate to the Roland G. Johnson sign. The trail tread is approximately 8 feet wide and can accommodate vehicles, however, shrubs and saplings overhang the trail and herbaceous plants and grasses create a narrower trail frame. The trail passes two fenced areas with "No Trespassing, Public Water Supply" signs. The trail is a cart path from the parking area to the second fenced well area that has several maintained stream crossings. Where the trail intersects with the open, maintained portion of the golf course, users may not know where the trail leads. The main loop trail becomes a Class 2 trail with an average width of 1.5 to 3 feet between the northeast side of the Reservoir and the western berm. This portion of the trail also contains several flooded and saturated areas where wooden planks were placed to assist users in crossing the wet areas. An intersecting trail has a 20-foot trail segment leading to the edge of Reservoir and another bootleg segment leading to abutting private property. An intersecting trail segment located south of the previously discussed trail connects the loop trail with Livingston Circle, however, it traverses private property. The loop trail lacks definition and a clear indication of intersections south of the Reservoir where a spur trail leads to South Street within the pine dominated portion of the site. The connection back to the berm on the western edge of the Reservoir is also overgrown.

No signage or road crossing is provided on South Street to identify the gravel parking area, connection with the Reservoir or indication of a trailhead for the South Street Trail. The two trail segments leading from the South Street Trail to South Street are overgrown and contain several fallen trees crossing the path.

Maintenance Needs

Bootleg trails leading to private property from the main loop trail should be barricaded and screened to deter users. An additional wooden trailhead kiosk might need to be added at the canoe launch to indicate trail locations and/or consolidate the information provided by the other signs hanging on a tree. Narrower portions of the loop trail would benefit from widening to make the trail width consistent. The portion of the South Street Trail leading east should be trimmed back to the trail frame and one spur trail barricaded and screened. The loop trail should be thoroughly brushed and cleared of all debris and herbaceous growth during the growing season so that the trail frame matches the tread width. A sign might be installed at the corner of the parking lot, near the metal gate,

indicating the trailhead for the loop trail, and/or the kiosk on the western berm should be updated to indicate this feature. A sign should be installed at the edge of the golf course indicating the direction of the trail. If the connection to Livingston Circle is desired, an easement or right of way should be sought for the portions of trail located on private property. Generally, there is only one trail within the parcel and blazing is not a maintenance priority. (See the Needham Reservoir Trail Maintenance Plan in Appendix D).

Other Observations

Several individuals fishing were observed on a sandy outwash area proximate to the metal gate at the head of the trail and on the western berm. During the day, the DPW Building parking lot is full due to employees. No trail users were observed during the site visit. Two individuals fishing were observed adjacent to the trail entrance.

2.3.7 Newman School

The Newman School trails system share a portion of the approximately 64 acres of land occupied by the Newman School, and is under the jurisdiction of the School Committee.

Location and Site Conditions

The Newman School Parcel is located in the west central portion of Town, between Great Plain Avenue, Central Avenue, and the Needham Recycling Center and Transfer Station. The Newman School trail network passes through the Thomas W. Eastman Conservation Education Study Area located southwest of the school building and athletic fields. Abutting residential properties are located on Central Avenue and Cedar Springs Lane, some of which share a property boundary with the Town-owned parcel. Portions of the wetland are traversed by boardwalks and wood plank bridges. A wooden observation platform is located on the bank of the small pond located near the trailhead. There are approximately 3,500 linear feet of trails within the Newman School property.

Natural Communities, Vistas, and Habitats

Red maple swamps represent the most common vegetative community within the Newman School parcel. The red maple swamp includes highbush blueberry, dogwood, winterberry holly, skunk cabbage, and cinnamon fern. Cedar, white pine and mixed hardwood species, including birch, oak, and maple are located within the upland portions of the site and on the edges of open fields. Flat wetland topography and thick vegetation limit the opportunity for vistas. The elevated boardwalk and wooden observation deck on the small pond provide picturesque views into the wetlands and bird watching opportunities. Berries and seeds from wetland shrub species and hardwood trees provide a valuable food source for wildlife. Red maple swamp vegetative communities are the most common wetland vegetative community in Massachusetts. Many different

species of salamander, frog, turtle, and snake are associated with red maple swamp habitats. Other birds and mammals, including finch, cardinal, warbler, duck, woodpecker, white tail deer, beaver, raccoon, and opossum, are associated with red maple swamps and their adjoining vegetative communities.

Access, Kiosks, and Signage

The Newman School trails are accessed from three trailhead located southwest of the school building and parking area. Trails are also accessed from the athletic fields to the west of the school building. Parking is available within the school parking lots. The "Thomas W. Eastman Conservation Education Study Area" sign located proximate to the trailhead is rusted, faded, overgrown with trees and vines, and set back off the trail. The "John F. Cusick Field" sign is located proximate to Central Avenue, as well as a sign directing people to park at the Newman School. There are no kiosks or maps for the trail system and there are no blazes or markers for the trails.

Trail Conditions

The main trail begins at the Eastman sign, proximate to the pond, and loops around the pond, through the wetlands, and back to the athletic fields. This trail is generally 2 to 4 feet wide and crosses several bridges, wood planks, and an elevated boardwalk. Portions of the trail are demarcated by branches and logs along the trail edge. Several wet areas are located along the trail, proximate to the wooden planks and bridges. The elevated board walk is approximately 3 feet wide, elevated 1.5 to 3.5 feet above the wetland and does not have a hand railing. A square wooden platform is located at the midpoint of the boardwalk. A second trail links the Newman School parking area with Cusick Field. This trail is 6 to 8 feet wide and appears to be mowed regularly.

Portions of the trail were inundated with water during site visits in early spring. The narrower and potentially incomplete portions of the trail are overgrown with shrubs and herbaceous plants. The trail also extends to an open field area used in school nature programs. A Class 1 spur trail located west of the pond leads to the tip of an upland peninsula surrounded by wetlands. A gravel path connects Great Plain Avenue with the school athletic fields. Trails within the Newman School parcel are suitable for walking and nature exploration. Bicycles, wheelchairs, and strollers cannot access most portions of the trails due to the bridges and boardwalks.

Maintenance Needs

Wet areas within the trail tread could benefit from improved drainage and grading. Portions of the main loop trail should be brushed to ensure saplings and shrubs overhanging the trail are trimmed back to the trail frame. The Boardwalk appears to be in good repair, however, due to the height and length, it could be made more secure by adding a hand railing. Furthermore the boardwalk is not

accessible. Wood plank portions of the trail could be better maintained if they were replaced with permanent bog bridges with elevated stringers. Generally, there are a limited number of trails within the property and blazing is not a maintenance priority. (See the Newman School Trails Maintenance Plan in Appendix D).

Other Observations
No trail users were observed during the site visit.

2.3.8 Mitchell Woods

The Mitchell Woods Conservation Land shares a portion of the approximately 17 acres of land occupied by the Mitchell School, located between Lindbergh Avenue and Brookline Street, and is under the jurisdiction of the Conservation Commission.

Location and Site Conditions
The trails are located in the westernmost portion of the property, west of the playing fields and adjacent to James Avenue. These are the shortest trails of any Town owned property and are sized appropriately for elementary school children.

Natural Communities, Vistas, and Habitats
Mixed hardwood forests represent the most common upland vegetative community within the undeveloped portion of the Mitchell School property. Tree species include oak, hickory, maple, birch, ash, and cherry. The site also contains wetland species associated with the intermittent stream located in the northwestern portion of the property. Undulating topography and dense sapling and shrub vegetation, as well as the surrounding residential development prevents vista opportunities. Hardwood seeds, including acorns, provide a valuable food source during the dormant season. Mixed hardwood forest communities are a common and demonstratively secure community associated with a variety of birds and mammals, including wild turkey, woodpecker, grey squirrel, and chipmunk. Reptiles and amphibians may be associated with the intermittent stream and wetland habitats. The size of Mitchell Woods and density of surrounding residential development severely inhibits wildlife habitat opportunities and connectivity with surrounding open spaces.

Access, Kiosks, and Signage
A sign reading “Mitchell Tree Trail” and “Patriots Trail Troop 3344, May 31, 2002” marks the trailhead on the edge of the field, proximate to a concrete bench. A smaller 1-foot wide trail spur accesses the field from behind the baseball diamond backstop. Access is also from Brookline Street and the James Avenue cul-de-sac where there is a “No Dumping” sign.

Trail Conditions
The trails are generally just as wide as the tread and no wider than three feet within the Mitchell Woods parcel. No signs or kiosks identify the trailheads on James Avenue and Brookline Street. The trail leading from James Avenue contains several wet pockets where the tread is saturated in the early spring. Portions of the trail leading from Brookline Street to the other trails are lined with branches that better define the trail tread. Small intersecting trails crisscross in a maze-like fashion within the site. One spur trail leads to adjacent private property and a second leads to a small area where grass clippings and yard wastes have been dumped. Portions of trails are overgrown with herbaceous plants, shrubs, and tree saplings.

Maintenance Needs
The trails should be brushed and cleared of all debris and overhanging branches so that the trail frame matches the tread width. The spur trails leading to private property should be barricaded and screened. Evidence of dumping, both trash and grass clippings and yard waste was observed proximate to the James Street cul-de-sac. The Town may wish to contact abutters and discourage them from dumping grass clippings and yard waste within Town property. Grass clippings and yard wastes should be cleaned. The trail tread should be graded for better drainage within the wet areas and/or wood planks added. Generally, trails are short and there are too few within the parcel to recommend blazing as a maintenance priority. (See the Mitchell Woods Trail Maintenance Plan in Appendix D).

Other Observations
Dumping of grass clippings and yard waste was observed along the perimeter of Mitchell Woods. No trail users were observed during the site visit.

2.3.9 Other Trails
Trails accessible to the public also occur on State and private lands within Needham. These trails were not mapped as part of the existing trails inventory, however, they were briefly reconnoitered during the examination of potential trail connections and are described below

Sweet Wildlife Preserve
The Sweet Wildlife Preserve, a town-owned property under the jurisdiction of the Conservation Commission, is located on Central Avenue west of the Hillside School and abuts residential property on West Street. The Sweet Preserve is managed by the Conservation Commission and contains a 50-foot gravel access drive that dissipates into private property. The site is overgrown with multiflora rose and oriental bittersweet. Much of the property contains wetlands associated with Rosemary Brook. A 4-foot wide trail located within private property that is adjacent to the Sweet Wildlife Preserve connects Booth Street to the athletic fields

behind Hillside School. The condition of this property indicates that it is not actively maintained, nor is it used for recreation. There may be little to no opportunity for trails within this property due to the presence of extensive wetland areas.

Memorial Park
Memorial Park, under the jurisdiction of the Memorial Park Trustees, is located at the corner of Rosemary Street and Highland Avenue, adjacent to Needham High School. Memorial Park contains a parking area, memorials to Needham veterans, a memorial garden, a gazebo, a track, and several athletic fields. In conjunction with moving the track to DeFazio Park, a paved trail that would encircle the athletic fields in Memorial Park is proposed to be constructed in 2008.

Nike Site
The former Nike Site, on Pine Street, is adjacent to the Ridge Hill Reservation and is under the control of the School Committee. Although there is no formal trail system, trails on the Ridge Hill Reservation connect to the Nike Site, and a paved road provides access from Pine Street for pedestrians.

Hemlock Gorge
Hemlock Gorge is located in the northeastern portion of Town, adjacent to the Charles River. The portion of the 23-acre DCR reservation located within Needham contains trails leading to Echo Bridge, the dam, and north to Wellesley along the Charles River. A small parking area for Hemlock Gorge is located on the corner of Central Avenue and Hamilton Place. The property may also be accessed from Newton via Echo Bridge.

Cutler Park
Cutler Park, a DCR property, is located in the eastern portion of Needham between Kendrick Street and Great Plain Avenue, east of Interstate Route 95 and adjacent to the Charles River. The 700- acre park contains several trails, wetlands, Kendrick Pond, and a canoe launch. Trails link the parking area located on Kendrick Street to the parking area located on Great Plain Avenue by crossing under the MBTA railroad that transects the park. Activities suitable to this wetland preserve are hiking, canoeing, bird watching, and fishing.

Red Wing Bay/Village Falls
DCR also maintains two small properties along the Charles River on South Street and on Fisher Street. Village Falls contains a small parking lot and provides views of the falls at the Cochrane Dam. Red Wing Bay contains a small parking area and canoe launch.

Charles River Peninsula
The Charles River Peninsula is located in the southern portion of Needham off of Fisher Street between the railroad right-of-way and the Charles River. The 30-acre property is owned and maintained by the Trustees of Reservations and includes a wooded shoreline of birch, hemlock, and beech concealing an upland peninsula that rises gently to a 20-acre open field. A narrow footpath tracks the river along the Reservation's shoreline, while the field's highest point offers views of the Charles River. An old wooden railroad trestle is visible at the western end of the Reservation. Footpaths follow the edges of the upland field and trails pass through a part of the wooded shoreline. Parking is available at the adjacent Red Wing Bay canoe launch.

Other DCR Property: Kendrick Street – Highland Avenue
A trail parallels 4th Avenue and the Charles River connecting Kendrick Street with Highland Avenue. The Highland Avenue end is marked with carved granite pillars. The proposed adjacent Chapter 40B residential development is required to provide trail improvements and river overlooks.

MWRA Aqueduct
The MWRA Aqueduct crosses the northeast corner of Needham, near the Eliot School. Portions of the Aqueduct are used as a walking trail.

Section 3.0
Proposed New Trails within Town Owned Properties

3.0 PROPOSED NEW TRAILS WITHIN TOWN OWNED PROPERTIES

3.1 Proposed Trail Descriptions

New trails within Town-owned properties are proposed in order to expand the internal network of existing trails, decrease the number of dead-end trails, and improve accessibility. Several of the new trails will also link existing trails with proposed new trail connections.

Most of these trails are proposed to be similar to the existing standards established for the adjacent trails with which they connect (See Trail Maintenance Plan Section 5.0). The two exceptions are the High Rock Estates Trail and the Reservoir Trail. The High Rock Estates Trail will be upgraded to connect the High Rock neighborhood with the southeastern portion of the Town Forest. The Reservoir Trail is proposed to be upgraded to an accessible trail.

The current guideline for accessibility for outdoor recreational trails is contained within the document "Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report, dated September 30, 1999." New trails must comply with the standards contained within these guidelines. There are exemptions for some trails, but trail managers are encouraged to improve accessibility on all trails through trail maintenance and repair activities. As the Master Plan is implemented, the guidelines should be carefully reviewed to ensure compliance for new trail construction and strive to improve accessibility for the trails being maintained.

Potential new trails within Town-owned properties were identified by the Needham Trails Advisory Committee. New trails were then added to the Proposed Trail Connections Map (Appendix B) and added to the individual Trail Maintenance Maps (Appendix D). Portions of these trails have been reconnoitered and all new trails were assessed remotely from aerial images to determine whether wetland/stream crossings or significant development inhibit trail installation.

3.1.1 Ridge Hill Loop (Conservation Commission)

Located in the north-westernmost portion of Ridge Hill, this proposed loop trail would create a large turnaround for the northernmost extension of the Esker Trail. This trail is labeled #31 on the Proposed Trail Connections Map. Currently, the maintained portion of the Esker Trail ends at a three-way fork, with two of the branching trails terminating at abutting private property. A relatively obscure spur trail branches off the easternmost trail and proceeds north as an overgrown trail with several portions connecting to abandoned cart paths. This trail also forks into several trails, with one terminating in the woods and the second ending within the gas easement that crosses the northernmost portion of Ridge Hill. The Ridge Hill Loop would connect these two spurs and serve to link connecting trails #30 and #32. In addition to significant vegetative removal and trail widening of the existing path, the trail leading to the loop trail would also require a bridge to

cross one intermittent stream. These improvements and the loop trail itself are a high priority for the new trails because creation of the loop would provide a destination trail with an obvious circuit at the end of the Esker Trail.

3.1.2 Ridge Hill Charles River Trail Extension (Conservation Commission)

Located in the southernmost portion of Ridge Hill, this proposed trail would extend the existing Charles River Trail located south of Charles River Road to the Charles River. This trail is labeled #7 on the Proposed Trail Connections Map. Currently, the Charles River trail ends short of the river within an abandoned/unmaintained area of Ridge Hill, adjacent to a small intermittent stream. The Charles River Trail Extension would connect Ridge Hill to the river, where there is potential to create a river viewing destination or wayside resting area with benches. This trail would also serve to link proposed connection trails #6 and #8. In addition to vegetative clearing, the Charles River Trail Extension may also require a bridge or other structure to cross the intermittent stream. These improvements are a high priority for the new trails because providing access to the Charles River would potentially increase use of the trails south of Charles River Road and create an opportunity for a destination spot at the end of the trail.

3.1.3 Nike Site Perimeter Trail (School Committee)

Located east of Ridge Hill, this proposed trail would extend the existing Meadow Trail and loop it around the perimeter of the former Nike Site located on Pine Street. This trail is labeled #34 on the Proposed Trail Connections Map. The Meadow Trail extends from the Fit Trail to the paved entrance drive that connects the Nike Site to Pine Street. The Nike Site Perimeter Trail would create a loop connecting the Meadow Trail with the Hornbeam Trail, creating a large circuit in the eastern portion of Ridge Hill. In addition to vegetative clearing, the Nike Site Perimeter Trail may also require removing remnant chain link fencing and cutting larger shrubs and/or trees to create a clear treadway. These improvements are a medium priority for the new trails because this trail would be an added amenity to the Ridge Hill network.

3.1.4 Farley Pond Loop (Conservation Commission)

This proposed loop trail would create a circuit for the Farley Pond Trail. This trail is labeled #12 on the Proposed Trail Connections Map. The Farley Pond Trail has several small bootleg trails that lead to abutting private property. The proposed loop trail would create a turnaround for users seeking a short circuit off of South Street or for users from the Town Forest. It would require some vegetative clearing and one or more structures for stream/wetland crossing. Although this is an internal loop trail that does not connect to any other trail connections, the Farley Pond Loop Trail is a high priority for the new trails because creation of the loop would provide an immediate benefit to the Town Forest, Boy Scout Property and Farley Pond users.

3.1.5 Reservoir Accessible Trail (Board of Selectmen)

This trail is a proposed upgrade of the existing trail located at the Needham Reservoir. The existing trail loops around the Reservoir, using portions of an access road that connects to old public supply well buildings, a small foot trail and the berm on the eastern side of the Reservoir. The existing trail is very flat with no major inclines and is generally dry during most of the year with several wet areas proximate to the wetlands. The new trail would be a 5 to 6-foot wide hardened or paved surface that would meet the ADA criteria for an accessible trail. Trail improvements would also include ramped structures for wetland crossings and an ADA accessible fishing area (Similar to the one located at Rocky Woods Reservation, Medfield, MA). This upgrade of the existing trail is a high priority for the new trails because it would provide a desired recreational off-road trail opportunity that does not currently exist in Needham.

3.1.6 High Rock Trails (Needham Housing Authority)

Located east of the Town Forest, two trails are proposed off Linden Street, Summit Road, and Murphy Road that could link the Town Forest to the adjacent High Rock neighborhood. Two new narrow, low impact trails are proposed with split rail and low shrub trailheads where they connect to the street network. These trails would be surfaced with wood chips and limit potential impact to the surrounding properties by formalizing access to several areas and potentially increase trail use by the community. Both of these trails already exist in discontinuous pieces. The trail running to the north of Linden St. will involve coordination and permitting with the Needham Conservation Commission since it runs within the buffer zone in places and involves a minor wetlands crossing. The new High Rock trails are proposed by the Needham Housing Authority as part of a Community Preservation Act project.

3.2 Costs

The new trails within Town-owned properties matrix identifies each trail by its unique number and describes the location and access for each trail. The matrix also describes and the general benefits that each trail provides, as well as the surrounding natural or neighborhood conditions. The strengths, weaknesses, and opportunities column identifies additional requirements for trail construction and the individual assessor's parcel numbers. The new trails within Town-owned properties matrix is located in Appendix C.

Professional trail construction costs are estimated based on data from R.S. Means Adjusted Values 2007 and professional judgment/experience of Beals and Thomas, Inc. Total construction costs for new trails within Town-owned properties, which does not include potential alternative trails, are approximately $135,000. Note that costs for the Memorial Park trail are presumed to be budgeted as part of the project to move the track to DeFazio Park and change the field layouts at Memorial Park. Costs associated with the High Rock Estates trail construction are assumed to be paid for as part of a future

Community Preservation Act (CPA) project. Ridge Hill trail construction costs also assume volunteer labor and therefore only cover trail signs and marker costs.

The seven proposed new trails within Town-owned properties total over 14,000 linear feet of new and improved trails that include approximately 4,800 feet of accessible off-road trails.

Section 4.0
Proposed Trail Connections

4.0 PROPOSED TRAIL CONNECTIONS

4.1 Trail Connections Summary

In order to increase the connectivity of public trails in Needham, proposed trail connections were identified that would link existing trails and properties. Proposed trail connections are divided into three types: proposed private land trails, proposed Town land trails, and proposed sidewalk/right-of-way trails. Private land trails would either need to be purchased by the Town or a public land trust, or a public trail easement would need to be placed on the property. Although Town land trail connections and proposed trails are both located within Town-owned property, Town land trail connections are differentiated because they are necessary to connect trails to other parcels and/or to complete a loop trail within a connected town property. Proposed sidewalk/right-of-way trails will be located on streets and/or within the aqueduct or other state-owned highway land.

Potential trail connections were identified by Beals and Thomas, Inc. and the Needham Trails Advisory Committee. Trail connections were then labeled and classified by their ownership. Some trail connections have been segmented (as designated by an A or B) where portions have differing ownership. Field reconnaissance was performed on the portions of the trail connections within Town-owned property and on public streets. Existing sidewalks were assessed for repairs/widening and crosswalks necessary to create a continuous path along the proposed trail connection. Private land trails were assessed remotely from aerial images to determine whether wetland/stream crossings or significant development would inhibit trail installation. See the Proposed Trail Connections Map located in Appendix B.

4.2 Proposed Trail Connection Description

Proposed trail connections were identified to create links between the following open space and trail parcels within Needham:

- Guernsey Sanctuary (Sabrina Lake)
- Ridge Hill
- Charles River Peninsula (TTOR)
- Walker Pond
- Town Forest
- Farley Pond
- Newman School
- Olin College
- Sportsman's Club
- Rosemary Lake
- Hillside School
- Sweet Preserve
- Eliot School
- Hemlock Gorge
- Memorial Park
- Mitchell Woods
- Greendale Avenue
- Cutler Park

In addition to linking these parcels, proposed trail connections also link to the Wellesley trails system, two canoe launch sites on the Charles River, five schools, and several neighborhoods. This new trail network would be comprised of on and off-road trails that could serve a variety of purposes, including: exercise, connecting trails to the Charles River, connecting neighborhoods with large open spaces in the eastern portion of Needham, potential bike paths, and create a nexus for a Town-wide system of trails.

4.3 Proposed Trail Connection Matrix and Cost Summary Description

The proposed trail connection matrix identifies each trail by its unique number and lists the type of connection (Private land, Town-owned land, or sidewalk/public right-of-way). The location and access for each trail is described and the general benefits that the trail provides, as well as the surrounding natural or neighborhood conditions. The strengths, weaknesses, and opportunities identifies whether a trail is located entirely within Town-owned land, if additional crosswalks are required, or if there is no existing sidewalk on a street. The land ownership is identified and the individual assessor's parcels are listed under the Strengths, Weaknesses, and Opportunities. The Proposed Trail Connections Matrix is located in Appendix C.

General recommendations and permitting requirements are identified, in addition to an approximate cost for professional construction. Generally, trails that are necessary to connect two trail properties are preferred and those trails that may provide an additional connection or alternative connection are also identified. Permitting requirements for trails may include approval/permission by Selectmen, Conservation Commission, Massachusetts Highway Department, Department of Conservation and Recreation, the gas utility provider, and from the Army Corps of Engineers. All trail connections proposing new sidewalks within a right-of-way require Selectman approval and proposed work within 100 feet of wetland or 200 feet of a perennial stream would require approval from the Conservation Commission. Any new crosswalk would have to be approved by the Town Engineer and meet state safety criteria.

The estimated costs for each individual trail connection are located in Appendix C. Professional trail construction costs are estimated based on data from R.S. Means Adjusted Values 2007 and professional judgment/experience of Beals and Thomas, Inc. Total proposed trail connection construction costs, which include potential alternative trails, are approximately $2.3 million dollars.

Timeframes are identified as either "short," "medium," or "long." Note that these timeframes are only relative to one another and do not dictate how many months or years the actual trail design, permitting, and construction would take. Long timeframes generally have one or more of the following: multiple private owners require permits from more than one entity, or cost over $100,000. Medium timeframes generally have one or two private owners, require one or two permits, or cost over $50,000. All other trail connections were considered to have a short timeframe. There are 20 connections with an estimated short timeframe, 19 medium, and 14 long term trail connections.

The 35 proposed trail connections and trail connection alternatives total over 100,000 linear feet of new trails that include approximately 48,500 feet of sidewalk/neighborhood trails, 31,000 feet of private off-road trails, and 25,800 feet of Town-owned off-road trails.

Once a proposed trail connection is constructed and integrated into the existing trails inventory, the trail should also be added to the maintenance plan.

Section 5.0
Maintenance Plan

5.0 MAINTENANCE PLAN

5.1 Summary and Overview

The Trail Maintenance Plan will provide the framework to set trail maintenance priorities, create a maintenance budget, provide potential maintenance funding sources, and schedule and track maintenance by:

- Setting specific maintenance goals
- Developing the necessary maintenance program to achieve these goals and to prioritize the execution of maintenance tasks
- Executing maintenance tasks by using the most effective combination of resources
- Evaluating and improving the effectiveness of the maintenance program in relation to the goals
- Furnishing cost data for maintenance tasks from which budgets can be built
- Suggesting funding sources and alternative resources (i.e. volunteer groups)

The Trail Maintenance Plan is specifically designed for the existing Town-owned trails in Needham. Proposed trails described in Section 3, once constructed, should be integrated into the Plan. Maintenance is currently performed by various groups within the Town, and the quality and caliber of maintenance varies highly depending on trail location and amount of use. Existing maintenance is largely done by the DPW staff and includes:

- Clearing skating ponds
- Maintaining fire roads
- Maintaining parking lots
- Collecting trash (where there are barrels)
- Clearing downed trees.

The Trail Maintenance Plan streamlines maintenance for all parcels by establishing goals and standards that are consistent throughout Town. The TMP also segments the maintenance into individual tasks that can be delegated and tracked by one entity that is responsible for coordinating trail maintenance and implementing the Plan.

Volunteers have completed several maintenance projects, but the projects are generally identified or selected through the interest of an individual or group, rather than through a comprehensive plan that identifies Town-wide needs and priorities for trail maintenance.

A separate set of maps described within this section depict the initial maintenance needs observed during 2007 that requires completion to bring existing trails up to usable standards. These plans do not depict needs/goals for proposed trails, proposed trail expansion, or upgrading trail classes.

5.2 Monitoring Goals

The first step in implementing a maintenance and management program is to determine the goals. Goals for the Needham Trail Maintenance Plan have been outlined by the Needham Trails Advisory Committee and are summarized as follows:

- Provide safe, dependable, and affordable maintenance;
- Preserve existing trails;
- Protect the natural environment;
- Increase awareness of trails and trail accessibility;
- Encourage users to report hazards or maintenance issues; and
- Provide citizens with a reference for maintenance expectations.

Effective steps to achieving these goals, or milestones, are an integral part of implementing the goals and monitoring the progress of the TMP. Milestones are derived from the TMP goals and divide the goals into a short-term achievable maintenance outline:

- Establish funding sources and/or volunteer efforts for trail monitoring
- Increase monitoring of existing trails for maintenance needs
- Improve communication of maintenance needs to those performing maintenance tasks
- Establish funding sources and/or volunteer efforts to perform maintenance tasks
- Strengthen communication about maintenance between boards with jurisdiction over trail properties
- Implement a regular schedule for trail maintenance tasks that includes:
    - Removing safety hazards
    - Keeping treadways clear and trail edges brushed
    - Fixing degraded and/or washed out portions of trails
    - Updating bridges, boardwalks, and other structures
    - Barricading bootleg trails
- Improve sign and kiosk maintenance
- Improve maintenance of parking areas, access points, and trailheads
- Identify areas where ADA accessibility is needed
- Identify and remove encroachments from abutting properties

Long-term maintenance and monitoring milestones are designed to make trail maintenance sustainable. Sustainable trail oversight includes physical maintenance, planning and funding:

- Establish permanent appropriations, endowments, or other funding sources
- Create or utilize existing government body, not for profit organization, or citizen groups to oversee trail maintenance funding and physical responsibilities
- Ensure that the entity(s) responsible for maintenance adheres to the overriding

direction established by this TMP
- Streamline communication and feedback regarding trail maintenance with the commissions or committee that will be responsible for future trail master planning

The trail maintenance and monitoring goals inform the development of the maintenance program that will prioritize the goals and create an outline for the execution of maintenance tasks.

5.3 Program

The maintenance program establishes the trail maintenance standards, priorities, tasks, and means to evaluate and improve maintenance in the future. The maintenance program acknowledges that properly constructed trails with adequate base, proper drainage, etc., have the fewest problems from a maintenance perspective. Therefore, design standards should be established for new trails and proposed trail connections, as well as for rerouting or reconstructing trails.

The maintenance program's most significant goal is to ensure the safety of trail users. In addition to performing regular safety inspections, preventative and proactive maintenance should be conducted on trail surfaces, signage, markers, and other trail amenities in order to ensure long-term, high-quality trail conditions and ensure the protection of natural resources through appropriate trail maintenance.

The "Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report, dated September 30, 1999," should be reviewed to ensure accessibility compliance for new trail construction and strive to improve accessibility for the trails being maintained. The current guideline for accessibility for outdoor recreational trails state that new trails must comply with the standards. There are exemptions for some trails, but trail managers are encouraged to improve accessibility on all trails through trail maintenance and repair activities.

5.4 Standards

Maintenance standards are assigned to trails based on the general activities and uses for which each trail is designed. The maintenance standards determine the frequency of monitoring, maintenance scheduling, and maintenance priorities. These maintenance standards should be reviewed and updated on an as-needed basis or as changes in trail maintenance arise. Maintenance standards are generally prioritized by use, with higher priority being given to trails where use is more significant. Maintenance standards also indicate the work requirements needed to achieve the desired physical trail conditions for a particular activity. Maintenance standards are satisfied when the activities for which each trail is designated can be performed without hindrance.

The trail inventories, performed in the spring of 2007 and described in Section 2, utilized a modified TRACS system based on the United States Forest Service Trail Assessment and Condition Survey. To maintain consistency between the inventory and maintenance

plan, the maintenance standards also utilize the modified TRACs trail classification. These categories generally focus on the trail treadway and frame as measures of classifying different trails. The treadway or tread is the surface with which users make direct contact and the frame is the area around the trail that is cleared for users. The following table outlines the physical trail standards for off-road trails in Needham:

Trail Class	Description	Treadway Width (feet)	Treadway Condition	Treadway Clearing	Frame Width Clearing* (feet)	Potential Uses
Class 5**	Fully Developed Trail	8+	Uniform, firm, and stable, gravel or paved	Gravel or Paved	12+	Walking, Running, Cycling, Strollers, Wheelchairs (Plowed in winter)
Class 4	Highly Developed Trail	6-8	Imported materials or hardening is common.	Evenly Graded	9-11	Walking, Running, Cycling, Strollers, Wheelchairs, Equestrian, Cross-country Skiing
Class 3	Developed/ Improved Trail	3-6	Native with some on-site borrow or imported materials.	No Stones or Stumps / Roots	5-8	Walking, Running, Mountain Bikes, Equestrian, Cross-country Skiing
Class 2	Simple/Minor Development Trail	1-3	Native with limited grading. Continuous, rough.	Few Stones & Stumps / Roots	1-3	Walking, Running, Equestrian
Class 1	Minimal/ Undeveloped Trail	<1	Native, un-graded. Intermittent, rough.	None	None	Walking, Hiking

Table 5.4-1: Class categories and descriptions based on United States Forest Service Trail Assessment and Condition Survey
*All overhead frame clearing, with the exception of Class 1, is 14 feet for coniferous trees and 11 feet for deciduous trees.
**There are no existing Class 5 trails in Needham

5.5 Priorities

Maintenance priorities are based on the relative importance of the trail within the scope of the entire network. The relative level of importance is determined by the amount of use the trail receives, its accessibility, and the use/mobility requirements for that trail. Maintenance priority has been assigned to trails based on their designated Trail Class under the Maintenance Standards. By simplifying prioritization and aligning it with class, the authority charged with maintenance will not be referring to multiple parameters for trail maintenance. During future trail master planning, should the need arise to increase maintenance of a particular trail, this will be easily achieved by upgrading the trail to a higher class.

Priority rankings for existing trails are divided into Classes 4 through 1 depending on the factors noted above. Class 4 priorities are the highest, Class 1 are the lowest with respect

to maintenance factors, such as frequency of regularly scheduled maintenance, response time to non-emergency maintenance requests/situations, and tolerance of maintenance conditions due to varying levels of use. Where site-specific conditions are known to cause maintenance concerns (i.e., more frequent maintenance required due to trouble spots), the individual maintenance plans for each property/trail should be referenced from the GIS database. Maintenance priorities are organized in a hierarchical manner as follows:

- Class 4 – Highest priority for maintenance, most regular maintenance and shortest response time
- Class 3 - High priority for maintenance, regular maintenance and short response time
- Class 2 - Low priority for maintenance, less frequent period of time between regularly scheduled maintenance operations
- Class 1 - Lowest priority for maintenance, longest period of time between regularly scheduled maintenance operations

5.6 Tasks

Tasks for the Needham TMP are derived from the physical assessment of the trails during the spring of 2007, trail maps developed using GPS, and the inventory of the features and maintenance needs found during these surveys.

Maintenance tasks are written from the perspective of the trail user. This perspective helps to define the expected outcome of any maintenance task, how often it will be performed, and what an acceptable response time is following notification of a problem (i.e. trail erosion or sign vandalism) or natural event (i.e. significant rain storm). Task descriptions are not intended to be prescriptive and will evolve with time. They are also likely to be more specific for trails with unique conditions.

Maintenance tasks are not meant to tell maintenance crews how to perform the tasks; rather the focus is on the outcome or result that is to be achieved when the tasks are complete. Maintenance operations and task completion should be performed in accordance with the techniques outlined in the *Needham Trail Stewardship Manual*. This is a comprehensive source for managing drainage, brushing, markers, signs, treadway repair, bridges, and safety procedures.

The following maintenance tasks should be performed on a continuous, regularly scheduled basis or irregular/as-needed basis.

To be performed on a continuous, scheduled basis:

1. **Trail Safety**
   Annual inspection of all trails in Needham should be performed to monitor and document any safety hazards. Other items that should be inspected and

documented include the condition of bridges, boardwalks, culverts, kiosks, signs, fit trail equipment, stairways, gates, rock barriers, parking areas, trail frame clearances, and trail surfaces. Documentation should be maintained by the responsible authority as part of the Town records. Other related activities that could be performed during safety inspections include the removal of debris or trash and light vegetative pruning. All safety hazards should be mitigated, repaired, or removed as soon as possible.

2. Trail Inspection

Trail inspections are similar to safety inspections; however, they are not specific to safety hazards. Inspections should occur on a regularly scheduled basis if possible, the frequency of which will depend on the trail class. Inspections promote safe and passable trails by monitoring trail conditions and providing an additional opportunity to report any safety hazards. Routine trail patrols require traveling their length, visually inspecting the trail, and recording and/or repairing any maintenance issues encountered. Trail inspections are often easily assigned to volunteer groups or property-specific stewards who live close to the trails and use them regularly. In addition to the annual safety inspection, more frequent inspections are recommended as follows:

- Class 4: once per month during the winter, twice per month during other seasons
- Class 3: once per month
- Class 2: once per month during the summer
- Class 1: twice per year

3. Debris Removal

Brush, branches and fallen trees will be removed from the treadway. The type of debris removed may be different and/or require more frequent attention depending on the trail location, and composition of the surrounding vegetative community. Debris removal should be performed in accordance with the trail inspection schedule described above. Training will be provided to volunteers participating in this type of project.

4. Trash Removal

Trash removal from along the trail is an important aesthetic maintenance task that may also include emptying trash containers. Trash removal should take place in accordance with the trail inspection schedule described above and the regular schedule for emptying trash containers as directed by the responsible Town authority.

5. Tree and Shrub Pruning

Pruning should be performed to maintain established trail frames at the widths and heights specified in the maintenance standards. This should occur at least twice a year (spring and fall) for all trails and on an as-needed basis for trails that

may have significant vegetative growth during different seasons.

6. **Mowing Vegetation**
   Where trails cross grassed areas and fields, trail maintenance personnel should mow vegetation regularly throughout the growing season to maintain the treadway. Trail "shoulders" - extending 1-2 feet on each side of the trail – should also be mowed periodically to keep herbaceous vegetation below 2 feet. For Class 3 trails where there is no mowing in the adjacent area (i.e. naturalized area), two cuts per active growing season should be undertaken, the first in late spring or early summer and the second in mid to late fall. Class 2 trails that require similar maintenance should also be mowed on the same schedule as Class 3, however, this applies to the trail itself and less so to adjacent areas.

7. **Scheduling Major Maintenance Tasks**
   Maintenance tasks that require capital expenditure to repair or replace damaged, worn, or failing trail features and amenities should be anticipated based on the estimated lifespan of the feature or amenity and should be scheduled accordingly. The full list should be maintained in a capital budget request each year and the priorities should be highlighted. This would either help with the effort to get Town funding, or to get outside funding, as the list will show the established priority and need.

To be performed on an as-needed basis:

1. **Trail Repair**
   The inspection schedule for identifying repair needs is identical to the regularly scheduled trail inspection schedule. The time between observation of trail repair needs and actual trail repair will depend on whether the repair is deemed a hazard, to what degree the needed repair will affect the safety of the trail user, and whether the needed repair can be performed by the trail maintenance crew or if it is so extensive that it needs to be repaired by contracted services. Maintenance aspects that are unique to on-road cycling facilities are not included as part of the trail network. The following criteria are used as maximums for allowable distortions in the trail surface:
   - Bumps or depressions causing water to pond on half of the width of the trail surface;
   - Drop-offs at the edges of trail greater than 5 inches in height;
   - Cracks greater than 3 inches wide by 2 inches deep;
   - Potholes greater than 10 inches in diameter and 2 inches deep; and
   - Tree roots more than 1 inch above the trail surface.

   Distortions that pose an immediate hazard to the users should be clearly marked as soon as possible. Prioritizing surface condition repairs based on class gives precedent to those trails that are used most frequently or that are designated to

accommodate the greatest number of users. The following time periods are goals to accomplish trail repairs:

- Class 4: within 2 months
- Class 3: within current season
- Class 2: within 1 year
- Class 1: within 1 year

2. Trail Replacement

Trail replacement requires cutting new trails, removing stumps and organic material, moving stones, and hardening the treadway. Replacement occurs where an older trail is degrading the surrounding natural area (i.e. eroding into an adjacent stream) or where persistent bootleg trail cutting warrants the installation of a replacement trail. Replacement may also involve a new surface, completely overlaying a gravel or asphalt trail with a new asphalt surface, or replacement of an asphalt trail with a concrete trail. Trail replacement will be prioritized based on trail class.

3. Vegetation Management

Trail edging maintains trail width and discourages bootleg trails. Pruning creates a safer trail environment for users by removing plant materials that obstruct trailside signs and block sightlines along the trail. Pruning involves the cutting of branches along trail edges that encroach into the clear zone and or travel area of the trail. Branches and brush are to be cut to eliminate sightline obstructions or encroachments that could impact on trail users. Priority should be given to trail intersections, trail crossings at roadways, sharp curves and all areas where branches pose an immediate hazard by encroaching significantly into the trail frame. Other areas, including straight sections of the trail and areas where branches may be encroaching into the trail frame should be considered more of a preventative maintenance operation. Trail edging should be conducted in coordination with the regular monitoring schedule, or more frequently as deemed on an individual trail basis.

Cuttings may be chipped on site and placed appropriately or used as mulch for new plantings. If not chipped on site, they should be removed except in the case of trails through woodlots or in environmental buffer areas. In woodlots, buffers and other naturalized settings, cuttings can be placed in a naturalistic manner away from the treadway. Cuttings can also be used to block and discourage traffic on bootleg trails and other unauthorized side trails that are to be closed.

4. Trail Drainage Control

In places where low spots on the trail catch water, trail surfaces should be raised, or drains built, to carry water away. Some trail drainage control can be achieved through the proper edging of trails. Problem areas generally include trail edges where berms tend to build up and where uphill slopes erode onto the trails.

Removing sediment deposits and filling eroded portions of trails will permit proper draining of the trail surface, allow the flow of the water to clean the trail, and limit standing water on trail surfaces. If trail drainage is corrected near steep slopes, the possibility of erosion must be considered. The main outcome of maintenance to trail drainage systems is to permit their ongoing function as intended in order to reduce the potential for flooding and associated conditions that could present a safety hazard or that could degrade the quality of the infrastructure. This standard applies to all drainage structures associated with trails, including but not limited to culverts, drainage ditches, swales, dry wells, and French drains.

Obstructed drainage systems can potentially cause flooding, pose a hazard to the users, or trigger deterioration that leads to an immediate safety hazard for users; these situations are a high priority and should be treated as hazards. Partially obstructed drainage systems can potentially cause intermittent water backups, but often they do not pose an immediate safety hazard. If these situations are left unchecked over time, they can potentially adversely affect the integrity of the trail and other trail infrastructure or the surrounding environment. Prioritizing drainage repairs based on class gives precedent to those trails that are used most frequently or that are designated to accommodate the greatest number of users. The following time frames are goals for the repair of drainage systems:

- Class 4: within 2 months
- Class 3: within current season
- Class 2: within 1 year
- Class 1: within 1 year

5. Trail Signage and Amenities

When a sign, bench, trash receptacle, kiosk, fence, fit-trail equipment, picnic table or other amenity is observed to be damaged and posing an immediate hazard or safety liability, the repair or removal of the object should be completed as soon as possible, and/or the trail should be considered for closure to prevent access (i.e., broken bridge or boardwalk). For amenities or signs that no longer perform their intended function or that will have a shortened lifespan if left unchecked, scheduled maintenance and replacement should be performed as soon as is practicable and within a minimum five-year schedule. Major renovation/replacement of large items, such as bridges, kiosks, gates, parking lots, would be on a 10 to 20 year replacement schedule, unless they break and become a hazard and/or no longer function as required.

6. Revegetation

Areas adjacent to trails that have been disturbed for any reason should be revegetated to minimize erosion. This activity should be scheduled on an as-needed basis with Class 5 trails having the highest priority and Class 1 trails having the lowest.

7. Graffiti Control

The key to graffiti control is prompt observation and removal. During scheduled trail inspections, graffiti should be noted and removed as soon as possible. In the case of graffiti containing hate messages, this should be attended to within 24 hours.

5.7 System and Program Evaluation

Evaluating the maintenance program determines if it is achieving the goals and standards set by the maintenance plan. Maintenance program evolution will provide quality control for maintenance by identifying where improvements are needed, either in trail monitoring or maintenance tasks. Evaluation inevitably determines when additional funding is required in order to complete trail maintenance on schedule and to a quality/caliber that is consistent with the standards. Evaluation also assists in rearranging priorities and reevaluating maintenance goals. Feedback from maintenance evaluation should be integrated into future trail master planning. The most effective tool for evaluating the maintenance program and relating it spatially to the trails themselves is a Geographic Information System (GIS).

Managing the trail maintenance using Global Positional System (GPS) and GIS technology will determine the type and accuracy of the data collected will. The GIS will assist with decision-making for trail maintenance and new trail development. As part of the GIS inventory, a number of attributes were recorded in the field. These included:

- Trail location
- Trail width
- Surface (asphalt, granular, earth)
- Clearance (vegetation overgrowth)
- Liabilities (steep slopes, trail erosion, etc.)
- Assets (seating, recreational amenities, etc.)
- Junctions
- Signs (location and type)

The Town's GIS base map serves as the framework for graphic information and the database created during trail reconnaissance. Graphic data such as trail location and data points were recorded with a GPS unit and imported into the GIS base map. Each data point corresponds to the location where trail attributes were collected. The GIS field data should be updated as new trail construction takes place and maintenance/repairs are completed. The database can be modified to suit the Town's needs over time and will become a long-term management tool to help the Town understand, organize and set priorities for the future.

The trail GIS provides an inventory of the physical features on or adjacent to the trail. Although the initial inventory was performed using GPS, it is not necessary for updating,

adding, or modifying the GIS. The GIS should be updated when inventoried features are replaced, removed, modified, or when new features are added. A trail GIS is useful for developing the maintenance budget and in determining the total cost of maintaining all trail systems within Needham. Maintenance logs or reports that can be generated by the GIS are also useful when performing maintenance work by contract. If kept current, logs may be used to prepare documentation for contract packages, and show the location of structures and other features that require maintenance, as well as, updating the trail GIS after maintenance is completed.

Many grants, donors, or nonprofit organizations contributing to trail maintenance may wish to receive evidence that funding is being invested in an organized and accountable manner. Consistent monitoring of trail maintenance with a GIS provides before and after "snapshots" of trail maintenance conditions for funding agencies to see how and where improvements are made. Consistent positive feedback is integral to maintaining funding sources and successfully applying for new grants.

The Trail Maintenance Plan is not intended to be a static document. It should serve as a guide for the Town to achieve the goal of a linked system of trails that is supported by appropriate policies and programs. It has been developed based on the 2007 inventory and assessment, development of current needs, issues, and priorities. The Plan is designed to be flexible enough to adjust to the inevitably changing needs, issues, and priorities for trails in Needham, therefore the Plan must evolve to continue to be an effective planning tool.

In addition to the recommended annual review of projects completed, and the establishment of priorities for the coming year by a standing trails committee (Section 7), the entire Trail Maintenance Plan should be reviewed and updated every 10 years so that it will continue to be current with changing needs in Needham.

The Town of Needham should:

- Consider the program outlined above as a starting point for developing a trail maintenance program that is effective and within the Town's means.
- Share trail maintenance experiences with other area municipalities with the goal of improving maintenance standards and/or learning new techniques to improve maintenance (such as Wellesley);
- Continue to develop and maintain a data management system based on the information collected as part of the Trail Maintenance Plan inventory to track maintenance schedules, monitor problem areas over time, and assist with decision-making regarding trail maintenance and future master planning; and
- Regularly evaluate the results of applying the trail maintenance program with the goal to improve it over time. Part of this evaluation should involve feedback from trail users.

5.8 Costs and Budgeting

Existing trail maintenance, where it exists, is generally handled by the DPW Parks and Forestry Division. The Parks and Forestry Superintendant estimates that $4,500 in salary is spent on trail related maintenance every year from the Parks and Forestry operations budget (Lance M. Remsen, Parks & Forestry Superintendent). This includes tree work and fire road clearing and maintenance. Note that this is salary only and that the equipment used to perform trail maintenance is owned and maintained by the Parks and Forestry Division of the DPW. The Conservation Officer estimates that the trail monitoring and lawn mowing portions of the Ridge Hill Rangers position is valued at $4,800 per year (based on ⅓ of the value associated with the monthly housing compensation) (Kristen Phelps, Conservation Officer). This does not include sign and kiosk repair or new trail construction. Current expenditures on trail maintenance in Needham are estimated at $9,300 per year.

Prior to this master plan, no evaluation on the total number and length of trails in comparison to the total expenditure on trail maintenance has been performed. Needham has a total of 119,000± linear feet (22.5 miles) of trails within Town-owned parcels. These trails are broken down in the following table based on the Town properties in which they are located:

Property	Class 4 linear feet	Class 3 linear feet	Class 2 linear feet	Class 1 linear feet	Total
Town Forest	4,436	11,804	20,565	10,709	**47,514**
Ridge Hill	0	9,570	25,499	7,921	**42,990**
Greendale Avenue	1,615	2,335	7,604	505	**12,059**
Newman School	0	946	1,699	896	**3,541**
Rosemary Lake	1,074	243	2,964	0	**4,281**
Reservoir	154	1,254	2,210	792	**4,410**
Farley Pond	0	150	0	2,000	**2,150**
Mitchell Woods	0	0	1,337	301	**1,638**
Total	**7,279**	**26,302**	**61,878**	**23,124**	**118,583**

There is little information available via online resources or from other trail organizations that are either general enough that it could be applied to Needham or specific enough to extrapolate costs per linear foot. AMC estimates that about 70,000 hours of work from volunteers and trail crews was performed last year on the approximately 1,400 miles of trails they maintain. AMC trails are not comparable to Needham's trails and cost estimates for their maintenance would be exponentially higher than cost estimate projections for Needham due to the scale of the operation and different trail conditions. Other open space management plans and trail master plans either do not provide specific costs for maintenance or lump these costs into general trail building budgets.

Cost estimates for trail maintenance, based on Pecos Baldy Enterprises of Santa Fe, are that two miles of 3½-foot wide trails would require two people for one day (Thorton Ranch Open Space Management Plan, 2005) to perform maintenance. Therefore, they estimate two miles of trail maintenance at $15 per hour equals $240 a day. This approximate estimate does not include structures, boardwalks, signs, benches, or maintenance of other trail amenities. By applying this estimate to Needham's Trail maintenance, it would require approximately 12.75 days and would cost $3,060. Note that this estimate is too low and does not adequately match the conditions in Needham because the Santa Fe project is located in a rural portion of the southwestern United States where the natural environment and economy are very different.

The City of Guelph Trail Master Plan reported that trail maintenance costs for other municipalities was about $550 to $600/mile/year (Canadian) for urban trails (not including winter maintenance, structures, or other trail amenities). This can be as low as $50/mile/year for rural trails. These budgets address regular maintenance and upkeep tasks (materials and labor), but not major upgrades (City of Guelph, Canada, Trail Master Plan 2005). Therefore, trail maintenance costs, based on these estimates, would total between $13,876 and $15,138 (Canadian) for existing trails in Needham if they are considered urban trails. This is an estimate performed in 2005, in Canadian dollars and although closer to a more urbanized and forested setting, it does not adequately address the economy and labor involved with trail maintenance.

Based on working knowledge of volunteer projects and the time and labor involved with trail maintenance, Beals and Thomas, Inc. developed an estimate that incorporates the time/labor and materials involved with northern hardwood forest trail maintenance and a current economic rate for these services. This estimate does not include maintenance of structures, signs, or other trail amenities and is approximate for a typical stretch of unpaved 4-foot wide trail (some areas will require more attention and other areas may require less). We estimate three individuals completing one mile of trail maintenance in an eight hour period. For both labor costs and materials, we estimate a rate of $60. Therefore, professional trail maintenance may be approximated at $1,240 per mile and would total approximately $29,140 for 23.5 miles of trails in Needham (all trails except those within the DPW Land). This is a gross estimate that does not include the reduced cost of volunteer maintenance.

Trail conditions described in Section 2.3 indicate that some level of deferred maintenance has accumulated within all of the trail properties. Therefore, the estimated expenditure of $9,300 per year for maintenance and/or the organization and implementation of volunteer maintenance are not adequate to address current trail needs. An estimate of $29,140 per year for maintenance is significantly greater than current yearly expenditures; however, they take into account the deferred trail maintenance and additional maintenance needs within trail properties that currently receive little to no funding. Depending on volunteer recruitment, trail maintenance cost estimates could be lowered significantly. Therefore, a stewardship and volunteer program should be established at the beginning stages of

implementing the trail maintenance program to better estimate the costs associated with initial, as-needed, and regular maintenance.

5.9 Future Funding and Resources

Existing trail maintenance funding as described in Section 5.8 above is estimated at $9,300 per year and trail maintenance funding needed for all of the trails is estimated at $29,140. New sources of funding and volunteer resources will be required to improve the trail maintenance program and begin resolving the deferred trail maintenance. Future funding and resources will include several immediate actions being undertaken by different Town entities and long term planning as part of the implementation plan (See Section 7).

Section 8.2 provides a complete listing of potential funding sources for trail construction and maintenance.

5.10 Generic Order of Conditions for Trail Maintenance

Trail maintenance requires removing vegetation and minor earthwork within wetland resource areas protected under the Massachusetts Wetlands Protection Act (vegetated wetlands, the 100-year floodplain, riverfront area) as well as the Needham Wetlands Bylaw, which also protects the 100-foot buffer zone to wetlands and vernal pools. In order for trail maintenance (both routine maintenance and the more substantial effort required to rehabilitate neglected trails) to be done in compliance with these statutes and regulations, a Generic Order of Conditions or Determination of Applicability should be issued by the Needham Conservation Commission that establishes standards for trail maintenance that will protect wetland resource areas.

5.11 Maps Description

The trail inventories, performed in the spring of 2007 and described in this section should be utilized to begin initial trail maintenance in order to bring existing trails up to usable standards for each trail's specified class. These maps are intended to be useful guides and not detailed prescriptions for maintenance. They do not depict the work needed to change a trail's class, nor to create proposed trail connections, but generally identify those trail segments that will require more maintenance and site specific maintenance issues that may require additional time and resources.

5.11.1 Maintenance Categories

There are two categories of maintenance needs for existing trails. They are color coded on the Trail Maintenance Plans located in Appendix D.

- Trail in good to fair shape: routine brush clearing needed to maintain frame width and likely to be completed by volunteers (yellow)
- Trail overgrown: significant brush/tree clearing and root removal needed to restore frame width and unlikely to be completed with volunteers alone (blue)

Although not maintenance categories, two other trail types are also depicted on the plans to show new proposed trails and trails that are existing, but will be closed.

- New trail: proposed trail that will be constructed as part of the trails master plan and integrated into the maintenance plan (orange)
- Trail to be Closed: existing trail that will be discontinued, brushed in, and removed from the Trail Maintenance Plan (red)

These maintenance categories are broadly associated with large trail segments, but specific prescriptions for maintenance (i.e. trim branches that are greater than 3 inches diameter or fill pot holes in trail surface, etc.) should be derived during routine trail inspections. More incidental and site specific maintenance needs, such as a fallen tree or a wet area along the trail are identified by individual symbols on the maps.

5.11.2 Maintenance Symbols

The following symbols are depicted on the maintenances maps and describe site specific/ incidental maintenance needs:

- *Log*, indicates a fallen tree of 5 inches DBH (Diameter Breast Height) or larger is blocking a portion of the trail. May require several individuals to move the fallen tree and/or a chainsaw to cut the tree and move off the trail treadway.

- *Puddle*, indicates an area that may flood seasonally or does not drain entirely after a heavy rain event. May require spot grading to divert water flows, raising the trail treadway's elevation, installation of drainage improvements, or improving bridges and/or other structures.

- *Trailhead*, indicates an ideal area to install a trailhead sign and/or other signage and information specific to the trail system.

- *Kiosk*, indicates an ideal trailhead for the installation of a kiosk with a trail map and/or other signage and information.
- *Parcel specific symbols*, are included on individual maintenance maps and briefly identified. They are not described in detail, as these features are proposed for a specific application or site need. Some parcel specific symbols include gates, canoe launches, and fishing areas.

More detailed comments on specific maintenance items are numbered to correspond with the appropriate location on the map. Most symbols and comments identify where a maintenance issue is located, however, they do not prescribe the necessary procedure for remedying that specific maintenance issue. Because each maintenance item is unique, specific prescriptions for these items should be generated during routine trail inspections.

The intended use for the maintenance maps is to provide those performing maintenance tasks on the trails with a quick visual representation of the general types of maintenance that a trail segment will require and where some specific maintenance issues are located. These may be especially useful in delegating trail maintenance tasks to a volunteer group that is not familiar with the trails and what types of maintenance are required. These maps were designed to be specific enough for a Town employee to use to complete necessary tasks and general enough such that volunteers and individuals less familiar with trail maintenance could use them to complete delegated tasks.

Section 6.0
Improved Trail Visibility, Access and Use

6.0 IMPROVED TRAIL VISIBILITY, ACCESS AND USE

Sections 6.2, 6.3, and 6.5 of this chapter were contributed by the Trails Advisory Committee.

6.1 Trailhead Signage

Trailhead signs fall into two categories: safety and information. Trail users should be informed of the name and location of the trailhead, where the trail leads, and any safety precautions for trail use. Signs related to safety are important, especially for liability reasons; thus they should receive the highest priority. Information signage is also important for safety, in that a user can better identify their location in the event of an emergency, as well as for enhancing the use of trails by new and less frequent users. A consistent system of trailhead information signage that does not diminish the natural surroundings of the trail should also be priority. Consistency of trailhead signage within the Town makes it easier for first time and infrequent users to identify the trailhead and informs the user that they are on a public trail maintained by the Town of Needham. Installation of new trailhead information and safety signage should be coordinated in order to minimize the use of multiple signs and potentially conflicting information.

6.2 Trail Signage and Markers

Trails and trail heads should be clearly and consistently marked with signs that clearly indicate that this is part of the Town-wide trails system, and that help trail users to find their way through the trail network. Trail junctions will be marked with numbers, to correspond to the trails map. The standard trail markers will incorporate a Needham Trails logo, which may be designed through a school arts program design contest.

Each trailhead should be marked by a 4-inch diameter aluminum circular disk illustrating the Needham Trails logo. The trailheads are located at the intersection of a Needham trail and a Needham street or a Needham trail and the main driveway at Ridge Hill. Marked trailheads shall not be located on private property. The markers shall be placed approximately 7-feet from the ground on a prominent tree at the wooded entrance to each trail. The estimated number of trailheads at each property is:

- Ridge Hill – 11
- Town Forest – 10
- Rosemary Lake – 3
- Greendale Avenue – 3
- Needham Reservoir – 5
- Newman School – 3
- Mitchell Woods - 4

The Needham Trail logo 4-inch diameter circular aluminum marker will be used at trailheads and to mark trails at Rosemary Lake, Greendale Avenue, Needham Reservoir, Newman School, and Mitchell Woods. At Ridge Hill and the Town Forest the Needham Trail logo circular marker will be used at trailheads and 4-inch diameter single color markers will be used to designate individual trails, the color designations should match

what is shown on the Public Trail Maps. The trail markers will be placed 7-feet from the ground on a tree, visible in both directions along each trail. The estimated number of Needham Trail logo markers at each property is:

- Rosemary Lake – 30
- Greendale Avenue – 20
- Needham Reservoir – 25
- Newman School – 16
- Mitchell Woods - 14

The estimated number of colored markers to be divided between Town Forest and Ridge Hill is:

- White – 60
- Orange - 60
- Blue - 80
- Red - 60
- Green - 80
- Yellow – 80

Smaller trails within Ridge Hill and the Town Forest which connect the color designated trails shall be marked with the Needham Trail logo marker.

Junctions as designated on the Public Trails Maps shall be marked on the trails with white 4-inch square aluminum makers with the junction number shown in black approximately 3-inches tall. The junction markers shall be placed approximately 7 feet from the ground on a tree at the intersection of two or more marked trails. The estimated number of junction markers required at each property is:

- Ridge Hill – 40
- Town Forest – 40
- Rosemary Lake – 4
- Greendale Avenue –4
- Needham Reservoir – 0
- Newman School – 2
- Mitchell Woods - 0

6.3 Kiosks

Kiosks should be located at the main entrance to a trail as shown on the Public Trails Map. The Committee recommends that the kiosks be similar to those used in Wellesley, and that they be made from composite materials or pressure treated wood. Kiosks should stand approximately 102 inches tall and 38 inches wide, containing a 25-inch by 30-inch weather resistant Plexiglas frame to place the trail map in for protection and visual access. An 18-inch by 12-inch by 6-inch box with a single 18-inch hinged roof would be bolted to the kiosk to hold folded maps for public use. The map boxes also provide an opportunity to distribute other information and notices. An example of a similar kiosk can

be found in Wellesley, Massachusetts at the corner of Route 135 and Route 16. Kiosks should be installed at the following locations:

- Ridge Hill – 1 near entrance to Fitness Trail, 1 near entrance to Esker Trail, 1 off Charles River Street across from the Ridge Hill driveway
- Town Forest – 1 in parking lot of Horsford Pond (this one already exists, though needs box to hold maps), 1 at end of Robinwood Avenue, 1 off High Rock Street at end of fire lane (white trail)
- Rosemary Lake – 1 in Rosemary Pool parking lot, 1 off Nehoiden Street across from Blacksmith Drive
- Greendale Avenue – 1 off Cheney Street and 1 at end of Old Greendale Avenue
- Needham Reservoir – 1 in front of Reservoir
- Newman School – 1 at the end of the parking lot near Eastman entrance
- Mitchell Woods – 1 at trail entrance near playing fields

Map boxes would be initially provided at all kiosks at Ridge Hill and the Town Forest, and could be added to other kiosks as needed.

6.4 Parking, Vehicular Access, and Accessible Parking

Parking and vehicular access improvements to trails and trail properties fulfills several goals of the Trail Master Plan: 1). Access; 2). Safety; 3). Maintenance; and 4). Aesthetics. These goals apply to the larger parking areas located at Ridge Hill and Town Forest as well as the smaller trail properties like Greendale Avenue and the Reservoir. Existing access and parking for each property is described in Section 2.3.

Ridge Hill, Town Forest, Rosemary Lake, Needham Reservoir, Newman School, and Mitchell Woods all have designated parking areas. Ridge Hill and Town Forest parking areas are generally exclusive to individuals visiting the properties for trail use and recreation. One parking sign that directs users to the main parking area and the "Welcome Kiosk" for Ridge Hill should be clearly visible from the main parking area. The smaller parking areas are low maintenance and well sited for access to the Fit Trail and other trails that are frequented by regular users. The main parking area should indicate where accessible parking is located and meet ADA requirements. It should be noted that improvements to parking, vehicular access, and accessible parking may evolve with the proposal to move the Needham Senior Center to Ridge Hill (See Needham Senior Center in Appendix F).

The access drive and parking area in the Town Forest requires regrading and restoring the country drainage. Improving the surface material may be an option, however, a paved surface may not be necessary. The access drive should have clear signage noting the entrance and exit, along with a sign for the Town Forest that can be seen when driving in either direction on Central Avenue. The existing single sign in the middle of the entrance cannot be clearly viewed from either direction and there is no clear indication for which portion of the entrance drive is the entrance or the exit. Parking areas could be better

defined using wooden guardrails. Clearly signed accessible parking should be provided. The "Welcome Kiosk" for Town Forest should be clearly visible from the parking area.

Rosemary Lake, Needham Reservoir, Newman School, and Mitchell Woods all have shared parking areas that serve adjacent facilities. The Rosemary Lake parking area could be improved by repaving, restriping, and directing stormwater flow away from the entrance of the trail. The "Welcome Kiosk" should be located at the edge of the parking area and parking striping should include a no parking area directly in front of the proposed kiosk to maintain visibility when the lot is full. Accessible parking is provided adjacent to the pool facility.

The Needham Reservoir parking area is shared with the adjacent DPW facilities. This parking lot tends to be full during weekdays and large trucks and equipment utilize different portions of the parking area and access drive. One sign proximate to the "Welcome Kiosk" should direct users to DeFazio Park for additional parking. Accessible parking should be improved and located proximate to the kiosk as part of the accessible trail improvements proposed in Section 3.1.5.

The Newman School and Mitchell School parking areas are adequately maintained and provide clearly designated accessible parking. A kiosk for the Newman School Trails should be installed where it will be visible from the parking area.

The current guideline for accessibility for outdoor recreational trails is contained within the document "Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report, dated September 30, 1999." New trails must comply with the standards contained within these guidelines. There are exemptions for some trails, but trail managers are encouraged to improve accessibility on all trails through trail maintenance and repair activities. As the Master Plan is implemented, the guidelines should be carefully reviewed to ensure compliance for new trail construction and strive to improve accessibility for the trails being maintained.

6.5 Needham Trails Webpage

A key element of the Master Plan is a Trails Webpage to make trails information readily accessible to Town residents. This webpage would include:

- Downloadable printer-friendly versions of all trail maps
- Descriptions of trails – conditions, lengths, features of interest
- Information on volunteer activities and events
- A Stewardship or Volunteer manual

6.6 Trails Maps and Descriptions

Public trails maps have been generated that depict existing trails located within Town-owned properties. These maps are 8½ by 11 inches and designed to be included in a threefold pamphlet that also includes general information about the property and its trails. The maps and pamphlets are designed such that they are legible if printed from either a

color or black and white printer. These pamphlets may be distributed at the Park and Recreation office, Conservation Commission office, Public Library, or other Town offices, and placed in the kiosks located at each trail property. These maps were also designed to be easily upgraded by the Town. The maps are generated using the Needham GIS database (ArcMap 9.0) and the electronic data provided to the Town from Beals and Thomas, Inc. as part of the Master Plan. The pamphlet information uses the Microsoft Word application. The pamphlets are also provided in electronic PDF format for publication to the Town website.

As a guide to these smaller trail maps, a larger 24 by 36 inch map of all of the Town-owned trail parcels places the smaller maps into context as a town-wide trail network. This map also depicts schools, open space, and other town owned properties. This map could be displayed at the Conservation Commission office, Park and Recreation office, Public Library, and could be used in trail kiosks to show the entire Town of Needham trail network.

Two additional 11 by 17 inch maps of Ridge Hill and Town Forest are also included. These color maps were generated to identify the unique trail naming and color markers within these two properties. These maps also provide better detail of the Town's largest trail properties. Appendix A contains the Public Trails Maps.

Section 7.0
Implementation Plan

7.0 IMPLEMENTATION PLAN

This chapter was provided by the Trails Advisory Committee.

7.1 Goals and Objectives

The Committee established six goals for the Trails Master Plan. This chapter describes how these goals will be implemented.

1. **Establish a long-term implementation structure.** Although Needham's trails are under the jurisdiction of several Town Boards, implementing the Master Plan requires coordinated actions to ensure consistent use of trail signs, continued trail monitoring and maintenance, and fair allocation of funds. The Master Plan envisions that many of the trail monitoring and maintenance activities, and much of the new trail construction, would be done by volunteers – who require training and supervision. All of these elements require that a long-term implementation structure be in place to carry out the Master Plan and serve the residents of Needham.
2. **Improve trail visibility, access and use.** Needham residents currently do not use the trail system to its fullest extent because of low visibility and varying levels of user-friendliness. To encourage increased trail use, which provides health benefits and increases environmental awareness, measures should be taken to promote use of the trail system; make residents aware of trails; and improve the usability of trails by adding signs, kiosks, and providing maps.
3. **Bring all existing trails up to standards.** Many of Needham's trails are not well-maintained, which discourages use and provides a negative visitor experience. All trails should be repaired and brought up to the standard for the appropriate trail class.
4. **Build new trails on Town lands.** Many of the existing trails dead-end and do not provide a full loop, which is attractive to walkers. New trails should be constructed on Town lands to provide loop trails, and to provide access to important features like the Charles River.
5. **Build new trails connecting existing systems.** As noted in Chapter 2, the large trail systems are not well-connected to residential neighborhoods or to each other. A comprehensive Town-wide trail system would incorporate new trails on Town lands, new trails constructed by obtaining property or easements, and designated sidewalk trails to provide these connections and make all of the Town's trails more accessible to residents.
6. **Implement and carry out annual inspections and maintenance.** Trails require continued maintenance to ensure that they remain safe and accessible. A program of annual inspections and maintenance (trail repair, vegetation removal, sign replacement) is essential to the long-term function of our trail system.

7.2 Trails Advisory Group

As noted above, although Needham's trails are under the jurisdiction of several Town Boards, implementing the Master Plan requires coordinated actions to ensure consistent

use of trail signs, continued trail monitoring and maintenance, and fair allocation of funds.

Short- and long-term implementation of the Trails Master Plan would be overseen by the Needham Trails Advisory Group (or "TAG"). The TAG would be populated by a single representative from the following existing Town boards: Conservation Commission, Park and Recreation Commission, School Committee, Department of Public Works, and any other existing Town board with jurisdiction over land containing trails identified in the Trails Master Plan. Interested members of the community could be invited to participate as associate members of the TAG. The TAG would hold public meetings quarterly (or on a timely basis to be determined).

The TAG should be governed by the Needham Trails Master Plan as well as local and statutory responsibilities. It would oversee decisions on a range of topics, including the implementation of the Trails Master Plan, approval of the Stewardship Plan/related policies, funding matters, and relevant issues raised by any member of the TAG, the Trails Coordinator, or other interested parties.

Any improvements, maintenance, or new trail construction would be undertaken only if approved by the Town Board (Conservation Commission, Park and Recreation Commission, School Committee, or DPW) with jurisdiction over the property, and would be funded through that jurisdictional entity.

7.3 Trails Coordinator

Implementing the Master Plan requires time and resources that are not currently available through the Town's staff and departments. A part-time trails coordinator position should be created, either within the Conservation Commission staff and/or Park and Recreation, to provide the following services:

- Maintain the Trails Website
- Oversee annual trail monitoring for safety and condition
- Update the Trails GIS database annually
- Train and supervise volunteers
- Organize volunteers and assign specific work projects
- Coordinate with DPW for trail maintenance activities (removing downed trees) that cannot be done by volunteers
- Apply for grants and other funding to maintain and construct trails
- Act as "first responder(s)" when trails-related issues arise
- Coordinate with the Trails Advisory Group and provide administrative support
- Develop descriptions of trails to be added to trail maps
- Oversee trail improvement and construction projects

A dedicated town phone number/email address should be established for trail matters,

which could be routed through the Town's existing systems to the designated "first responder(s)." Voice and email systems can be set up to immediately generate an automated response to patrons, noting a timeline for responding to typical inquiries or indicating how often regular inquiries are reviewed.

7.4 Trail Stewardship Plan

Implementation of the Trails Master Plan will require a significant level of coordination and volunteer labor. There will be a variety of ways that interested residents can participate in improving the trails and advancing the goals of the Trails Master Plan. Individuals or groups with limited availability can assist with discrete trail projects. Those who may not be able to undertake actual trail work may be interested in helping out with editorial and/or organizational tasks associated with trails, such as drafting and updating trail related documents, writing grants, contacting volunteers for workday, etc. Lastly, those with more time to offer will be encouraged to adopt a trail to walk regularly and care for by reporting any issues to the Town and undertaking basic cleanup and/or maintenance activities. This group of individuals will be collectively known as Needham Trail Stewards.

Trails stewards will be a vital component in achieving the implementation plan outlined in Section 7. Stewards will commit to overseeing the trails within a particular parcel or a single trail within the larger parcels such as Ridge Hill and Town Forest. Specific responsibilities will include

- hiking the trail;
- providing notes on conditions encountered;
- highlighting immediate safety concerns so that issue can be directed to appropriate Town staff or volunteer group;
- recommending trail improvements; and
- checking condition of signs, markers, kiosks, and recommending repair or replacement needs.

Trail Stewards and other volunteers will be required to sign waiver forms that place them under Town jurisdiction and provides protection for liability purposes. Stewards will also be required to attend an orientation and training program and to familiarize themselves with the Needham Trail Steward Manual which can be found in draft form in Appendix G of this Master Plan.

7.5 Friends of Needham Trails

A "Friends of Needham Trails" group should be formed to give citizens a vehicle for expressing their ideas and concerns relating to trails matters. It would be comprised of all presently active volunteer individuals and would solicit involvement from a variety of interested Needham groups of the following types: General service, civic, fraternal, educational (including schools), youth, and religious. We envision the "Friends" group as being open to any interested citizen, including the Stewards, and to be primarily a consulting body that keeps the TAG connected to its constituency. Participation in the

"Friends" group would not confer any policy or decision-making authority, as that would necessarily rest with the various jurisdictional members of the TAG.

7.6 Potential Volunteer Resources

In addition to the financial resources discussed in Section 7.4, volunteer resources will be critical to supporting trail stewardship that is community supported and within the means of the Town's financial resources. Volunteers play an active role in many private non-profit trail organizations, such as the Appalachian Mountain Club, and in performing stewardship for local municipalities. Volunteers participate in order to be involved with their community, contribute to the recreational facilities that they use, and enjoy the outdoors. Volunteers may have extensive skills that are conducive to trail maintenance and stewardship, such as carpentry, woodworking, engineering, orienteering, cartography, forestry, or other skills. In order to seek out volunteers, especially some who may already have trail maintenance skills that they would be willing to share, the stewardship plan should utilize several sources for potential volunteers.

Section 8.2.2 and 8.2.3 provides a listing of potential volunteer sources for trail stewardship.

7.7 Funding for Trail Construction and Maintenance

Total proposed trail connection construction costs, which include potential alternative trails, are approximately $2.3 million dollars and professional trail maintenance funding as described in Section 5.8 is estimated at $29,140. While some of these costs may be reduced by volunteer labor and materials, new sources of funding will be required to pay for new trail construction and ongoing maintenance. A process should be developed to actively seek out grants and apply for funding from the Federal, State, private and other resources that fund trail initiatives.

The Park and Recreation Commission currently has a "gift fund" which can be used to allow private donors to fund trail projects (bridge repair, trail construction, signage, etc). The Conservation Commission will consider creating a similar "gift fund" for support of trails projects on Conservation lands.

Section 8.2 provides a complete listing of potential funding sources for trail construction and maintenance.

7.8 Implementation Schedule

The Implementation Schedule subdivides the Goals and Objectives of the Trail Master Plan into individual assignments that are scheduled according to their implementation year.

GOALS, OBJECTIVES, & IMPLEMENTATION SCHEDULE

❍ = Start, ● = Complete

Goals and Objectives	Implementation Year (FY)					
	2009	2010	2011	2012	2013	>2013
Goal 1 – Establish a Long-Term Implementation Structure						
1A Prepare proposal for standing Trails Committee	●					
1B Obtain funding for part-time Trails Coordinator	❍	●				
1C Establish guidelines for trails volunteers	●					
1D Implement training program for trails volunteers	❍	●				
1E Develop list of volunteer projects	●					
Goal 2 – Improve Trail Visibility, Access and Use						
2A Create trails webpage	●					
2B Install kiosks at designated trail access points						
2B-1 Obtain funding for kiosks	●	●	●			
2B-2 Construct and install kiosks at Ridge Hill	❍	❍	●			
2B-3 Construct and install kiosks at Town Forest	❍	❍	●			
2B-4 Construct and install kiosks at other locations			❍	●		
2C Install trailhead signs on all designated trails	❍	●				
2D Create trail descriptions to supplement trail maps	❍	❍	●			
2E Improve Farley Pond access						
2E-1 Design and permit new parking area			●			
2E-2 Obtain funding for parking area construction				●		
2E-3 Bid and construct new parking area					●	
Goal 3 – Bring All Existing Trails up to Standards						
3A Obtain generic Order of Conditions (permit) for trail maintenance	●				●	
3B Repair/improve all trails at Rosemary Lake	❍	●				
3C Repair/improve all trails at Farley Pond			●			
3D Repair/improve all trails at Greendale Avenue		●				
3E Repair/improve all trails at Mitchell School	●					
3F Repair/improve trails at Newman School	●					
3G Repair/improve all trails at Town Forest		❍	●			
3H Repair/improve all trails at Ridge Hill						
3H-1 Repair trails north of Charles River Street (to end of Esker Trail)	❍	●				
3H-2 Repair trails south of Charles River Street		❍	●			
3H-3 Repair trails north of Esker Trail				❍	●	
3I Repair/Improve Reservoir Trail	●					

Goal 4 – Build New Trails on Town Lands						
4A New loop trail at north end of Ridge Hill						
4A-1 Design new trail and obtain any needed permits					●	
4A-2 Construct and install signage						●
4B Extend Ridge Hill (south) trail to Charles River						
4B-1 Design new trail and obtain any needed permits		●				
4B-2 Construct and install signage			●			
4C New loop trail at Farley Pond						
4C-1 Design new trail and obtain any needed permits					●	
4C-2 Construct and install signage						●
4D New loop trail around Nike Site						
4D-1 Design new trail and obtain any needed permits		●				
4D-2 Construct and install signage			●			
4E New trail along sewer between Newman School and Carol Road						
4E-1 Design new trail and obtain any needed permits			●			
4E-2 Construct and install signage				●		
4F Construct All-Persons accessible trail at Reservoir						
4F-1 Design new trail and obtain any needed permits		●				
4F-2 Apply for funding for construction			●			
4F-2 Construct and install signage				●		
Goal 5 – Build New Trails Connecting Existing Systems						
5A Sign all designated sidewalk trails	❍	●				
5B Obtain MWRA approval and sign aqueduct	●					
5C New trail from Ridge Hill to Olin College (Trail 30A)			❍	❍	●	
5D New trail from Hillside School to Central Avenue through Sweet Preserve (Trail 18B)				❍	❍	●
5E New trail from Walker Pond to Town Forest						❍
5F New trail from Ridge Hill to Walker Pond						❍
5G Investigate Feasibility - New trail from Red Wing Bay to Farley Pond/Chestnut Street (Trail 11)						❍

Goal 6 – Implement and Carry Out Annual Inspections and Maintenance						
6A Perform annual inspections		●	●	●	●	●
6B Perform annual maintenance		●	●	●	●	●
6C Update Website with any trails changes		●	●	●	●	●
6D Update list of volunteer projects		●	●	●	●	●
6D Update Master Plan					❍	●

❍ = **Start,** ● = **Complete**

Section 8.0
References and Resources

8.0 REFERENCES AND ADDITIONAL RESOURCES

8.1 References

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www.egplanning.org/trails/

Friends of Hemlock Gorge. 2007.
www.hemlockgorge.org/

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Wellesley Trails Committee. 2007. www.wellesleyma.virtualtownhall.net/Pages/WellesleyMA_Trails/index

Weinstein, Jeff. 2007. "How Much Will That Trail Cost?" Trails and Greenways Conference. May 11, 2007 Presentation.

8.2 Additional Resources

The following additional resources are provided for further trail research, exploration, and potential answers to questions that may arise during implementation of the Master Plan.

8.2.1 Trail Construction and Maintenance Funding Sources

With general increases in population, infrastructure needs and costs, and increased competition for funding, Massachusetts' municipalities are under greater pressure to develop local financing mechanisms and programs in order to maintain and expand trail systems. Local governments need to become more innovative, act locally, develop new revenue streams, and increase their share of local revenue contributions to build and maintain public facilities. Additionally, some municipalities have developed other programs to provide dedicated and specific funds. Examples of these programs include those towns and cities that maintain trails with funds appropriated to a municipal department that oversees trail maintenance.

Potential funding sources will be challenging to develop into consistent revenue and should be considered part of pursuing a Town-wide trail system funding strategy.

As a town within the metropolitan Boston region, Needham has an opportunity to form partnerships with other regional entities such as The Trustees of Reservations, schools such as Olin College, as well as state agencies such as the Department of Conservation and Recreation (DCR). Partnerships and shared trail maintenance responsibilities could increase the likelihood of success by providing several funding sources that are administered by these partner groups.

The following is a list of potential funding sources for trail projects within Needham:

Department of Conservation and Recreation, Recreational Trails Program
The DCR Recreational Trails Program in partnership with the Massachusetts Recreational Trails Advisory Board and the Executive Office of Transportation (EOT) provides funding on a reimbursement basis for a variety of trail protection,

construction, and stewardship projects. Recreational Trails grants are 80-20 challenge grants where 80% of the project costs are reimbursed to grantees, but at least 20% of the total project value must come from other sources. Program legislation requires that portions of funds be reserved for different types of projects. The Recreational Trails program also requires that projects be primarily recreation, rather than transportation-oriented, and gives priority to projects creating or facilitating physical, on-the-ground trail improvements, which protect or enhance the site's natural and cultural resources, and link individuals and communities to these resources.

DCR Trails and Greenways Demonstration Grants Program
DCR provides grant awards to municipalities, non-profits and regional planning agencies to support innovative projects that advance the creation and promotion of greenway and trail networks throughout Massachusetts. Grants range from $5,000 to $10,000. (Source: MAPC Regional Bicycle Plan, March 2007)

Executive Office of Energy & Environmental Affairs
The EOEEA has just made $100,000 in grant funding available in fiscal year 2008 to the Commonwealth's municipalities and Regional Planning Agencies in support of their efforts to implement Massachusetts' Sustainable Development Principles. Specifically, this program is intended to fund projects tied to a capital construction project such as site specific planning, engineering, and related activities necessary to increase energy efficiency and provide parks, renewable energy facilities, trails and greenways, homes and businesses and other facilities that are consistent with the Principles. Eligible activities include site specific planning, engineering, and architectural and landscape design. (Source: EOEEA, January 2008)

Transit Oriented Development Infrastructure and Housing Support Program
This program is a joint effort of EOT and the Office for Commonwealth Development. It provides grants of up to $500,000 for bicycle and pedestrian improvements within ¼-mile of a transit station. (Source: MAPC Regional Bicycle Plan, March 2007)

Public Works for Economic Development (PWED)
Administered by EOT. This program funds infrastructure related to large-scale commercial development and can be a means of constructing bike and pedestrian facilities in conjunction with roadway work. Grants are normally limited to $1,000,000. (Source: MAPC Regional Bicycle Plan, March 2007)

NEMBA Trail Maintenance Grants
The New England Mountain Bike Association awards between $4,000 and $5,000 in grants for projects around New England every year. NEMBA grants provide

financial support to enable mountain bikers to perform trail projects on public land where mountain biking is allowed. Preference is given to projects that build or improve trails, but all projects will be considered.

Self Help and Urban Self Help Program
The Self Help Program is designed for the purchase of Conservation Land and is administered by the Division of Conservation Services. Needham is also eligible for Urban Self-Help funds as a small community for funding the acquisition, construction or renovation of parks.

Land and Water Conservation Fund
The Land and Water Conservation Fund has been a cornerstone of conservation and recreation for more than 30 years. State and local agencies may use the fund to buy land to preserve wilderness, create parks, and protect trails as long as outdoor recreation is the primary use. The Massachusetts Division of Conservation Services oversees this federal grant program in conjunction with the Self-Help programs.

Rivers, Trails and Conservation Assistance Program
The RTCA is a community assistance program sponsored by the National Park Service whose mission is to help citizens and community leaders plan and advance locally led conservation projects that range from protecting waterways from pollution and misuse to converting old railways into trails. Projects also involve maintaining greenways to connect neighborhoods and beautify towns, introducing greenery to urban areas, planning and constructing trails, and beautifying open spaces. RTCA does not direct or fund projects, but when citizens and community leaders have decided to conserve close-to-home landscapes, RTCA can help them get started. (Source: National Park Service Rivers, Trails and Conservation Assistance Program, January 2008 www.nps.gov/ncrc/programs/rtca/)

Transportation Enhancement Program
Ten percent of federal Surface Transportation Program funds are set aside for the Transportation Enhancement program, which may be used for provision of facilities for bicyclists and pedestrians and preservation of inactive railway corridors, including the conversion and use thereof for pedestrian or bicycle trails. A 10 percent local match is required. (Source: MAPC Regional Bicycle Plan, March 2007)

SAFETEA-LU
Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users is administered by the U.S. Department of Transportation's Federal Highway Administration and is the nation's largest single source of funding for multiple use trails and related projects. The new transportation law (SAFETEA-

LU) includes significant funding for trails through programs, including Transportation Enhancements and the Recreational Trails Program, that fund trails.

National Trails Fund (American Hiking Society)
Created in 1998, the National Trails Fund (NTF) is the only privately supported national grants program that provides funding to grassroots organizations working to establish, protect, and maintain foot trails in America. To 2007, American Hiking has granted more than $240,000 to 56 different organizations across the country for land acquisition, constituency building campaigns, and traditional trail work projects.

The Conservation Alliance
The Conservation Alliance was founded to fund grassroots conservation organizations and their efforts to protect rivers, trails, and wild lands for muscle-powered outdoor recreation. The Conservation Alliance has awarded almost $2 million in grants since its formation in 1989.

American Trails Organization
The American Trails Organization is a comprehensive resource for information on fundraising, grant acquisition, researching lending sources, establishing youth programs, federal assistance, and community involvement.

Environmental Support Center
The ESC works to strengthen the organizational effectiveness of local, state and regional non-profit organizations that work on environmental issues. Typical areas of capacity building include: board development, marketing, fundraising, leadership development, etc.

Congestion Mitigation and Air Quality (CMAQ) Program
This program is administered by the Federal Highway Administration and the Federal Transit Administration and may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as brochures, public service announcements and route maps) related to safe bicycle use. A 10 percent local match is required.

Regional Transportation Demand Management Program (TDM)
This program is funded under the Congestion Mitigation and Air Quality program, the TDM program provides funds for efforts to change the behavior of motorists, encouraging them to use alternatives to driving alone and supporting strategies that promote the use of these alternatives. (Source: MAPC Regional Bicycle Plan, March 2007)

Safe Routes to School (SR2S)
This program is a new federal program inaugurated under SAFETEA-LU in which States are required to hire an SR2S coordinator to fund projects to increase bicycling and walking to primary and middle schools. At least 70 percent of these funds must be used for infrastructure projects, while 10 to 30 percent may be used for educational and promotional activities. No local match is required. (Source: MAPC Regional Bicycle Plan, March 2007)

Community Preservation Fund
Needham is a community that has accepted the Community Preservation Act legislation. Some of the recommended projects related to maintenance would be eligible for funding.

Recreational Equipment Inc. (REI)
Annually, REI dedicates a portion of its operating profits to help protect and restore the environment, increase access to outdoor activities, and encourage involvement in responsible outdoor recreation. REI employees nominate organizations, projects, and programs in which they are personally involved to receive funding or gear donations. Each store also organizes local volunteer stewardship projects dedicated to restoring and improving areas in which outdoor recreation is enjoyed. (Source: REI.com)

8.2.2 Potential Trail Construction and Maintenance Resources

Other potential sources for future trail maintenance may include volunteer groups that can monitor and perform maintenance on a regular schedule and be coordinated to assist with larger maintenance needs on an as needed basis. These may include:

- Creation of a "Friends of the Needham Trails" group
- Forming an "Adopt-A-Trail Program" (similar to Broadmoor Sanctuary)
- Appointed trails committee
- School groups, including local colleges
- Friends of High Rock
- Corporate trail sponsorship
- Civic organizations, employees of local businesses
- Nonprofit organizations and land trusts
- Boy and Girl Scout groups and/or Individual Scout Projects
- Trail Ambassadors
- Annual Earth Day events

8.2.3 Potential Partner Organizations

Friends of Hemlock Gorge
1094 Chestnut Street
Newton Upper Falls, MA 02464
www.hemlockgorge.org/

The Trustees of Reservations
572 Essex Street
Beverly, MA 01915-1530
www.thetrustees.org/

Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114-2104
www.mass.gov/dcr/

Wellesley Trails Committee
525 Washington Street
Wellesley, MA 02482
www.wellesleyma.virtualtownhall.net/Pages/WellesleyMA_Trails/index

Charles River Watershed Association
190 Park Road
Weston, MA 02493
www.crwa.org

8.2.4 Some Towns & Cities in Massachusetts with Trails Committees

Acton	www.actontrails.org/
Amherst	www.amherstma.gov/departments/Conservation/trails.asp
Andover	www.andovertrails.org/trails.html
Ashland	www.ashlandopenspace.org/trails.html
Bolton	www.hikebolton.com/
Carlisle	www.carlisle.org/trails/
Haverhill	www.ci.haverhill.ma.us/departments/econ/conservation/trails/
Hollis	www.hollis.nh.us/trails/Index.html
Holliston	www.townofholliston.us/hollistontrails/
Hopkinton	www.hopkinton.org/gov/selectmen/pdf/trails_policy.pdf
Marblehead	
Natick	www.natickma.gov/Public_Documents/
Northborough	www.town.northborough.ma.us/ntrails/index.htm
Shirley	www.shirley-ma.gov/content/blogcategory/93/115/
Southbridge	www.ci.southbridge.ma.us/trails.html
Sturbridge	
Tyngsborough	
Walpole	
Wellesley	www.ci.wellesley.ma.us/Pages/WellesleyMA_Trails/index

APPENDICES

Appendix A

Public Trail Maps

Appendix B

Proposed Trail Connections Maps

Town of Needham
Massachusetts

PROPOSED TRAIL CONNECTIONS

- Proposed Town Land Trails
- Proposed Private Land Trails
- Proposed Sidewalk Trails
- Existing Private Land Trails
- Existing Town Land Trails
- Other Trails
- Driveways / Parking Area
- Railroad
- P Parking
- 26 Proposed Trail Connection

- Water
- Town Lands With Trails
- State Land
- Schools
- DPW Facilities
- Park
- Open Space
- Town Boundary

0 0.25 0.5 1 Miles

Disclaimer: This map is for display purposes only. It is neither legally recorded nor is it a survey and it is not intended to be used as such. Consult appropriate boards or town departments for specific questions and accuracy requirements. The Town of Needham expressly disclaims responsibility for damages or liability that may arise from the use of this map.

TO WELLESLEY TRAILS

N W E S

WELLESLEY
NEWTON
DOVER
DEDHAM
WESTWOOD
BOSTON

HEMLOCK GORGE
CENTRAL AVENUE
ELIOT SCHOOL
MILLS PARK
Wellesley Water Lands
BABSON COLLEGE
OLIN COLLEGE
SWEET PRESERVE
HILLSIDE SCHOOL
HUNNEWELL STREET
HILLSIDE AVENUE
WEST STREET
HURTING ROAD
KENDRICK STREET
Kendrick Pond
GUERNSEY SANCTUARY
BEARD WAY
GROVE STREET
RIDGE HILL
Fuller Brook
GREAT PLAIN AVENUE
ROSEMARY LAKE
ROSEMARY STREET
Rose-mary Lake
HIGHLAND AVENUE
MEMORIAL PARK
HIGH SCHOOL
MITCHELL WOODS
MITCHELL SCHOOL
BROOKLINE STREET
GREENDALE AVENUE
CHARLES RIVER STREET
Sabrina Lake
Ice Pond
NEWMAN SCHOOL
NIKE SITE
CLAXTON FIELD
MARKED TREE ROAD
HIGH ROCK SCHOOL
HIGH ROCK HOMES
CHESTNUT STREET
WEBSTER STREET
GREAT PLAIN AVENUE
HARRIS AVENUE
INTERSTATE ROUTE 95
Charles River
CUTLER PARK
TOWN FOREST
POLLARD SCHOOL
BROAD MEADOW SCHOOL
DeFAZIO PARK
NEEDHAM GOLF CLUB
DEDHAM AVENUE
SOUTH STREET
RESERVOIR
SAINT SEBASTIAN SCHOOL
GREENDALE AVENUE
Walker Pond
BOY SCOUT PROPERTY
RED WING BAY
MILL FALLS
FARLEY POND RESERVATION
Farley Pond
CHARLES RIVER PENINSULA
Charles River

BEALS AND THOMAS, INC.

Consultants Supporting the Development and Conservation of Land and Water Resources

Appendix C

Proposed Trail Connection Matrices and Cost Summaries
New Trails within Town Owned Properties Matrix

Trail #	Type of Connection	Location & Access	Benefits	Conditions	Length (ft. ±)	Strengths, Weaknesses, & Opportunities	Land Ownership	Recommendation	Permitting Requirements	Costs to Construct	Timeframe
5	Private Land	Between Charles River Road and Charles River, within a gas easement	Connect Ridge Hill to the Charles River connector path leading from DPW Land	Residential, large, single family homes, Within existing gas easement, mowed	2,500	gas easement within parcel: 305.0-0023-0000.0, Requires easements or purchasing property	Private	Preferred, requires approaching land owner		$ 60.00	Medium
6	Private Land	On Charles River, between DPW Land and Southernmost portion of Ridge Hill	Connect DPW Land with Ridge Hill along the Charles River	Residential, large, single family homes, May be within existing gas easement?, mowed	3,800	Existing private trails on one lot. Private Land Parcels include: 222.0-0007, 222.0-0008, 305.0-0023, 305.0-0011, 305.0-0010, 305.0-0027, 304.0-0002, 305.0-0026	Private	Preferred, Requires approaching land owners, trail clearing and construction		$ 80.00	Medium
8A	Private Land	Between Ridge Hill and Central Avenue (Where it crosses the Charles River)	Connect Ridge Hill to Central Avenue and to Fisher Street	Low density, single family, Residential neighborhood, Backyards, Lawn, wetlands?, portions mowed	1,200	Requires easements or purchasing property, within parcels: 214.0-0058, 214.0-0057, 214.0-0056, 214.0-0055, 214.0-0054	Private	Preferred, requires approaching land owner, trail clearing and construction	Notice of Intent	$ 38,290.00	Medium
10B	Private Land	Adjacent single family homes on Stratford Road	Connect Needham Peninsula, canoe launch, and Ridge Hill Charles River trail with the Town Forest	Medium density, single family, Residential neighborhood	140	Wetland crossing may require bridge and/or boardwalk, Easement or purchase of parcels: 211.0-0017-0000.0, 211.0-0018-0000.0, 211.0-0019-0001.0	Private	Preferred, requires approaching land owner, trail clearing and construction	Notice of Intent	$ 10.00	Medium
11A	Private Land	Between South Street and Chestnut Street, along the Charles River	Connect Chestnut Street with Needham	Low density, single family, Residential neighborhood, Within fields and potentially a gas and/or sewer easement	7,900	Requires constructing new trail, May be within existing easement, Parcels: 209.0-0001, 209.0-0002, 209.0-0003, 209.0-0010, 209.0-0011, 208.0-0001, 208.0-0002, 208.0-0004, 207.0-0012, 207.0-0015, 207.0-0009, 205.0-0010, 205.0-0009, 205.0-0007, 205.0-0012, 205.0-0013, 205.0-0005, 205.0-0016, 205.0-0001, 205.0-0006	Private	Alternative, Requires approaching land owners	Notice of Intent	$ 14,470.00	Long
11B	Private Land	Between Farley Pond and the Charles River	Connect Farley Pond with Charles River and Needham Peninsula	Low density, single family, Residential neighborhood, woods and wetlands	1,200	Requires constructing new trail, purchase and/or easement, may require boardwalk/bridge for any wetland crossing, Parcels: 205.0-0006, 205.0-0012, 205.0-0013	Private	Alternative, Requires approaching land owners	Notice of Intent	$ 39,065.00	Long
17B	Private Land	Between Tillotson Road Cul-de-sac, Pershing Road, and West Street	Connect Rosemary Lake with Hillside School and the Sweet Preserve	Medium density, single family, Residential neighborhood, May be cleared trail within woods/wetlands	1,200	Parcel: 123.0-0002-0000.0, may require wetland crossing, bridges and/or boardwalks	Private	Preferred, requires contacting land owners and trail improvement		$ 630.00	Long
18C	Private Land	On West Street, On Booth Street Connector	Connect Sweet Preserve to West Street, Connect Hillside School to Booth Street	Medium density, single family, Residential neighborhood, Existing connector trail to Booth Street	950	Existing Booth Street Connector Trail, Parcels for Sweet Preserve: 103.0-0025, Parcels for Booth Street: 098.0-0040, 098.0-0039, 098.0-0032, 098.0-0031, 098.0-0019	Private	Alternative Route if no public right of way route can be established - Sweet Preserve requires more study/evaluation		$ -	Long
21B	Private Land	On Rosemary Street	Create a loop trail around Rosemary Lake and connect Rosemary Street Parking to Campground area	backyard lawns, woods, wetlands	830	Close proximity to shoreline, require easements or purchase, located within backyard lawns, Parcels: 225.0-0003, 225.0-0004, 225.0-0004-0001.0, 225.0-0005, 225.0-0006, 225.0-0007, 225.0-0008, 225.0-0002	Private	Alternative, requires contacting land owners	Notice of Intent	$ 68,150.00	Long
23A	Private Land	Properties on Great Plain Avenue	Connect Rosemary Lake with the Sportsman's Club open space and Town Forest	Woods, stream, wetlands, lawn	630	Requires crossing streams and wetlands, may require bridges and/or boardwalks, requires purchase and/or easement, Parcel: 140.0-0062, 142.0-0073, 140.0-0053	Private	Alternative, requires wetland crossing and contacting land owners, other connection means may be explored	Notice of Intent	$ 16,745.00	Medium
23C	Private Land	Properties on Marked Tree Road	Connect Rosemary Lake with the Sportsman's Club open space and Town Forest	Woods, wetlands, lawn	650	Requires purchase and/or easement, Parcels: 141.0-0030, 141.0-0029, 141.0-0064, 141.0-0013, 141.0-0017, 141.0-0014	Private	Alternative, requires contacting land owners, other connection means may be explored		$ 12,920.00	Medium

Trail #	Type of Connection	Location & Access	Benefits	Conditions	Length (ft. ±)	Strengths, Weaknesses, & Opportunities	Land Ownership	Recommendation	Permitting Requirements	Costs to Construct	Timeframe
26C	Private Land	Off Brewster Drive, Standish Road, and Caravan Circle	Connect Newman School to Ridge Hill	wetlands, lawns, agricultural fields, streams, forests, perennial river	3,100	Wetland crossing may require bridge and/or boardwalk, clearing for new trail, purchase and/or easements, existing berm across perennial river may have had a bridge in the past, Parcels: 217.0-0004-0001.0, 117.0-0078, 217.0-0010, 115.0-0045, 115.0-0046, 145.0-0008	Private	Preferred, requires contacting land owners	Notice of Intent	$ 85,680.00	Long
28	Private Land	Olin College	Connect Wellesley trails with Olin open space and Great Plain Avenue	Existing trails, fields, sidewalks, and Sudbury Aqueduct, woods and cart paths	4,300	Minimal clearing due to existing cart paths and trails, Parcels: 114.0-0001-0000.1, 081.0-0033, 309.0-0019	Private	Alternative, requires contacting land owner		$ 410.00	Medium
30B	Private Land	Army Corps land off Great Plain Avenue near Wellesley Town Boundary	Connect Ridge Hill to Great Plain Avenue, Olin College and Wellesley trails	forests, wetlands, gas easement, perennial river	720	Crossing wetlands requires bridges/boardwalks, permission from gas company, creating new trail, permission from DCR to access the Sudbury Aqueduct Parcels: 218.0-0021-0041.0, 218.0-0012-0000.0, 081.0-0033-0000.0, 140.0-0026-0000.0	Private	Preferred, requires contacting land owners and utility company	Notice of Intent, USACE Approval, DCR Approval, gas company approval	$ 183,620.00	Long
30C	Private Land	Olin College	Connect Great Plain Avenue to Olin College and Wellesley trails	gas easement, forests, wetlands, parking area	1,200	Crossing wetlands requires bridges/boardwalks, permission from gas company, creating new trail, Parcels: 309.0-0011, 309.0-0017, 309.0-0016, 081.0-0033	Private	Preferred, requires contacting land owners and utility company	Notice of Intent	$ 38,430.00	Medium
32B	Private Land	Off Cartwright Road, adjacent to Ridge Hill	Connect Beard Trail (Wellesley) with upper loop trail of Ridge Hill	Low density, single family, Residential neighborhood, forested	700	requires purchase and/or easement, Parcels: 219.0-0007, 218.0-0001	Private	Preferred, requires contacting land owners		$ 170.00	Medium
1	Sidewalk / Public Right-Of-Way	Winding River Road, between Charles River Street and the Wellesley Town Boundary	Connect DPW Land with Guernsey Sanctuary Trail and Wellesley Trail	Low density, single family, Residential neighborhood, No existing sidewalks	2,200	Requires crosswalk on Charles River Street, Requires new sidewalk/path	Town of Needham	Alternative, Requires typical sidewalk improvement and construction	Approval by Selectmen	$ 58,900.00	Medium
2	Sidewalk / Public Right-Of-Way	Locust Lane	Connect DPW Land with Guernsey Sanctuary Trail and Wellesley Trail	Low density, single family, Residential neighborhood, Existing Sidewalk	1,700	Requires crosswalk on Charles River Street, Leads to parcel: 223.0-0010-0000.0	Town of Needham	Preferred, more direct route	Approval by Selectmen	$ 1,500.00	Short
3	Sidewalk / Public Right-Of-Way	Charles River Street, from Winding River Road to Ridge Hill entrance	Connect DPW Land with Ridge Hill north of Charles River Road	Low density, single family, Residential neighborhood, No existing sidewalk, mowed road shoulder	5,600	Requires crosswalk on Charles River Street, potential connection to Ridge Hill at gas easement	Town of Needham	Preferred, Requires off-road path design or typical sidewalk construction	Approval by Selectmen	$ 146,050.00	Long
8B	Sidewalk / Public Right-Of-Way	Central Avenue (Proximate to the canoe launch)	Connect Ridge Hill Charles River Trail to canoe launch	Low density, single family, Residential neighborhood, No sidewalk	580	Requires new sidewalk, proximate to a "complex" on opposite side of Central Avenue	Town of Needham	Preferred, Requires typical sidewalk improvement and construction	Approval by Selectmen	$ 14,500.00	Short
9	Sidewalk / Public Right-Of-Way	Fisher Street, between central avenue and South Street	Connect Ridge Hill and canoe launch with Needham Peninsula	Low density, single family, Residential neighborhood, No sidewalk, At grade RR crossing	2,400	Requires new sidewalk, Requires crosswalk on central Avenue, Requires Crosswalk on South Street	Town of Needham	Preferred, Requires typical sidewalk improvement and construction	Approval by Selectmen	$ 63,900.00	Short
10A	Sidewalk / Public Right-Of-Way	Russell Road, Walker Lane (Between Fisher Street and Charles River Street)	Connect Needham Peninsula, canoe launch, and Ridge Hill Charles River trail with the Town Forest	Medium density, single family, Residential neighborhood, Existing sidewalks	1,200	Requires crosswalk on Charles River Road	Town of Needham	Preferred, Requires typical sidewalk improvement and construction	Approval by Selectmen	$ 18,700.00	Short
10C	Sidewalk / Public Right-Of-Way	Stratford Road (Between open space lot and boy scout property	Connect Needham Peninsula, canoe launch, and Ridge Hill Charles River trail with the Town Forest	Medium density, single family, Residential neighborhood, Existing sidewalks	2,200	Requires crosswalk on Stratford Street	Town of Needham	Preferred, Requires typical sidewalk improvement and construction	Approval by Selectmen	$ 2,300.00	Short
14	Sidewalk / Public Right-Of-Way	Kendrick Street, between Cheney Street and the Cutler Park entrance	Connect the Greendale Avenue trail with Cutler Park	Busy road with adjacent commercial and industrial uses, No sidewalk, wooded along side of Route 128, overpass over the highway	2,400	Requires construction of a sidewalk/path, , adjacent to Route 128	Town of Needham, Commonwealth of Massachusetts	Preferred, requires typical sidewalk improvements, bridge crossing improvements, and construction, coordination with state	Approval by Selectmen, Mass Highway Direct Access Permit	$ 67,100.00	Long

Trail #	Type of Connection	Location & Access	Benefits	Conditions	Length (ft. ±)	Strengths, Weaknesses, & Opportunities	Land Ownership	Recommendation	Permitting Requirements	Costs to Construct	Timeframe
15A	Sidewalk / Public Right-Of-Way	Oak Hill Road, between Falcon Street and Greendale Avenue	Connect Greendale Avenue trail with Mitchell School	Medium density, single family, Residential neighborhood, Existing sidewalk,	1,500	requires crosswalk on greendale avenue	Town of Needham	Preferred	Approval by Selectmen	$ 5,050.00	Medium
16	Sidewalk / Public Right-Of-Way	James Avenue, Manning Street, Lindberg Avenue, Webster Street, Rosemary Street	Connect Mitchell Woods with Rosemary Lake	Medium density, single family, Residential neighborhood, Sidewalks on all streets except portions of Rosemary Street	4,900	Connect Library, High School, Memorial Park, Requires Crosswalk on Highland Avenue, Requires at grade railroad crossing	Town of Needham	Preferred, requires sidewalk improvements and crosswalks	Approval by Selectmen	$ 9,450.00	Medium
17A	Sidewalk / Public Right-Of-Way	Tillotson Road	Connect Rosemary Lake with Hillside School and the Sweet Preserve	Medium density, single family, Residential neighborhood, Existing sidewalk	1,000	Requires Crosswalk on Rosemary Street	Town of Needham	Preferred	Approval by Selectmen	$ 15,150.00	Medium
18A	Sidewalk / Public Right-Of-Way	West Street, Glen Gary Road	Connect Rosemary Lake with Hillside School and the Sweet Preserve	Medium density, single family, Residential neighborhood, Sidewalks on both sides of road, existing crosswalks	1,200	Existing sidewalks and crosswalks	Town of Needham	Preferred		$ 500.00	Short
19A	Sidewalk / Public Right-Of-Way	Booth Street, Taylor Street, and Ardmore Road	Connect Hillside School to Eliot School and Sudbury Aqueduct trail (Wellesley)	Medium density, single family, Residential neighborhood, Sidewalk on portions of Booth Street and portions of Taylor Street	3,700	Potential alternate route and crossing on Central Avenue and Hunnewell Street, Crossing needed on Central Avenue, Requires additional sidewalks	Town of Needham	Preferred, several road routes and crossings to choose	Approval by Selectmen	$ 19,600.00	Medium
20	Sidewalk / Public Right-Of-Way	DCR aqueduct, St. Mary Street, Central Avenue, Reservoir Street	Connect Eliot school with Wellesley trails and Hemlock Gorge	Medium density, single family, Residential neighborhood, Existing sidewalks on St. Mary Street and Reservoir Street, aqueduct is mowed and maintained	7,200	Requires a sidewalk on Central Avenue under Route 128, Requires permission from DCR to use Aqueduct, Requires crossing St. Mary Street and Reservoir Street	Commonwealth of Massachusetts	Preferred, requires permission from DCR	DCR Approval, Selectmen Approval, Mass Highway Direct Access Permit	$ 19,500.00	Long
22	Sidewalk / Public Right-Of-Way	Nehoiden Street, Newell Avenue, and Great Plain Avenue	Connect Rosemary Lake with the Sportsman's Club open space and Town Forest	Medium density, single family, Residential neighborhood, Existing sidewalk on Nehoiden Street, Newell Avenue, and Great plain Avenue	3,600	Requires crossing Nehoiden Street and Great Plain Avenue	Town of Needham, State Numbered Route	Preferred	Approval by Selectmen	$ 12,500.00	Short
24	Sidewalk / Public Right-Of-Way	Marked Tree Road, Central Avenue	Connect Sportsman's Club with the Town Forest	Medium density, single family, Residential neighborhood, Existing sidewalk on Marked Tree Road and Central Avenue	2,300	Existing sidewalks, requires a crosswalk on Marked Tree Road	Town of Needham	Preferred	Approval by Selectmen	$ 7,250.00	Short
26A	Sidewalk / Public Right-Of-Way	Brewster Drive cul-de-sac	Connect Newman School to Ridge Hill	Forested and partially paved	100	Forested right of way at the end of the cul-de-sac, requires sidewalk/path construction,	Town of Needham	Preferred	Approval by Selectmen	$ 250.00	Short
27	Sidewalk / Public Right-Of-Way	Wellesley - Forest Street	Connect Olin College with Wellesley trails (Sudbury Path)	Low density, single family, Residential neighborhood, Proximate to Babson College and Wellesley Country Club	1,600	Crossing Forest Street, Permission from Wellesley	Town of Wellesley	Alternative, requires contacting Town of Wellesley	Approval by Selectmen	$ 43,950.00	Medium
29	Sidewalk / Public Right-Of-Way	Great Plain Avenue	Connect and access Olin College open space with Wellesley trails and Ridge Hill	Low density, single family, Residential neighborhood, Existing Sidewalk	1,500	existing sidewalk, requires crossing Great Plain Avenue	Town of Needham, State Numbered Route	Alternative, requires crosswalk	Approval by Selectmen	$ 800.00	Short
32A	Sidewalk / Public Right-Of-Way	Cartwright Road	Connect Beard Trail (Wellesley) with upper loop trail of Ridge Hill	Low density, single family, Residential neighborhood, Narrow road with no sidewalks	1,600	narrow right-of-way with little extra room for a trail and/or sidewalk	Town of Needham	Preferred, may require street signage		$ 42,650.00	Short
4	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									
7	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									

Trail #	Type of Connection	Location & Access	Benefits	Conditions	Length (ft. ±)	Strengths, Weaknesses, & Opportunities	Land Ownership	Recommendation	Permitting Requirements	Costs to Construct	Timeframe
10D	Town Owned Land	Open space lot on Charles River Street	Connect Needham Peninsula, canoe launch, and Ridge Hill Charles River trail with the Town Forest	Woods, Wetlands	620	Requires crossing wetlands, Parcel: 211.0-0017	Town of Needham	Preferred,	Notice of Intent	$ 29,345.00	Short
12	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									
13	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									
15B	Town Owned Land	Mitchell School	Connect Mitchell School with Oak Hill Road and Greendale Avenue trails	Medium density, single family, Residential neighborhood, woods, potential existing foot path	650	Parcel: 056.0-0001-0000.0	Town of Needham	Preferred, requires trail improvement		$ 170.00	Long
18B	Town Owned Land	Hillside School and Sweet Preserve	Connecting Sweet Preserve to West Street (1,300 sf) and Connecting Glen Gary Road with Hillside School Fields (1,900 sf)	Medium density, single family, Residential neighborhood, Woods and Wetlands, mowed athletic fields	3,200	Removal of bittersweet, wetland crossing requires boardwalks and bridges, creation of trails on the athletic field edges, Parcels: 102.0-0001, 103.0-0027	Town of Needham	Preferred, Route within school property - Sweet Preserve Connection may be an alternative	Notice of Intent	$ 184,980.00	Long
19B	Town Owned Land	Eliot School	Connect Ardmore Road to Sudbury Aqueduct trail (Wellesley)	Existing trail and/or driveway within school land	250	Trail may exist, Adding signage, Parcel: 091.0-0019	Town of Needham	Preferred		$ -	Short
21A	Town Owned Land	Rosemary Lake	Create a loop trail around Rosemary Lake and connect Rosemary Street Parking to Campground area	The Town owns the shoreline of Rosemary Lake, woods, wetlands and stream crossing	460	potential to reuse an existing wooden bridge crossing the stream, defining and clearing for connecting trails to existing trails within Rosemary Lake, may require bridges and/or boardwalks, 225.0-0002, 225.0-0001	Town of Needham	Alternative	Notice of Intent	$ -	Medium
23B	Town Owned Land	Sportsman Club	Connect Rosemary Lake with the Sportsman's Club open space and Town Forest	Woods, stream, wetlands	750	Parcel: 140.0-0001	Town of Needham	Alternative, requires wetland crossing	Notice of Intent	$ 63,780.00	Medium
25	Town Owned Land	Town Forest, Recycling and Transfer Station, Newman School	Connect Town Forest to Newman School	Woods and wetlands	2,000	Potential to reuse an abandoned cart path, adjacent to landfill, requires crossing Central Avenue, potential connection to Gravel Drive cul-de-sac, requires Town Forest entrance drive improvements, Parcels: 308.0-0002, 308.0-0001, 216.0-0040, 216.0-0021	Town of Needham	Preferred, requires cutting and clearing trail		$ 4,185.00	Short
26B	Town Owned Land	Newman School	Connect Newman School to Ridge Hill	wetlands, forest	950	Wetland crossing may require bridge and/or boardwalk, significant wetland crossing, clearing for new trail, Parcels: 216.0-0021, 217.0-0008	Town of Needham	Preferred, requires wetland bridge/boardwalk	Notice of Intent, USACE Approval	$ 191,280.00	Long
30A	Town Owned Land	Off Great Plain Avenue near Wellesley Town Boundary	Connect Ridge Hill to Great Plain Avenue, Olin College and Wellesley trails	Forests, wetlands, gas easement	700	Appears to be a facility within the gas easement, requires cutting new trail,, Parcel: 144.0-0004	Town of Needham	Preferred, requires trail clearing and construction	DCR Approval, Gas company approval	$ 7,170.00	Short
31	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									
33A	Town Owned Land	Ridge Hill	Connect Ridge Hill to the landfill	wetlands, woods	2,600	requires extensive wetlands crossing (95%), boardwalks and/or bridges, trail construction, Parcels: 306.0-0014, 306.0-0015, 217.0-0009, 308.0-0012	Town of Needham	Alternative	Notice of Intent, USACE Approval	$ 637,850.00	Long
33B	Town Owned Land	Ridge Hill	Create loop trail off the Esker Trail	woods	1,200	Clearing and trail construction, may be a redundant trail, parcels: 306.0-0014, 218.0-0004	Town of Needham	Preferred		$ 330.00	Short
34	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									
35	Town Owned Land	**See New Trails Within Town Owned Properties Matrix**									

Needham Trail Master Plan

BEALS AND THOMAS, INC. **Order of Magnitude Estimated Costs Summary**

Trail	Esimated Cost	
Trail 1	$	58,900.00
Trail 2	$	1,500.00
Trail 3	$	146,050.00
Trail 4	$	90,200.00
Trail 5	$	60.00
Trail 6	$	80.00
Trail 7	$	15,480.00
Trail 8A	$	38,290.00
Trail 8B	$	14,500.00
Trail 9	$	63,900.00
Trail 10A	$	18,700.00
Trail 10C	$	2,300.00
Trail 10B	$	10.00
Trail 10D	$	29,345.00
Trail 11A	$	14,470.00
Trail 11B	$	39,065.00
Trail 12	$	28,750.00
Trail 13	$	-
Trail 14	$	67,100.00
Trail 15	$	5,050.00
Trail 15B	$	170.00
Trail 16	$	9,450.00
Trail 17A	$	15,150.00
Trail 17B	$	630.00
Trail 18A	$	500.00
Trail 18B	$	184,980.00
Trail 18C	$	-
Trail 19A	$	19,600.00
Trail 19B	$	-
Trail 20	$	19,500.00
Trail 21A	$	-
Trail 21B	$	68,150.00
Trail 22	$	12,500.00
Trail 23A	$	16,745.00
Trail 23B	$	63,780.00
Trail 23C	$	12,920.00
Trail 24	$	7,250.00
Trail 25	$	4,185.00
Trail 26A	$	250.00
Trail 26B	$	191,280.00
Trail 26C	$	85,680.00
Trail 27	$	43,950.00
Trail 28	$	410.00
Trail 29	$	800.00
Trail 30A	$	7,170.00
Trail 30B	$	183,620.00
Trail 30C	$	38,430.00
Trail 31	$	210.00
Trail 32A	$	42,650.00
Trail 32B	$	170.00
Trail 33A	$	637,850.00
Trail 33B	$	330.00
Trail 34	$	360.00
Trail 35	$	-
Total	$	2,302,420.00

BEALS AND THOMAS, INC. **Professional Materials and Labor Estimated Cost Summary**

Painted Crosswalks	**$500.00**	ea	Professional Judgment (BTI-REW, 2007)
Curb Cuts with ADA ramp	**$1,000.00**	each	Professional Judgment (BTI- REW, 2007)
Sidewalk Repairs			
Sealing random cracks, min 1/2" wide to 1 1/2", 1,000 lf	$1.52	lf	R.S. Means 2007 Site Work and Landscape Cost Data
	$0.18		City Cost Index
	$0.30		Contingency (20%)
	$2.00	lf	Total
Sidewalk Replacement	$25.00	sy	Town of Holliston Highway Superintendent (2007)
	$2.78	sf	
	$15.00	lf	5' width
Sidewalk Installation (with curbing)			
Bituminous Sidewalk, 2" thick paving, 8" gravel base, 5' width	$14.00	lf	R.S. Means 2007 p 531 Professional Judgment (JEB)
Bituminous Concrete Curbs, 8" wide, 8" high	$5.00	lf	R.S. Means 2007 p 321 Professional Judgment (JEB)
subtotal	$19.00	lf	
	$2.19		City Cost Index
	$3.81		Contingency (20%)
	$25.00	lf	Total
Trail Signs			
	$150.00	ea	Professional Judgment (BTI-REW, 2007)
Trail Markers			
	$5.00	ea	Ben Meadows Forestry Supplies 2007 and Professional Judgment
New Trail Kiosks			
	$7,000.00	ea	RS Means Adjusted Values- Kiosk with walls
Boardwalk/ Bog Bridges	**$255.00**	lf	Boardwalk with Helical Pier, BTI (2005)
Bridges/ Stream Crossing	**$255.00**	lf	Boardwalk with Helical Pier, BTI (2005)
Class 5 Trail (8' wide bituminous concrete sidewalk)	**$25.00**	lf	RS Means Adjusted Values 2007- Modified Sidewalk Pricing

Trail Connection: 1

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	2	$ 1,000.00	$ 2,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	2200	$ 25.00	$ 55,000.00
New Intersection Signage	Quantity	6	$ 150.00	$ 900.00
Total				**$ 58,900.00**

Trail Connection: 2

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	0	$ 1,000.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet	200	$ 2.00	$ 400.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	4	$ 150.00	$ 600.00
Total				**$ 1,500.00**

Trail Connection: 3

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	4	$ 1,000.00	$ 4,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	5600	$ 25.00	$ 140,000.00
New Intersection Signage	Quantity	7	$ 150.00	$ 1,050.00
Total				**$ 146,050.00**

Trail Connection: 4

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	8	$ 5.00	$ 40.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	1500	$ 4.00	$ 6,000.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 6,040.00**

Trail Connection: 5

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	12	$ 5.00	$ 60.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	2500	$ 4.00	$ 10,000.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 10,060.00**

Trail Connection: 6

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	16	$ 5.00	$ 80.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	3800	$ 4.00	$ 15,200.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 15,280.00**

Trail Connection: 7

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	50	$ 255.00	$ 12,750.00
Bridges / Stream Crossing	Linear Feet	10	$ 255.00	$ 2,550.00
Class 2 Trail	Linear Feet	900	$ 3.00	$ 2,700.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 18,180.00**

Trail Connection: 8 A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	8	$ 5.00	$ 40.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	150	$ 255.00	$ 38,250.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	1050	$ 4.00	$ 4,200.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 42,490.00**

Trail Connection: 8 B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet	580	$ 25.00	#########
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		########	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				#########

Trail Connection: 9

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	2	$ 1,000.00	$ 2,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	2400	$ 25.00	$ 60,000.00
New Intersection Signage	Quantity	6	$ 150.00	$ 900.00
Total				**$ 63,900.00**

Trail Connection: 10A1

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	2	$ 1,000.00	$ 2,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	50	$ 2.00	$ 100.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	600	$ 25.00	$ 15,000.00
New Intersection Signage	Quantity	4	$ 150.00	$ 600.00
Total				**$ 18,700.00**

Trail Connection: 10B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	2	$ 5.00	$ 10.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	140	$ 3.00	$ 420.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 430.00**

Trail Connection: 10A2

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	1	$ 1,000.00	$ 1,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	100	$ 2.00	$ 200.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	4	$ 150.00	$ 600.00
Total				**$ 2,300.00**

Trail Connection: 10B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	100	$ 255.00	$ 25,500.00
Bridges / Stream Crossing	Linear Feet	15	$ 255.00	$ 3,825.00
Class 2 Trail	Linear Feet	505	$ 3.00	$ 1,515.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 30,860.00**

Trail Connection: 11A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Road Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	34	$ 5.00	$ 170.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity	2	$ 7,000.00	$ 14,000.00
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	7900	$ 4.00	$ 31,600.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 46,070.00**

Trail Connection: 11B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	-
Repave Existing Sidewalk	Linear Feet		$ 15.00	-
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	-
New Painted Sidewalk	Quantity		$ -	-
New Intersection Signage	Quantity			-
New Trail Markers	Quantity	8	$ 5.00	40.00
New Trail Signs	Quantity	1	$ 150.00	150.00
New Trail Kiosks	Quantity	1	$ 7,000.00	7,000.00
Boardwalk / Bog Bridges	Linear Feet	125	$ 255.00	31,875.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	-
Class 2 Trail	Linear Feet		$ 3.00	-
Class 3 Trail	Linear Feet	1075	$ 4.00	4,300.00
Class 4 Trail	Linear Feet		$ 5.00	-
Class 5 Trail	Linear Feet		$ 25.00	-
Total				**$ 43,365.00**

Trail Connection: 12

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	8	$ 5.00	$ 40.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	300	$ 255.00	$ 76,500.00
Bridges / Stream Crossing	Linear Feet	12	$ 255.00	$ 3,060.00
Class 2 Trail	Linear Feet	1300	$ 3.00	$ 3,900.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 83,650.00**

Trail Connection: 13

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity	1	$ 7,000.00	$ 7,000.00
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet	3500	$ 25.00	$ 87,500.00
Total				**$ 94,650.00**

Trail Connection: 15

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	2	$ 1,000.00	$ 2,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	400	$ 15.00	$ 6,000.00
New Bituminous Concrete Sidewalk	Linear Feet	2300	$ 25.00	$ 57,500.00
New Intersection Signage	Quantity	4	$ 150.00	$ 600.00
Total				**$ 67,100.00**

Trail Connection: 15

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	4	$ 1,000.00	$ 4,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	50	$ 2.00	$ 100.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	3	$ 150.00	$ 450.00
Total				**$ 5,050.00**

Trail Connection: 15B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	650	$ 3.00	$ 1,950.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 2,120.00**

Trail Connection: 16

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	3	$ 500.00	$ 1,500.00
Curb Cuts and Ramps Required	Quantity	4	$ 1,000.00	$ 4,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	100	$ 2.00	$ 200.00
Replace Existing Sidewalk	Linear Feet	200	$ 15.00	$ 3,000.00
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	5	$ 150.00	$ 750.00
Total				**$ 9,450.00**

Trail Connection: 17

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	5	$ 500.00	$ 2,500.00
Curb Cuts and Ramps Required	Quantity	7	$ 1,000.00	$ 7,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	200	$ 2.00	$ 400.00
Replace Existing Sidewalk	Linear Feet	300	$ 15.00	$ 4,500.00
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	5	$ 150.00	$ 750.00
Total				**$ 15,150.00**

Trail Connection: 17B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity	4	$ 150.00	$ 600.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	1200	$ 3.00	$ 3,600.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 4,230.00**

Trail Connection: 18

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	0	$ 500.00	$ -
Curb Cuts and Ramps Required	Quantity	0	$ 1,000.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet	100	$ 2.00	$ 200.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	2	$ 150.00	$ 300.00
Total				**$ 500.00**

Trail Connection: 18B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	12	$ 5.00	$ 60.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	700	$ 255.00	$ 178,500.00
Bridges / Stream Crossing	Linear Feet	24	$ 255.00	$ 6,120.00
Class 2 Trail	Linear Feet	2450	$ 3.00	$ 7,350.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 192,330.00**

Trail Connection: 18C

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	950	$ 3.00	$ 2,850.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 2,850.00**

Trail Connection: 19

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	2	$ 500.00	$ 1,000.00
Curb Cuts and Ramps Required	Quantity	5	$ 1,000.00	$ 5,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	100	$ 2.00	$ 200.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	500	$ 25.00	$ 12,500.00
New Intersection Signage	Quantity	6	$ 150.00	$ 900.00
Total				**$ 19,600.00**

Trail Connection: 19B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	250	$ 3.00	$ 750.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 750.00**

Trail Connection: 20

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	3	$ 500.00	$ 1,500.00
Curb Cuts and Ramps Required	Quantity	3	$ 1,000.00	$ 3,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	600	$ 25.00	$ 15,000.00
New Intersection Signage	Quantity	0	$ 150.00	$ -
Total				**$ 19,500.00**

Trail Connection: 21A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	460	$ 4.00	$ 1,840.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 1,840.00**

Trail Connection: 21B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	250	$ 255.00	$ 63,750.00
Bridges / Stream Crossing	Linear Feet	16	$ 255.00	$ 4,080.00
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	550	$ 4.00	$ 2,200.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 70,350.00**

Trail Connection: 22

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	3	$ 500.00	$ 1,500.00
Curb Cuts and Ramps Required	Quantity	3	$ 1,000.00	$ 3,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	100	$ 2.00	$ 200.00
Replace Existing Sidewalk	Linear Feet	450	$ 15.00	$ 6,750.00
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	7	$ 150.00	$ 1,050.00
Total				**$ 12,500.00**

Trail Connection: 23A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	50	$ 255.00	$ 12,750.00
Bridges / Stream Crossing	Linear Feet	15	$ 255.00	$ 3,825.00
Class 2 Trail	Linear Feet	565	$ 3.00	$ 1,695.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 18,440.00**

Trail Connection: 23B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	250	$ 255.00	$ 63,750.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	500	$ 3.00	$ 1,500.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 65,280.00**

Trail Connection: 23C

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	50	$ 255.00	$ 12,750.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	600	$ 3.00	$ 1,800.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 14,720.00**

Trail Connection: 24

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	4	$ 500.00	$ 2,000.00
Curb Cuts and Ramps Required	Quantity	4	$ 1,000.00	$ 4,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	250	$ 2.00	$ 500.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	5	$ 150.00	$ 750.00
Total				**$ 7,250.00**

Trail Connection: 25

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	12	$ 5.00	$ 60.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet	15	$ 255.00	$ 3,825.00
Class 2 Trail	Linear Feet	2000	$ 3.00	$ 6,000.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 10,185.00**

Trail Connection: 26

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	0	$ 500.00	$ -
Curb Cuts and Ramps Required	Quantity	0	$ 1,000.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet	50	$ 2.00	$ 100.00
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	1	$ 150.00	$ 150.00
Total				**$ 250.00**

Trail Connection: 26B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	750	$ 255.00	$ 191,250.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	200	$ 3.00	$ 600.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 191,880.00**

Trail Connection: 26C

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity		$ 5.00	$ -
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	300	$ 255.00	$ 76,500.00
Bridges / Stream Crossing	Linear Feet	36	$ 255.00	$ 9,180.00
Class 2 Trail	Linear Feet	2800	$ 3.00	$ 8,400.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 94,080.00**

Trail Connection: 27

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	3	$ 1,000.00	$ 3,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	1600	$ 25.00	$ 40,000.00
New Intersection Signage	Quantity	3	$ 150.00	$ 450.00
Total				**$ 43,950.00**

Trail Connection: 28

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	22	$ 5.00	$ 110.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet	4300	$ 4.00	$ 17,200.00
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 17,610.00**

Trail Connection: 29

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	0	$ 1,000.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	0	$ 25.00	$ -
New Intersection Signage	Quantity	2	$ 150.00	$ 300.00
Total				**$ 800.00**

Trail Connection: 30A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity	1	$ 7,000.00	$ 7,000.00
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	700	$ 3.00	$ 2,100.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 9,270.00**

Trail Connection: 30B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity		$ 150.00	$ -
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	720	$ 255.00	$ 183,600.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet		$ 3.00	$ -
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 183,620.00**

Trail Connection: 30C

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	150	$ 255.00	$ 38,250.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	1050	$ 3.00	$ 3,150.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 41,580.00**

Trail Connection: 31

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$25.00	$ -
Repave Existing Sidewalk	Linear Feet		$15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$2.00	$ -
New Painted Sidewalk	Quantity		$0.00	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	12	$5.00	$ 60.00
New Trail Signs	Quantity	1	$150.00	$ 150.00
New Trail Kiosks	Quantity		$7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$255.00	$ -
Bridges / Stream Crossing	Linear Feet		$255.00	$ -
Class 2 Trail	Linear Feet	2400	$3.00	$ 7,200.00
Class 3 Trail	Linear Feet		$4.00	$ -
Class 4 Trail	Linear Feet		$5.00	$ -
Class 5 Trail	Linear Feet		$25.00	$ -
Total				**$ 7,410.00**

Trail Connection: 32

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
Painted Crosswalks Required	Quantity	1	$ 500.00	$ 500.00
Curb Cuts and Ramps Required	Quantity	2	$ 1,000.00	$ 2,000.00
Crack/Seam Repair Existing Sidewalk	Linear Feet	0	$ 2.00	$ -
Replace Existing Sidewalk	Linear Feet	0	$ 15.00	$ -
New Bituminous Concrete Sidewalk	Linear Feet	1600	$ 25.00	$ 40,000.00
New Intersection Signage	Quantity	1	$ 150.00	$ 150.00
Total				**$ 42,650.00**

Trail Connection: 32B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	4	$ 5.00	$ 20.00
New Trail Signs	Quantity	1	$ 150.00	$ 150.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	700	$ 3.00	$ 2,100.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 2,270.00**

Trail Connection: 33A

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	10	$ 5.00	$ 50.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet	2500	$ 255.00	$ 637,500.00
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	100	$ 3.00	$ 300.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 638,150.00**

Trail Connection: 33B

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	6	$ 5.00	$ 30.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	1200	$ 3.00	$ 3,600.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 3,930.00**

Trail Connection: 34

Approximate Cost Estimate using order of magnitude costs and professional judgement.

Item	Unit	Total Units	Cost / Unit	Subtotal
New Bituminous Concrete Sidewalk	Linear Feet		$ 25.00	$ -
Repave Existing Sidewalk	Linear Feet		$ 15.00	$ -
Crack/Seam Repair Existing Sidewalk	Linear Feet		$ 2.00	$ -
New Painted Sidewalk	Quantity		$ -	$ -
New Intersection Signage	Quantity			$ -
New Trail Markers	Quantity	12	$ 5.00	$ 60.00
New Trail Signs	Quantity	2	$ 150.00	$ 300.00
New Trail Kiosks	Quantity		$ 7,000.00	$ -
Boardwalk / Bog Bridges	Linear Feet		$ 255.00	$ -
Bridges / Stream Crossing	Linear Feet		$ 255.00	$ -
Class 2 Trail	Linear Feet	2500	$ 3.00	$ 7,500.00
Class 3 Trail	Linear Feet		$ 4.00	$ -
Class 4 Trail	Linear Feet		$ 5.00	$ -
Class 5 Trail	Linear Feet		$ 25.00	$ -
Total				**$ 7,860.00**

Trail No.	Painted xwalks req'd	HC Ramp/ Curb Cuts req'd	sidewalk to be repaired (lf)	sidewalk to be replaced (lf)	sidewalk to be installed (lf)	Approx. Signs req'd	Approx. Guard rail req'd (lf)	Notes
1	2	2	0	0	2200	6		
2	1	0	200	0	0	4		
3	2	4	0	0	5600	7		
9	2	2	0	0	2400	6		
10A1	2	2	50	0	600	4		
10A2	1	1	100	0	0	4		
14	2	2	0	400	2300	4		
15	1	4	50	0	0	3		Presently a cart path at one end (approx 650' Class 4+)
16	3	4	100	200	0	5		
17	5	7	200	300	0	5	-	
18	0	0	100	0	0	2	-	
19	2	5	100	0	500	6		May not be sufficient space to install sidewalk along one way portion of Taylor Street
20	3	3	0	0	600	0		Aquaduct: Sidewalk planned?
22	3	3	100	450	0	7	-	Portion along Nehoiden Street moved to Southern side of street
24	4	4	250	0	0	5		
26	0	0	50	0	0	1		Repair number for potential cracking, no damage noted.
27	1	3	0	0	1600	3		In Wellesley
29	1	0	0	0	0	2		Excellent condition. Likely maintained by the school.
32	1	2	0	0	1600	1		
								Note: Ramps have been included for new construction
Unit Cost	$500.00	$1,000.00	$2.00	$15.00	$25.00	$150.00		

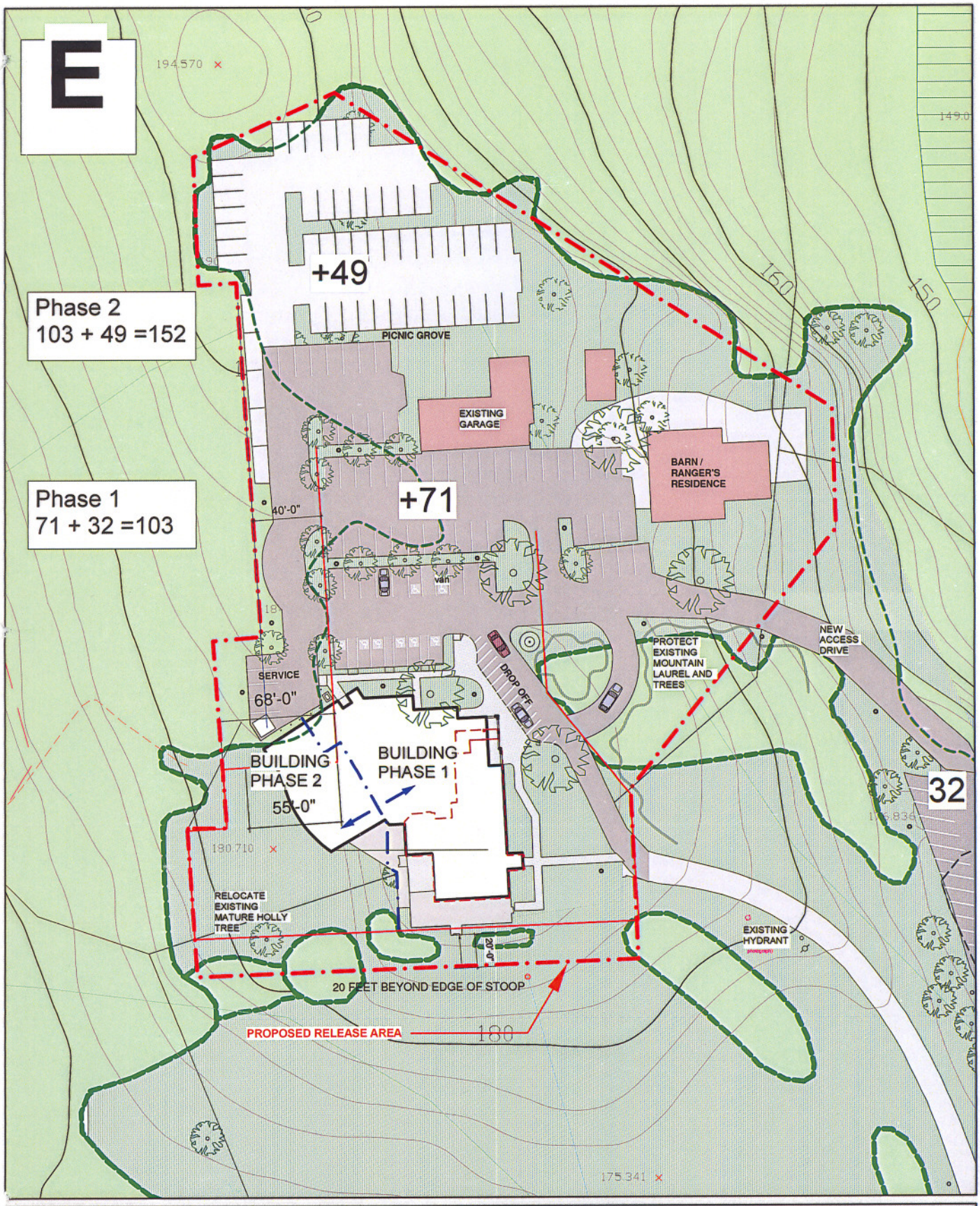
Trail #	Type of Connection	Location & Access	Benefits	Conditions	Length (ft. ±)	Strengths, Weaknesses, & Opportunities	Land Ownership	Recommendation	Permitting Requirements	Costs to Construct	Timeframe
4	Town Owned Land	Needham Reservoir	Create accessible loop trail around the perimeter of the reservoir	Generally flat, portions include an old access road and the berm adjacent to the DPW facility	2,500	Requires widening portions of the trail, creating solid base for 5 to 6-foot wide paved trail, installation of boardwalks and bridges with ramps Opportunity for accessible fishing area, parcel: 302.0-0010	Town of Needham	Preferred trail upgrade, clearing, and structure installation		$ 90,200.00	Medium
7	Town Owned Land	Ridge Hill, South of Charles River Road	Connect Ridge Hill Trails with Charles River Trail between DPW and Needham Peninsula	Wooded, stream, wetlands	930	Requires clearing new trail, may require bridge/stream crossing, May require a boardwalk, Opportunity for a viewing area of the river, Parcel: 304.0-0006	Town of Needham	Preferred, trail clearing and construction	Notice of Intent	$ 15,480.00	Short
12	Town Owned Land	Farley Pond	Create internal loop trail south of the railroad	Forested, wetlands	1,600	Requires clearing and constructing new trail, requires boardwalks and/or bridges, May require surveying to determine PL, Parcels: 206.0-0067, 206.0-0026	Town of Needham	Preferred, trail clearing and construction, boardwalks and bridges	Notice of Intent	$ 28,750.00	Medium
13	Town Owned Land	Memorial Park	Create accessible loop trail around the perimeter of the athletic fields	Mowed and maintained playing fields	2,300	Proximate to parking, playing fields, and school, Requires construction of the new trail treadway, Parcels: 226.0-0030	Town of Needham	Preferred, Trail path construction		Budgeted	Medium
31	Town Owned Land	Ridge Hill	Loop trail near Wellesley town boundary	Forested uplands, Abandoned cart path, gas easement	2,400	Requires cutting new trail, parcels: 218.0-0009, 218.0-0004	Town of Needham	Preferred		$ 210.00	Short
34	Town Owned Land	Ridge Hill	Create a loop trail around the former NIKE site	Woods	2,500	Clearing and trail construction, may require permission from school (owner of the parcel), parcels: 306.0-0011, 306.0-0001	Town of Needham	Preferred		$ 360.00	Short
35	Town Owned Land	High Rock Neighborhood	Link High Rock Neighborhood to the Town Forest	Informal trail, unimproved	1,800	Two trail segments within the woods behind residential houses, potential to link to Town Forest via sidewalks on Murphy Road and High Rock Street	Town of Needham	Preferred, CPA project	Notice of Intent	CPA Funding	Short

Appendix D

Trail Maintenance Maps

Appendix E

Proposed Needham Senior Center Plan
Proposed High Rock Neighborhood Trail Plan
Proposed Memorial Park Plan
Cutler Park Trail Map
Needham Plowed Sidewalks Map



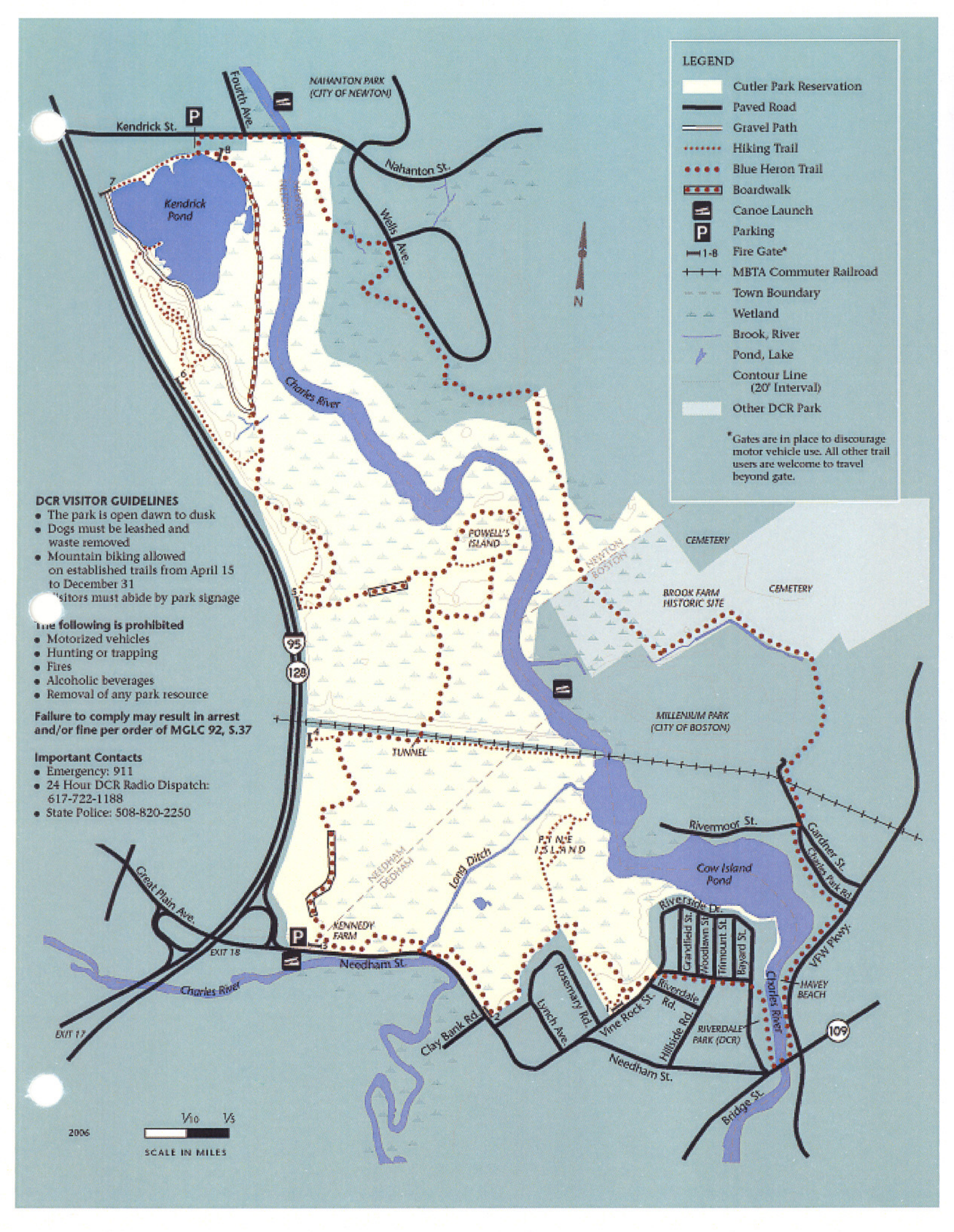
NEEDHAM SENIOR CENTER
PROPOSED SITE LAYOUT - 3/22/07

CatlinArchitecture
www.catlinarchitecture.com 617-770-2440

From High Rock Homes Master Plan
July 5, 2007

#10 Trail

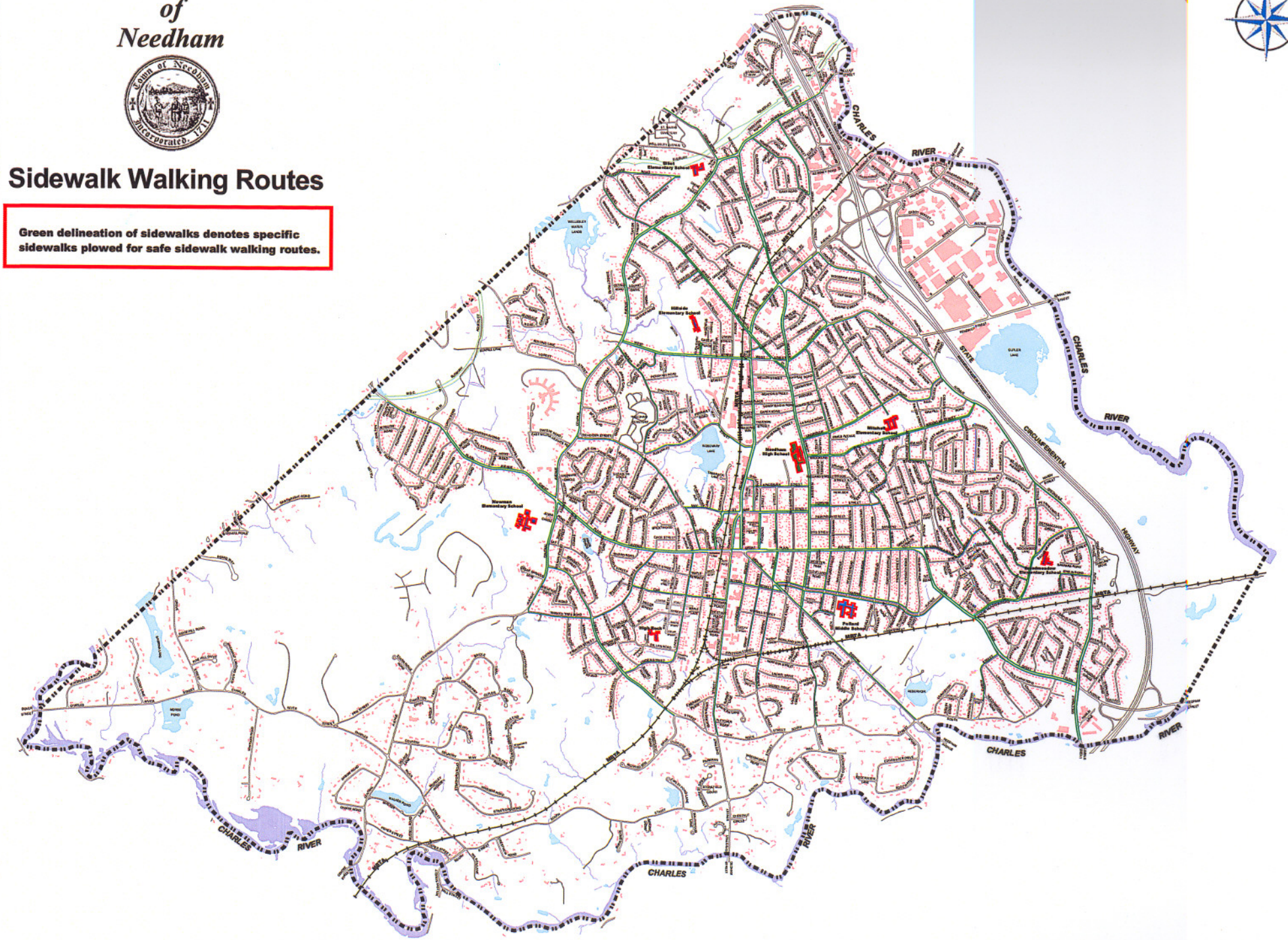
MEMORIAL PARK
Proposed Configuration


LEGEND
Cutler Park Reservation
Paved Road
Gravel Path
Hiking Trail
Blue Heron Trail
Boardwalk
Canoe Launch
Parking
1-8 Fire Gate*
MBTA Commuter Railroad
Town Boundary
Wetland
Brook, River
Pond, Lake
Contour Line (20' Interval)
Other DCR Park
*Gates are in place to discourage motor vehicle use. All other trail users are welcome to travel beyond gate.
DCR VISITOR GUIDELINES
• The park is open dawn to dusk
• Dogs must be leashed and waste removed
• Mountain biking allowed on established trails from April 15 to December 31
• Visitors must abide by park signage
The following is prohibited
• Motorized vehicles
• Hunting or trapping
• Fires
• Alcoholic beverages
• Removal of any park resource
Failure to comply may result in arrest and/or fine per order of MGLC 92, S.37
Important Contacts
• Emergency: 911
• 24 Hour DCR Radio Dispatch: 617-722-1188
• State Police: 508-820-2250
Kendrick St.
Fourth Ave.
NAHANTON PARK (CITY OF NEWTON)
Nahanton St.
Wells Ave.
Kendrick Pond
Charles River
N
POWELL'S ISLAND
CEMETERY
NEWTON
BOSTON
BROOK FARM HISTORIC SITE
CEMETERY
MILLENIUM PARK (CITY OF BOSTON)
TUNNEL
95
128
Rivermoor St.
Gardner St.
Charles Park Rd.
Cow Island Pond
PETTY ISLAND
Long Ditch
NEEDHAM
DEDHAM
Great Plain Ave.
KENNEDY FARM
EXIT 18
Needham St.
Charles River
EXIT 17
Riverside Dr.
Crandfield St.
Woodlawn St.
Trimount St.
Bayard St.
VFW Pkwy.
Riverdale Rd.
Vine Rock St.
Rosemary Rd.
Lynch Ave.
Clay Bank Rd.
Hillside Rd.
RIVERDALE PARK (DCR)
Charles River
HAVEY BEACH
109
Needham St.
Bridge St.
2006
1/10 1/5
SCALE IN MILES

Town of Needham

Sidewalk Walking Routes

Green delineation of sidewalks denotes specific sidewalks plowed for safe sidewalk walking routes.



Appendix F

Trail Steward Guidelines

NEEDHAM STEWARDSHIP MANUAL

INTRODUCTION

Needham has approximately 25 miles of existing trails across several different parcels of Town-owned open space. Trails, especially those in Town Forest and at Ridge Hill are used year-round for passive recreation purposes such as walking, running, dog walking, cross-country skiing, and birding. In 2007, with a grant provided through the Community Preservation Fund, the Town initiated a Comprehensive Master Trails Plan which inventoried trails on Town-owned property and highlighted the need for a systematic method of monitoring and maintaining the trail networks throughout Needham. The Needham Trail Steward Program was established to address this need.

NEEDHAM TRAILS

The following list outlines the Town-owned parcels with existing trail systems and the Town Board (or other government entity) with jurisdiction over the property.

Ridge Hill	Conservation Commission
Town Forest	Park and Recreation Commission
Rosemary Lake	Park and Recreation Commission
Greendale Avenue	Park and Recreation Commission
Needham Reservoir	Board of Selectmen
Newman School	School Committee
Mitchell Woods	Conservation Commission
Farley Pond	Conservation Commission
High Rock Homes	Needham Housing Authority
Memorial Park Path	Memorial Park Trustees
Nike Site Perimeter Trail	School Committee

REGULATIONS

Several of the larger open space parcels have rules and regulations that have been adopted by the controlling Board or Committee. See the attached rules and regulations for Town Forest and Ridge Hill (exhibit A).

AUTHORITY

No Steward can assume implied permission to do work at any site. All work must be approved by the Commission or Board as noted above before it is started. Additionally, all Stewards and trail volunteers must sign the attached volunteer form (exhibit B).

TRAIL STEWARD RESPONSIBILITIES

Trail stewards monitor and report observations related to trail conditions (i.e. trail obstructions, areas of erosion, missing and/or vandalized signs or markers) Stewards may also perform minor trail maintenance such as picking up trash, removing minor trail impediments (such as fallen branches) and trimming back small vegetation. Larger trail projects will also involve Trail Stewards but will be organized by with the input of the Boards with controlling authority over the parcel on which work is proposed and with the oversight of the Trails Advisory Group.

Monitoring:

Citizens that join the Stewards are often regular visitors at one or several of the open space parcels throughout Town, and monitoring requires little more than continuing to walk your favorite trails while

observing and noting their condition. Steward groups monitor each of the properties listed above. At the two largest parcels, Town Forest and Ridge Hill, stewards may choose different trail systems to regularly inspect.
The following is a partial list of monitoring requirements:

1. Walk chosen site or trail on a regular basis (at least once per month).
2. Pick up trash and litter – no permission is needed.
3. Submit trail steward form (see attached) on a monthly basis to designated Trails Coordinator.
4. Report problems/issues needing immediate attention to the appropriate board/department.
5. Update kiosks/fill map holders.
6. Suggest ideas for trail improvements and maintenance.

What to look for while walking trails:

- ❒ Any unusual changes in natural or manmade features.
- ❒ People committing illegal activities, or evidence of such, particularly underage drinking, fires, operation of motor vehicles, hunting or trapping, shooting, and disposal of hazardous materials or pollutants.
- ❒ Large deposits of trash or junk.
- ❒ Vandalism of natural or manmade objects.
- ❒ Digging of holes.
- ❒ Any type of construction.
- ❒ Overgrown trails.
- ❒ Trails that are becoming progressively eroded.
- ❒ Trails that are wet or muddy outside of the spring wet season (roughly March through April).

Maintenance:

1. Don't start any work without getting the proper permission from the Board or Commission with controlling authority (see above list).
2. Don't rake trails. Leaves, pine needles, and other organic matter build forest soil, absorb water, and prevent erosion.
3. Don't trim or open up an overgrown or blocked trail until you have confirmed with the designated Trails Coordinator that the trail is not closed or slated for closure.
4. Don't build new trails, however "small". If you have a new trail idea, contact the Trails Coordinator. The creation cycle of a new trail is typically about one year.
5. Don't mark or blaze trails. There are standards for doing this, and all trail marking must be approved by the controlling Board or Committee before any work is started.
6. Don't dump fill, wood chips, stone dust, etc. on trails without the permission of the controlling Board or Committee.
7. Don't apply herbicides or pesticides anywhere on Town property.

Visitor Outreach

Trail Stewards are on the front lines of public outreach. They are potentially the most visible "land managers" and are often known to other users of and/or abutters to open space parcels. This presence and accessibility is one of the best ways to encourage responsible visitor behavior and reinforce public support of natural open space preservation. The following are suggestions to advance the goal of positive public outreach:

1. Wear your trail steward T-shirt.
2. Carry a site map and extras to hand out if practical.
3. Carry contact information to share with walkers, including the website address.
4. Don't guess or assume when answering questions or providing information. Do your homework and follow up with a quality answer.
5. Don't argue with anyone. Refer them to the appropriate Board/Department
6. Carry a notebook to take the contact information of people you talk to and try to always follow up with them and ask if they are interested in joining the Stewards or coming to a meeting.

HOW TO JOIN

Fill out a Trail Steward application form available at the Park & Recreation office, the Conservation office, and on the Town of Needham website and return to either office at the addresses listed below:

Town of Needham
Park & Recreation Department
Attn: Trail Stewards
1141 Highland Avenue
Needham, MA 02492

Town of Needham
Conservation Department
Attn: Trail Stewards
470 Dedham Avenue
Needham, MA 02492

STEWARD MANUAL APPROVAL & REVISION PROCESS

1. This manual was approved by the Board of Selectmen, The Park & Recreation Commission, the School Committee and the Conservation Commission. Changes to the manual must be submitted for review and approval prior to inclusion in this document.
2. This manual should be reviewed annually and revised (if necessary) by the Stewards as near to its publishing anniversary as practical, with final drafts approved by the Boards listed above.