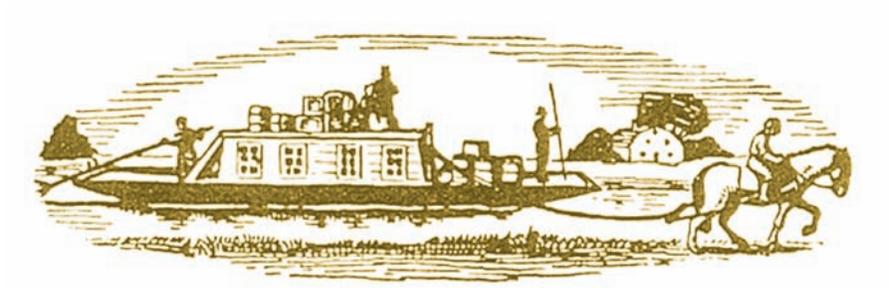


**THE MIDDLESEX CANAL RESTORATION
Bicycle & Walking Paths Concept Study**



Segment Six:

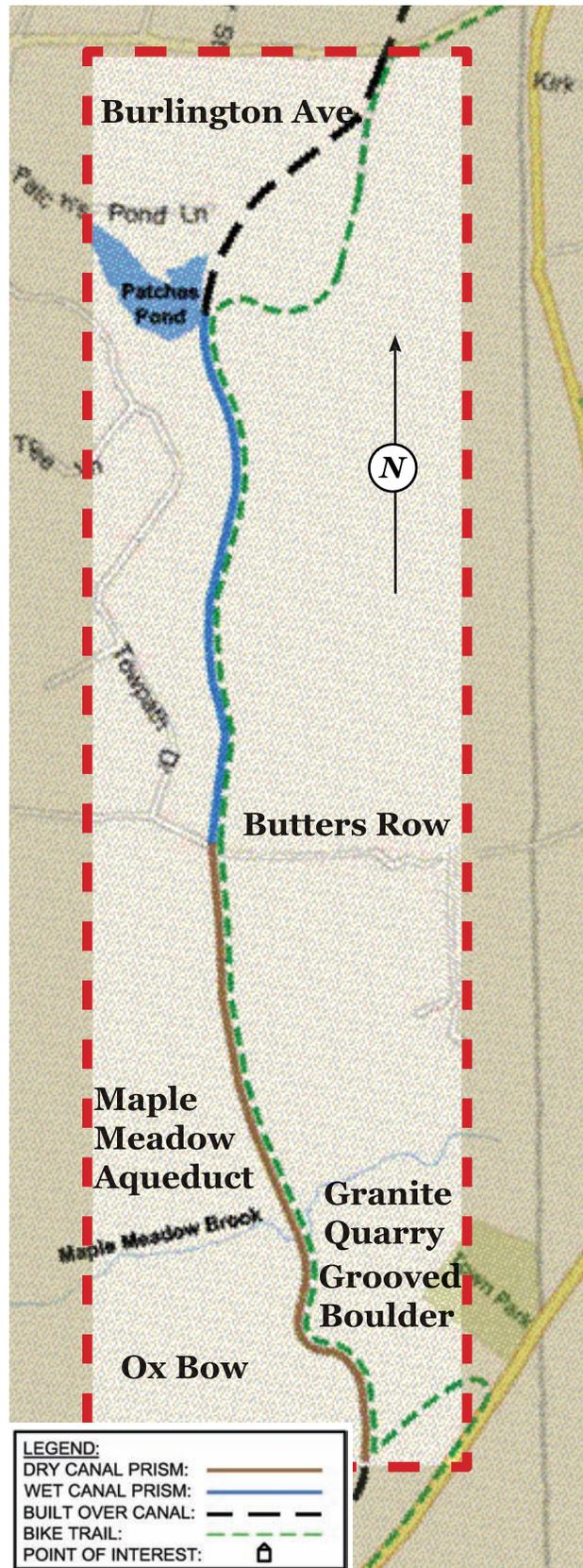
Main Street to Burlington Avenue
Wilmington, Massachusetts
of
The Middlesex Canal Restoration Program Study

prepared for
The Middlesex Canal Commission

May 2008

prepared by
The Waterfield Design Group, Inc.
50 Cross Street Winchester Massachusetts 01890 USA

Segment Six: Main Street to Burlington Avenue



The Middlesex Canal Restoration

Bicycle & Walking Paths Concept Study

Segment Six: Main Street to Burlington Avenue

Project Goals

The Program Study conducted by the Waterfield Design Group, March 2008, for the Middlesex Canal Commission, identified Segment #6 as one of the highest priorities for restoration. The primary reason was that the Middlesex Canal Association owns the approximate one mile of extant canal and has voted authority to the Commission to design and construct the restoration and open it to the public.

In addition, the Town of Wilmington owns the Town Park which abuts the southern end of the Association property and the continuation of the canal through it. The parking lot off Main Street provides access to the canal.

This Segment includes four historic canal structures or sites which are listed in the National Register, the Ox Bow, the Grooved Boulder and the Maple Meadow Aqueduct with the nearby Granite Quarry from which the stones were cut.

At the northern end of the Association property, the canal ends at Patches Pond, which was used as a basin for passing boats and for storage in the winter. It will be necessary to construct a boardwalk for access from Patches Pond, across Town preservation wetlands, to Floradale Avenue and thence to Burlington Avenue. Around the corner on Main Street there is the Commuter Rail Station.

There is the opportunity to present the complete history and significance of the Middlesex Canal by interpretive signs along the reconstructed canal and the Maple Meadow Aqueduct while providing access to over a mile of outdoor pathway. This would also become part of the Middlesex Canal Historic Corridor walking biking path.



Grooved Boulder from the towropes



Remains of the Maple Meadow Aqueduct

Segment Six: Main Street to Burlington Avenue

Existing Conditions Summary

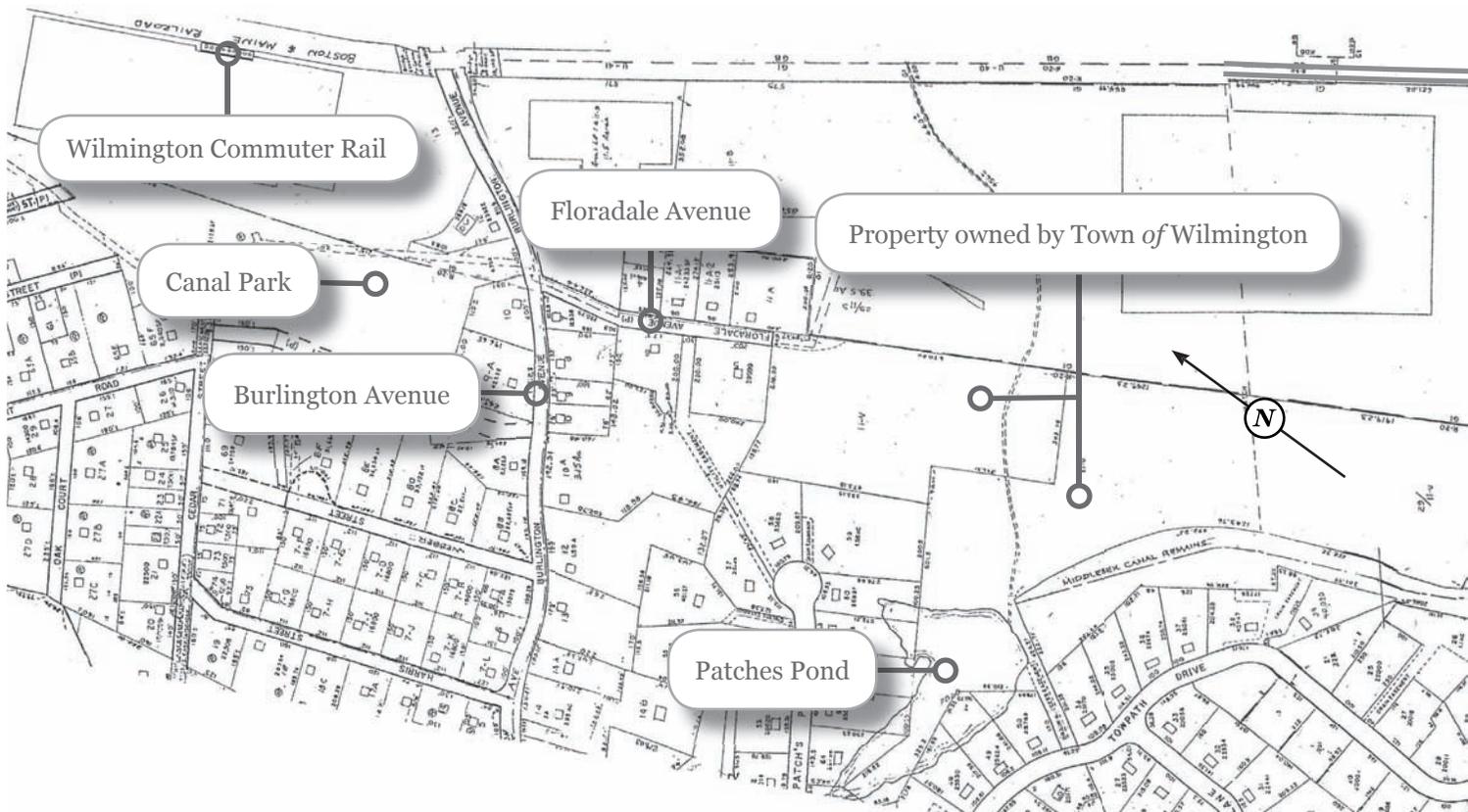
The Main Street to Burlington Avenue segment consists of approximately 6000 linear feet of both wet and dry canal. The integrity of what remains of the canal varies throughout the length of this section.

The southern terminus of the canal segment begins at the Town Park parking lot where two alternative pathways exist. The pathways loop in opposite directions around a small mound meeting at the Maple Meadow Aqueduct. The longer of the two pathways follows the old canal route along the Ox Bow where an “s” curve in the canal was built around the mound to the east of the canal. Along the Ox Bow are the Grooved Boulder and the Granite Quarry. The grooves were cut into the stone outcroppings by the ropes towing the boats around the bend. Beyond is the Maple Meadow Aqueduct abutments and center support pier. The Ox Bow, Granite Quarry, Grooved Boulder, and Maple Meadow Aqueduct are all registered with the National Register of Historical Sites. The remains of the aqueduct consist of well preserved fieldstone abutments and a center pier which allows the brook to run through.

The dry canal bed and towpath from Maple Meadow Brook to Butters Row can be easily seen. The towpath, berm and dry canal have numerous trees which have grown since the canal was abandoned. Foot traffic has kept a well worn path on the towpath side which sometimes crosses over to the berm side.

North of Butters Row, the canal way is still heavily wooded and standing water can be found in limited areas with no apparent hydraulic feeder connection. The cross section of the canal along this stretch has been eroded or filled to be less discernable. At Patches Pond, the canal bed and towpath discontinue because of residential properties built over the canal way.

From Patches Pond to Floradale Avenue and Burlington Avenue, access will require a boardwalk passage over wetlands belonging to the Town.





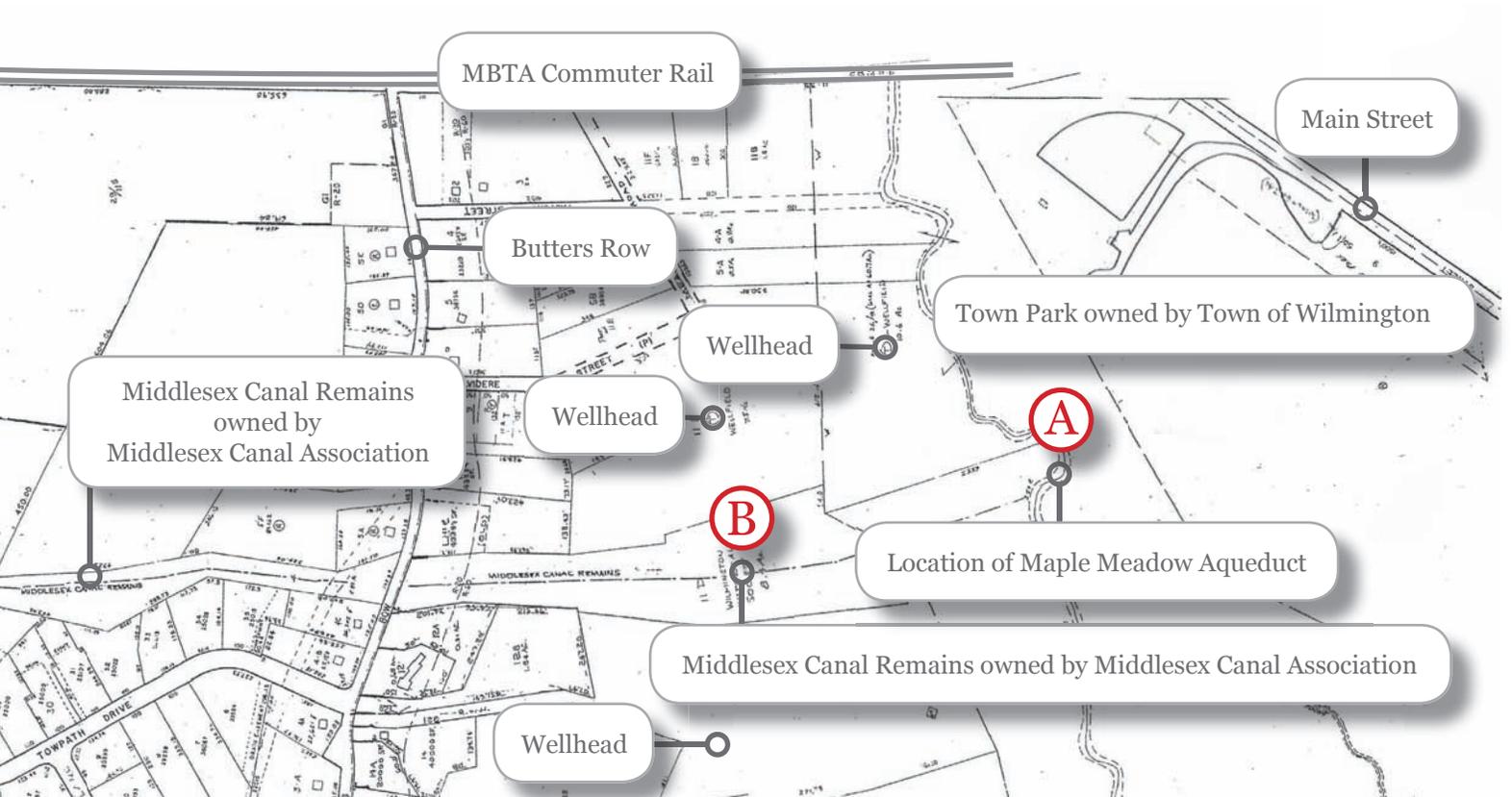
A

Remains of Maple Meadow Aqueduct



B

Towpath looking north from the Maple Meadow Aqueduct



Segment Six: Main Street to Burlington Avenue

Concept Summary

This long segment of the old Middlesex canal, with its four National Register features and the Town Park and boardwalk, will create a large outdoor recreation space adjacent to a densely populated area. The historical recreation of the canal and its features will be the basis for the education of the public about the important role the canal played. The segment will be divided into four sections based on the natural features and conditions of each.

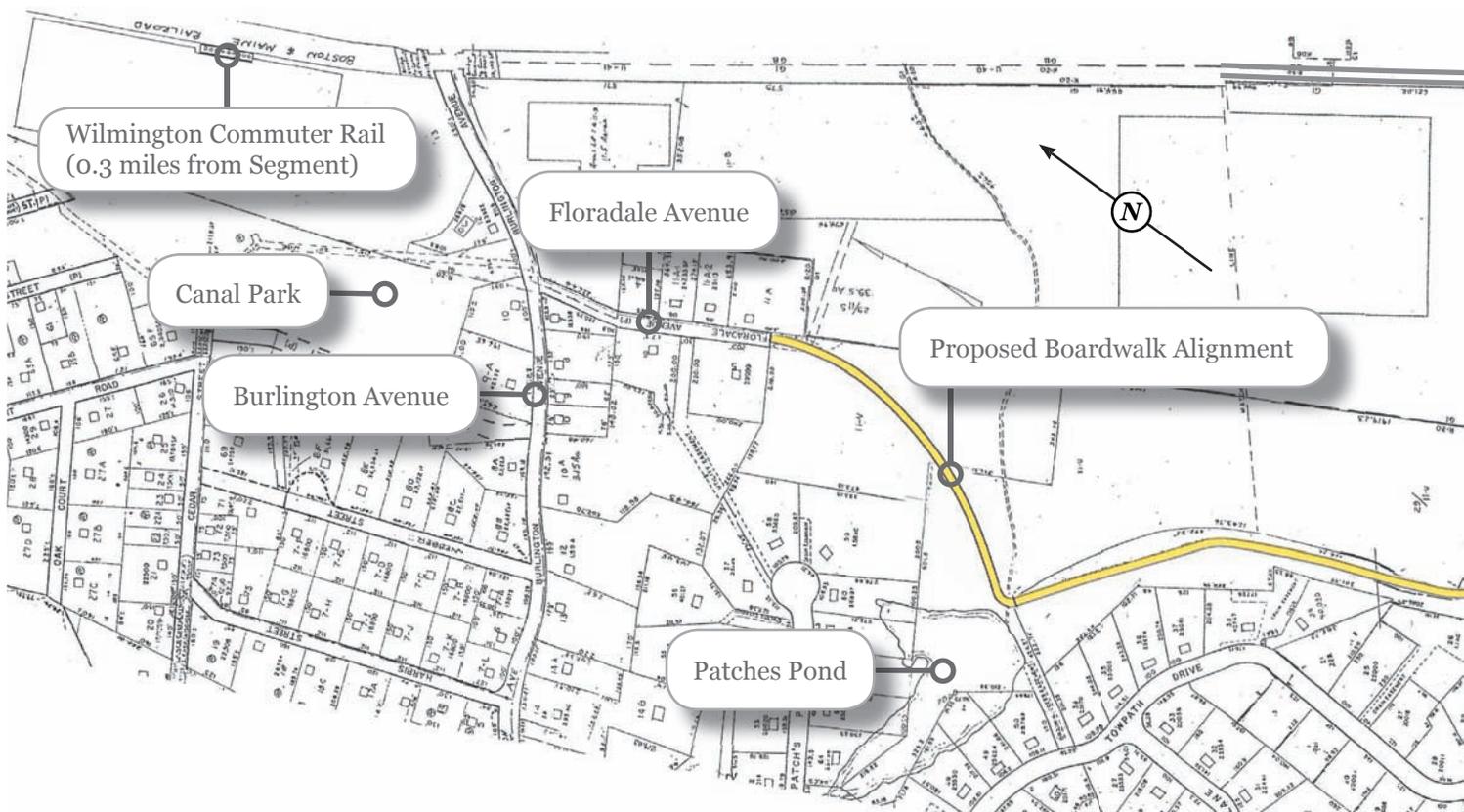
Town Park to Maple Meadow Aqueduct

Entering from either end of the Town Park parking lot, there would be signage identifying that the area is a wellhead protection area requesting that pedestrians keep to the path and pick up after any pets. Paths from both entrances have been well maintained and would need minimum improvement to provide access to the canal. Illustrative signage would be installed along the entrance that follows the canal to identify the Granite Quarry, Ox Bow and Grooved Boulder, highlight the significance of each in the creation and use of the canal, and identify them as National Register Historic Sites.

It is recommended that the bridge be constructed across Maple Meadow Brook to replicate an aqueduct that is depicted on historic renderings of the area. According to Mary Stetson Clarke, author of *The Old Middlesex Canal*, “the Middlesex Canal’s aqueducts were of wooden construction supported by stone piers and abutments.” The restored aqueduct, which is on the National Register, will be a bridge across the Maple Meadow Brook as well as an educational tool about the historical function and method of construction of the other seven aqueducts along the canal.

Maple Meadow Aqueduct to Butters Row

The existing towpath from the Maple Meadow Aqueduct to Butters Row, owned by the Middlesex Canal Association, is in relatively good condition due to foot traffic that has kept a well worn path in place. The entire surface of the towpath from the aqueduct to Patches Pond would be replaced with a dense graded crushed stone or pea stone material. This path would be used for walking and biking, no roller blades or motorized vehicles. In addition, at either end of this section, within 100 feet of the Aqueduct and Butter’s



Row the majority of the vegetation between the towpath and the canal would be cleared to recreate the original look of the canal, as best as possible. The rest of the canal length some of the under growth between the towpath and the canal would be cleared. Some of the larger more robust trees would remain to ensure the continued wooded atmosphere of the area.

Butters Row to Patches Pond

The majority of the canal form in this location, from Butters Row to Patches Pond owned by the Middlesex Canal Association, is in good condition compared to many other segments.

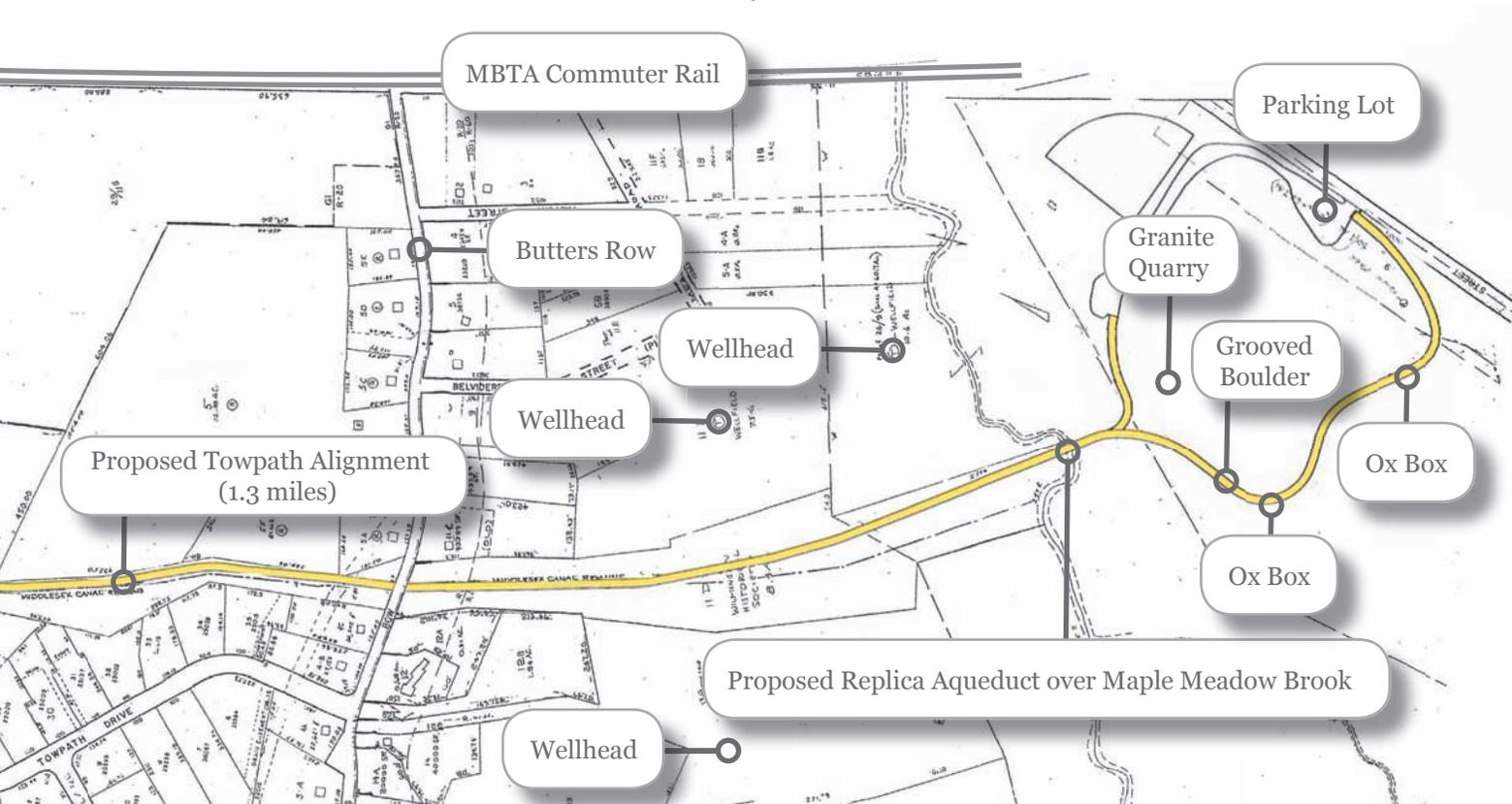
The wetlands regulations may limit the degree of restoration of the canal in this section. For this reason, it may not be practical to restore the entire length of the canal to its original cross-section. Rather, it is proposed that the segments of the canal be fully restored at points of access (Butters Row) as it is restored at areas of public interest (Maple Meadow Aqueduct).

Restoration at these locations would involve accurately

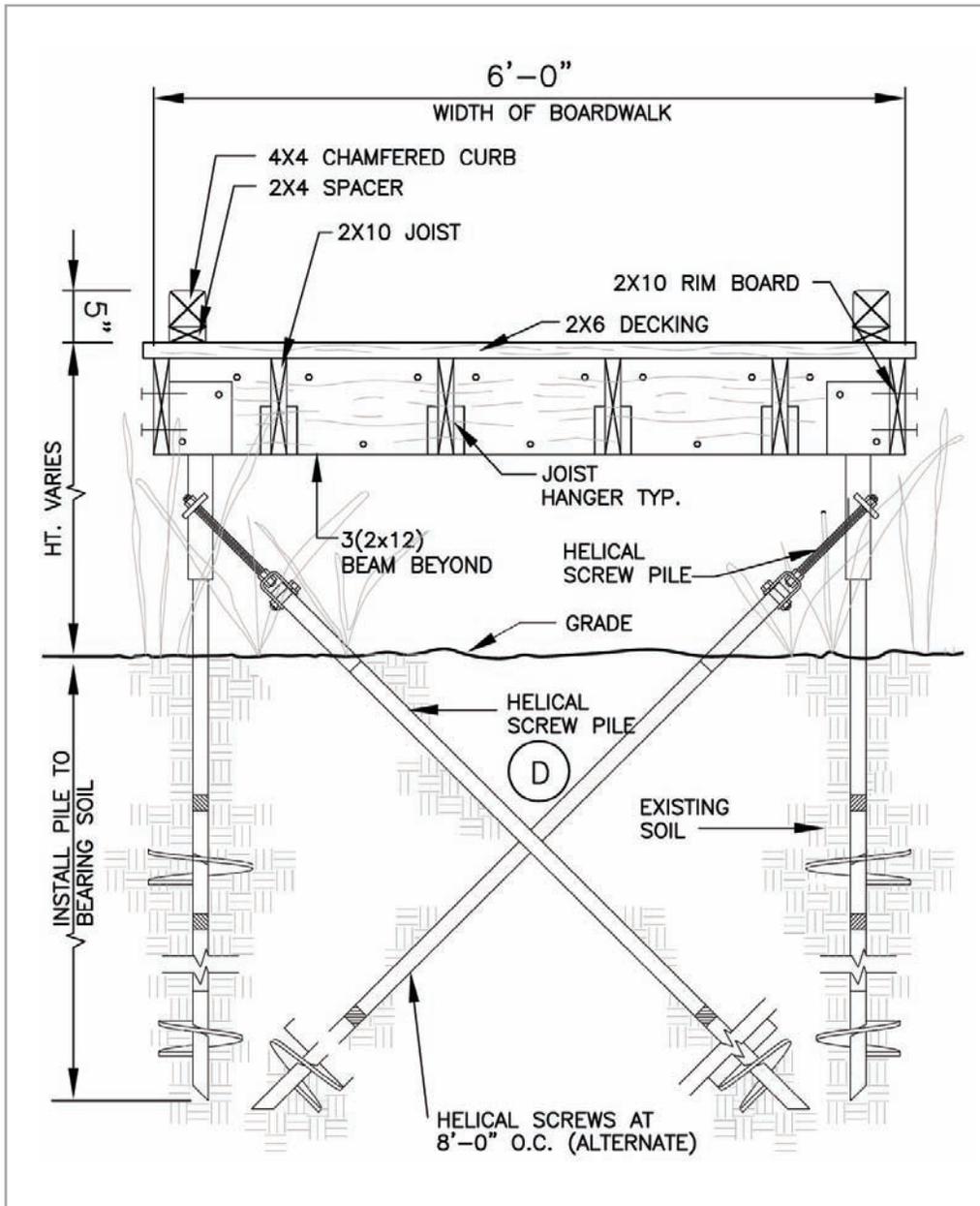
recreating the canal cross section removing all trees and vegetation. One-hundred foot long restoration sections are recommended to represent the historical reproduction to the passerby.

Patches Pond to Floradale Avenue Connection

The area of the proposed alignment between Patches Pond to Floradale Avenue is located on wetlands. At this location it is proposed that path construction consist of an elevated boardwalk. Designed correctly, the boardwalk will allow for the continuation of the path over sensitive environmental areas without compromising the benefit wetlands provide to the surroundings.

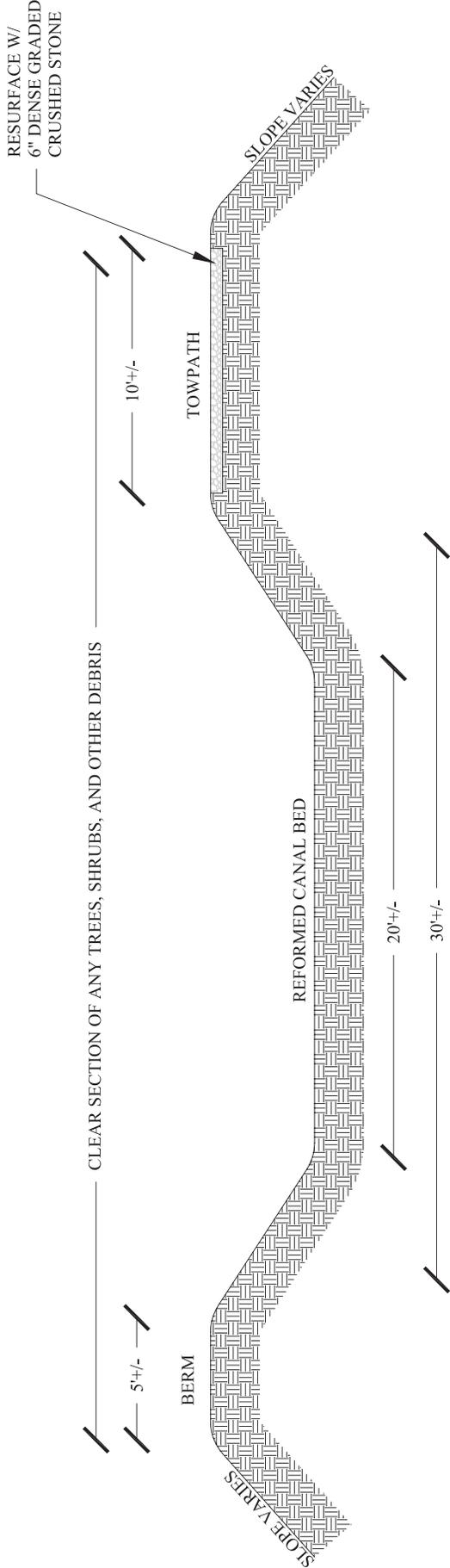


Segment Six: Main Street to Burlington Avenue



Boardwalk Detail for wetland areas

Segment Six: Main Street to Burlington Avenue



**CANAL RESTORATION
TYPICAL WILMINGTON SECTION**

Segment Six: Main Street to Burlington Avenue

Summary of Restoration Items

ITEMS #1: Historical Interpretation

The purpose of the project is to restore the Middlesex Canal, provide a pathway which would become part of the overall Heritage Park corridor of the canal and to educate the public about the historical significance of the canal. Therefore specific areas of the canal will be restored as exact replicas of the original and interpretive signage will explain its construction and use.

ITEMS #2: Path Construction (towpath)

Due to the growth of large trees since the abandonment of the canal, the removal of trees will be the main object and problem throughout the length of the Segment. In order to provide a full width all trees must be removed from the towpath. In all other areas such as the canal bed and the berm, trees will be removed on the basis of need for the reasonable reconstruction and replication of the canal. At a minimum, the entire canal whether dry or wet should be cleared of all fallen trees, saplings, scrub and overgrown vegetation.

ITEMS #3: Maple Meadow Brook Crossing

An exact wooden replica of an aqueduct will be constructed using modern materials to provide a public crossing on the towpath portion. The aqueduct would be dry since there is no water in the canal on either side of the aqueduct, but it would serve to showcase an aqueduct's construction. The canal abutments and the center pier would be historically repaired with local stones. The brook passage will be cleared of debris to provide free flow.

ITEMS #4: Butters Row Crossing

Butters Row has vehicles traveling at speeds around 35-40 MPH. With the curvature of the road, visibility to pedestrians and drivers becomes limited. Therefore, lighting and signage shall be considered for pedestrian crossings.

ITEMS #5: Wetland Boardwalk and Access

In order to provide a continuous passage from the Town Park, an exit would be required at Burlington Avenue. The nearest to the original route would be over the Town wetlands between Patches Pond and Floradale Avenue with a properly constructed boardwalk. The plans and agreement on the permission to construct this passage must be arranged before any design is done as it impacts the whole project objective for a continuous path.

Segment Six: Main Street to Burlington Avenue

Conceptual Cost Estimate*

Item	Unit	Quantity	Unit price	Total
Site Preparation				
Clearing and Grubbing	A	7.20	\$5,000.00	\$36,000.00
Removal of Canal Debris (Wet Segment)	LF	739	\$50.00	\$36,950.00
Tree Removed - Dia. Under 24 Inches	EA	37	\$750.00	\$27,750.00
Tree Removed - Dia. 24 Inches and Over	EA	7	\$1,500.00	\$10,500.00
Mobilization	LS	1	\$10,000.00	\$10,000.00
Bales of Hay for Erosion Control	EA	3,700	\$13.00	\$48,100.00
			Subtotal	\$169,300.00
Embankment & Path Construction				
Earth Excavation	CY	200	\$26.00	\$5,200.00
Earth Excavation Rehandled and Reused	CY	200	\$15.00	\$3,000.00
Ordinary Borrow	CY	2,802	\$26.25	\$73,552.50
Fine Grading , Compacting and Finishing	SY	9,700	\$5.00	\$48,500.00
Gravel Borrow for Sub-base	CY	0	\$35.00	\$0.00
Dense Graded Crushed Stone (Towpath)	CY	1,005	\$44.00	\$44,220.00
Wooden Board Walk	LF	425	\$100.00	\$42,500.00
			Subtotal	\$216,972.50
Drainage and Utilities				
Cleaning Drainage Structures	EA	0	\$250.00	\$0.00
			Subtotal	\$0.00
Interpretive Elements				
100' Wet Canal Restoration	EA	1	\$20,000.00	\$20,000.00
Pedestrian Bridges	EA	1	\$130,000.00	\$130,000.00
Illustrative Signage	EA	7	\$1,000.00	\$7,000.00
			Subtotal	\$157,000.00
			Construction Subtotal	\$543,272.50
			10% Construction Contingency	\$54,327.25
			Subtotal	\$597,599.75
			Survey and Design	\$59,759.98
			Design and Construction Total	\$657,360

* This estimate for budgeting purposes only

A = Acre, EA = Each, CY = Cubic Yard, LF = Linear Feet, LS = Lump Sum, SY = Square Yard, TON = Ton