# Feasibility Study for a Proposed Extension of the Bruce N. Freeman Memorial Path in Sudbury and Framingham

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# Executive Summary

This is a study to determine the feasibility, benefits, and costs of building a trail on the South Sudbury Industrial Track in Framingham and Sudbury.

CSX Transportation, Inc., (CSX) owns the 4.8-mile right-of-way. The southern endpoint is the active Fitchburg Secondary line in Framingham and the northern endpoint is the inactive Central Massachusetts line (Central Mass.) in Sudbury. The potential trail under study would make use of the entire South Sudbury Industrial Track, except that it would stop just short of the Fitchburg Secondary line.

The South Sudbury Industrial Track is part of a right-of-way that extends to Lowell. The Commonwealth of Massachusetts owns the line from the Central Mass. crossing in Sudbury to Lowell; this portion is known as the Lowell Secondary. Construction of a trail, called the Bruce N. Freeman Memorial Path, is expected to start on the northernmost section in 2006. This 6.8-mile segment would extend from the Lowell-Chelmsford line into Westford. Detailed engineering analyses have been done or are underway for all additional segments on the 13 miles of right-of-way between that northernmost section and the study area, traversing the communities of Westford, Carlisle, Acton, Concord, and Sudbury. The potential trail on the South Sudbury Industrial Track would be an extension of this Bruce N. Freeman Path.

The rail trail would be a major asset for Framingham, Sudbury, and surrounding communities. The proposed rail trail would provide access to many schools, as well as residential, commercial, and recreation areas. There is a proposal for a trail on the Central Mass. right-of-way, which extends intact west to Berlin and east to Belmont. From Belmont, there is the possibility of connecting to Alewife Station in Cambridge and to the Minuteman Commuter Bikeway and the Linear Park in Somerville. There are also plans to connect the Minuteman to the Charles River path system. West of the study area, the Central Mass. line crosses the Assabet River Rail Trail in Hudson. That trail, already built in Marlborough and Hudson, is slated to continue through Stow and Maynard, ending at the MBTA commuter rail station in South Acton.

The character of the trail would vary. In Framingham, the right-of-way passes through primarily residential areas. Most of the abutters live in single-family dwellings. The trail would abut the Hemenway School and conservation land owned by Sudbury Valley Trustees and the Garden in the Woods. The right-of-way in Sudbury passes primarily through open space, as well as residential and commercial areas.

Depending on the type of surface used, the trail would be expected to attract pedestrians, bicyclists, joggers, wheelchair users, and baby carriages. If a hard surface were used,

skaters would also use the facility. If the trail were not plowed, cross-country skiers would be accommodated as well.

Costs include acquisition, engineering and design, and construction. After construction, the two communities would need to police and maintain the facility.

If both communities agree to proceed, CSX would sell the right-of-way as a railbanked facility. If only one or neither community agrees to purchase the right-of-way, then several scenarios are possible, from a partial trail to selling the right-of-way parcel by parcel.

There would be extensive public review by state, regional, and local officials, and members of the general public in the design stage. It is during this stage that detailed decisions on the trail would be made. A detailed construction cost estimate would be included, although the actual construction cost would not be determined until the project is bid. The lowest responsible bidder would be awarded the construction contract. A preliminary estimate of the construction cost is $3,300,000.

# Introduction

The communities of Sudbury and Framingham requested this study of a potential trail on the South Sudbury Industrial Track. The Boston Region Metropolitan Planning Organization funded the study. The South Sudbury Industrial Track, located between the Central Mass. line in Sudbury and the Fitchburg Secondary line in Framingham, is owned by CSX. No trains have run on the line since 2000.

The term "shared-use path" denotes a path used by bicyclists, pedestrians, joggers, skaters, wheelchair users, etc. A "rail trail" is a category of shared-use path. It denotes a path that is built on a railroad right-of-way. As this is a study of such a facility, the more specific term "rail trail" will be used.

A task force composed of representatives from agencies, organizations, and the two communities met during this study. The agencies and organizations that appointed representatives were the MetroWest Growth Management Committee (MWGMC), the Executive Office of Transportation (EOT), the Metropolitan Area Planning Council (MAPC), and the Department of Conservation and Recreation (DCR). The following individuals served on the task force:

| | |
|---|---|
| Framingham | Bill Williamson, Christine Long (alternate) |
| Sudbury | Dick Williamson, Deborah Dineen (alternate) |
| MWGMC | John Stasik |
| EOT | Josh Lehman, Todd Fontanella |
| DCR | Dan Driscoll |
| MAPC | Scott Walker, Barbara Lucas (alternate) |

Other individuals who helped with various aspects of this study included Craig Della Penna of Greenway Solutions; Betsy Goodrich of the Rails to Trails Conservancy; Bryan Taberner of the Town of Framingham; Harvey Bingham and Tom Fortmann of the Friends of the Minuteman Bikeway in Lexington; and George Batchelor, Steve McLaughlin, and Steve Miller of MassHighway.

Input was also received from citizens attending two public meetings in 2005, held on February 2 in Framingham and on February 17 in Sudbury.

Chapter 1 of this report presents background information on the study area, including demographics, travel patterns and services, and bicycle and pedestrian crash data. Chapter 2 provides a brief history of the rail service on the South Sudbury Industrial Track, written by Thomas J. Humphrey of CTPS, and a description of the right-of-way, including details on width, environmental issues, and current uses. Chapter 3 discusses the proposed trail, including modes of travel, street crossings, potential destinations, parking, community impacts, and costs. The final chapter concerns implementation.

Thomas J. Humphrey also wrote Appendix A, a more detailed description of the history of the rail line. Appendix B is an excerpt from the environmental section of the Framingham-Sudbury Rail Trail Task Force Report. Appendix C describes the method employed to estimate users of the proposed trail.

Copies of this report are being sent to state, regional, and local officials, staff members in the study area communities, area libraries, and interested individuals.

# 1 Existing Conditions

This chapter contains background information on the study area communities of Framingham and Sudbury. Discussed here are demographics, transportation modes used by area residents and workers, transportation infrastructure and services, and bicyclist and pedestrian crash data.

## A DEMOGRAPHICS

Table 1 contains demographic information for the towns of Framingham and Sudbury.

**Table 1**
**Population, Land Area, Population Density,**
**Employment, and Employed Residents, by Community, 2000**

| | Population | Land Area (sq. mi.) | Population per Sq. Mi. | # Working in Each Community | # Employed Residents[1] |
|---|---|---|---|---|---|
| **Framingham** | 66,910 | 25.1 | 2,587 | 44,335 | 34,909 |
| **Sudbury** | 16,841 | 24.4 | 690 | 7,919 | 7,944 |
| **Total** | 83,751 | 49.5 | - | 52,254 | 42,853 |

*Source: 2000 U.S. census*

Framingham houses almost four times the number of people as Sudbury in about the same land area, translating into a population density in Framingham that is 3.7 times higher than Sudbury's. The difference in the number of persons whose jobs are located in the two towns is even more significant: 5.6 times as many people have jobs located in Framingham (44,335) as in Sudbury (7,919).

Both communities have more residents than workers. In Framingham, the population (66,910) is about 50 percent higher than the number of those working there (44,335). There are over twice as many people residing in Sudbury (16,841) as employed there (7,919).

The last column of Table 1 indicates the number of the community's residents who are employed. This number in Sudbury (7,944) is about the same as the number of people whose jobs are located there (7,919). In Framingham, those working in the town (44,335) outnumber employed Framingham residents (34,909). On balance, then, on an average weekday, about 10,000 more people come into Framingham to work as leave Framingham to go to work.

According to data from the 2000 U.S. census, there are approximately 12,300 residents living within a half-mile of the proposed rail trail. About 85 percent of these residents live in

[1] This is the number of residents who are employed, regardless of where their jobs are located.

Framingham and 15 percent live in Sudbury. The larger number in Framingham is partially due to the fact that most of the right-of-way is in Framingham (3.4 of the 4.8 miles, or about 70 percent). In addition, much of the nearby land in Sudbury is open space or commercial. Adjacent land use in Framingham is primarily residential.

## B TRANSPORTATION MODES

Table 2 contains journey-to-work data. As can be seen, of the almost 43,000 resident workers, 33,730 (79 percent) drive alone and 4,235 (10 percent) carpool, for a combined automobile mode share of about 89 percent. Approximately 1,900 residents use some type of transit, while about 1,100 walk or bicycle to work. Almost as many people work at home (1,640) as use transit to get to work.

**Table 2**
**Transportation Modes Used to Get to Work**
**by Employed Residents, by Community, 2000**

| | All Workers | Drive Alone | Carpool | Transit* | Bicycle/Walk | Work@Home | Other** |
|---|---|---|---|---|---|---|---|
| **Framingham** | 34,909 | 26,995 | 3,935 | 1,629 | 970 | 1,170 | 210 |
| **Sudbury** | 7,944 | 6,735 | 300 | 249 | 135 | 470 | 55 |
| **Total** | 42,853 | 33,730 | 4,235 | 1,878 | 1,105 | 1,640 | 265 |

*Source: 2000 U.S. census*
*Includes: "bus, streetcar, subway, rail."
**Includes: "taxi, motorcycle, other mode."

The percentage of Framingham resident workers who carpool (11 percent) is almost three times the corresponding percentage for Sudbury (4 percent). While 3 percent of Sudbury residents use transit, 5 percent do so in Framingham, where there are more public transportation alternatives (described in the next section).

Six percent work at home in Sudbury, twice the rate of Framingham residents. Seventy-seven percent of Framingham residents drive to work alone; 85 percent do so in Sudbury. Three percent bicycle and walk in Framingham; 2 percent do so in Sudbury.

The census numbers above are estimates based on a sample questionnaire. Several factors suggest that these data might underestimate the bicycle and perhaps the pedestrian mode share. First, the census data only include workers: all trips by high school and college students are excluded. Second, the census data are collected in early spring, when, according to metropolitan Boston counts,[2] bicycle volumes are about one quarter of the peak volumes. It is not known what the seasonal variations are for pedestrians.[3] Third, the census questionnaire asks for the mode used for the longest part of the trip to work. A trip involving two miles of bicycling to a rail station, five miles by train, and a half-mile walk to the office would be classified as a rail trip.

[2] CTPS has been collecting bicycle traffic data since 1975. Some of these data are collected at the same locations throughout the year, yielding information on seasonal variations.

[3] Most of the historical counts were of bicyclists, not pedestrians.

Table 3 indicates both the number and percentage of resident workers over the age of 16 who bicycle or walk to work. Ninety Framingham residents bicycle to work, while almost 10 times that number walk. In Sudbury, 135 residents walk to work and none bicycle. In light of the caveats above and margins of error, it is likely that more residents bicycle to work than these numbers suggest, especially from late spring through mid-autumn.

**Table 3**
**Number and Percentage of Employed Residents Bicycling and Walking to Work, by Community, 2000**

| | Bicycling | | Walking | |
|---|---|---|---|---|
| | # | % | # | % |
| **Framingham** | 90 | 0.26 | 880 | 2.5 |
| **Sudbury** | 0 | 0.00 | 135 | 1.7 |
| **Total/Average** | 90 | 0.21 | 1,015 | 2.4 |

*Source: 2000 U.S. census journey-to-work data*

## C TRANSPORTATION INFRASTRUCTURE AND SERVICES

This section describes highways and public transportation in the study area. A rail trail may be a catalyst for some to walk or bicycle directly to a destination or it may be used to reach another mode of transportation. Many people, for example, bicycle to the MBTA's Alewife Station on the Red Line because the Minuteman Commuter Bikeway provides a direct connection.[4]

### Highways

The major highway in the study area is the Massachusetts Turnpike (I-90). Other numbered highways in or proximate to the study area are Routes 9, 20, 27, 30, and 126. (See Figure 1.)

Near its southern end in Framingham, the right-of-way crosses over the Turnpike. The closest Turnpike interchange is at Route 9, about 1.5 miles west. Route 9 is located about 200 yards beyond the southern terminus of the right-of-way, as is Route 30. Route 20 crosses the right-of-way in Sudbury, about 50 yards south of the Central Mass. right-of-way. All of these are east–west numbered routes.

As for north–south numbered roadways, the closest are Route 27 (outside of map area) which crosses the right-of-way about a mile north of the study area in Sudbury, and Route 126, which parallels the right-of-way about 1.5 miles east. Collector and local roads provide all other vehicular access.

Six roadways cross the right-of-way at grade. All of them are local roads except Route 20 in Sudbury. Motor-vehicle volumes on these crossings were recorded on Saturday, January 29, 2005, from 11:00 AM to 12:30 PM. Average hourly volumes varied from 2,680 to 250 two-way vehicles. These crossings will be discussed in more detail later in the report.

[4] A weekday count in September 2004 found 175 bicycles parked at Alewife Station.

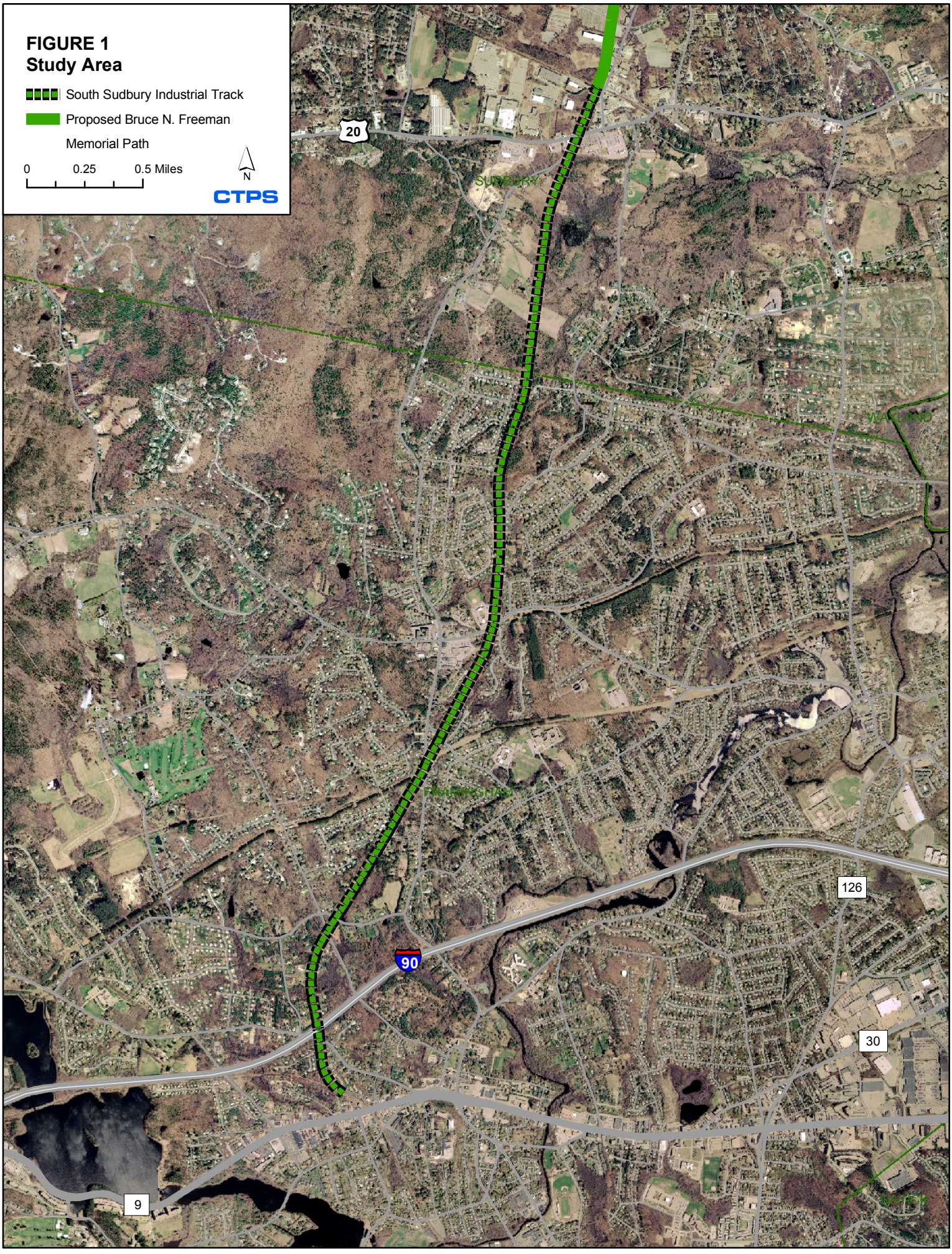
FIGURE 1
Study Area
South Sudbury Industrial Track
Proposed Bruce N. Freeman
Memorial Path
0
0.25
0.5 Miles
N
CTPS
20
SUDBURY
WAYLAND
FRAMINGHAM
126
90
30
9
NATICK

## Public Transportation

The MBTA, the Framingham LIFT, and three private bus carriers serve the study area.

*MBTA Commuter Rail*

MBTA service is provided on the Framingham/Worcester commuter rail line. There is one stop in downtown Framingham. The station is about 2.5 miles south of the study area. On weekdays, 21 inbound trains and 20 outbound trains serve Framingham Station; Framingham is the only station on the line served by all 41 trains.[5] About half of those trips, 10 inbound and 10 outbound, serve Worcester. Of these 20 Worcester trains, 12 (7 inbound and 5 outbound) bypass some of the inner stations in Natick, Wellesley, and Newton.

The MBTA permits the transport of non-folding bicycles on all commuter rail lines during off-peak hours; folding bicycles are allowed on all trains. Inbound, this policy allows regular bicycle access on all trains after the morning peak (on the Framingham/Worcester line, 12 trains; at Framingham Station, the first is the 11:08 AM Framingham inbound departure). Outbound, it is allowed on all trains except during the evening peak; this means bicyclists can board in Boston and interim stations from the start of service in the morning through and including the 2:40 PM South Station departure (9 trains) and the 4 last trains of the day (the 7:15 PM through 11:25 PM South Station departures).

While the same hours apply to bicyclists traveling anywhere on the line, the effect is different for those traveling outbound in the morning. A resident of Framingham, for example, who works near one of the outer stations (Ashland, Southborough, Westborough, Grafton, or Worcester) could board a train to work during the AM peak period and return during the PM peak period because those trips would be in the opposite direction of the main flow of passengers. Likewise a resident of Boston could take a bicycle on board to reach Framingham for work in the morning. The train schedule for these workers, however, is not as convenient as it is for the major flow of passengers.

*Town of Framingham*

The LIFT Public Transit System, operated by the Town of Framingham, has five routes: #2, #3, #5, #6, and #7. The first two routes are internal to Framingham; the others also serve other communities. Route #5 serves Ashland and Hopkinton. Lift #6 serves Ashland, Holliston, Milford, and Natick. Route #7 serves Southborough and Marlborough. LIFT #9, serving highway Route 9 in Framingham and Natick, began service in August 2006.

Patrons flag down the LIFT buses anywhere along their routes. LIFT #2 and #3 are the only ones to serve the study area directly. They follow the same route, one running clockwise, the other counter-clockwise. They travel along Pleasant Street, Edgell Road, and Water Street. LIFT #5 and LIFT #7 serve Framingham State College, which is located about a quarter-mile south of the South Sudbury Industrial Track.

[5] As of the April 24, 2006, schedule.

*Private Carriers*

A Cavalier Coach Company bus makes two stops on Route 20 in Sudbury, at Friendly's and at MacKinnon's Liquors. This service is part of one daily round-trip between Northborough and Boston. The railroad right-of-way crosses Route 20 in Sudbury at Friendly's, providing a direct connection to this service. The same company provides one daily round-trip between Marlborough and Boston, which stops in Framingham at the Route 9 park-and-ride lot near Exit 12 of the Massachusetts Turnpike.[6] This stop is about 1.5 miles from the right-of-way.

Peter Pan Bus Lines provides two trips from Worcester to Boston in the morning and two back to Worcester in the evening, with five stops in Framingham: Edgewater, Temple Street, Framingham State College, Georgetown/Granada, and the Flutie Pass lot at Shoppers World. There are two more trips, one AM inbound and one PM outbound, between the Flutie Pass lot and Boston. The southern terminus of the right-of-way is within a quarter-mile of the Framingham State College stop.

## D CRASH DATA

The data discussed here include crashes that have occurred between motor vehicles and either bicyclists or pedestrians. There are two primary reasons to include these data in this study. The first is to determine whether there are high-crash locations that are close to the right-of-way. The second is to provide an overview of crashes in the community for elected officials, municipal staff, and members of the public.

MassHighway obtained these data from the Massachusetts Registry of Motor Vehicles (RMV) and provided them to CTPS. The RMV data are based on police reports. The years 1995 through 2001 are used. The seven-year span allows a broad view of what has occurred. The year 2001 is the most recent that has bicycle and pedestrian crash data available. The data are limited in two important ways. First, many incidents are not reported, especially bicyclists' falls that do not involve impact with a motor vehicle. Second, for many of the reported crashes, information is incomplete and/or imprecise, especially regarding location. In Framingham, enough information was provided to map 65 percent of the pedestrian and 73 percent of the bicyclist crashes. In Sudbury, there was enough information to map 44 percent of the pedestrian and 46 percent of the bicyclist crashes.

Table 4 shows the number of bicyclist and pedestrian crashes by community and the rates per thousand residents. There were 142 bicyclist crashes in Framingham and 24 in Sudbury for the seven-year period. With respect to population, the bicyclist crash rate per resident in Framingham was 50 percent higher than in Sudbury. There were 333 pedestrian crashes in Framingham and 29 in Sudbury. The pedestrian crash rate per resident in Framingham was almost three times that of Sudbury.

[6] This Marlborough service began in the fall of 2006, replacing service formerly provided by Gulbankian Bus Lines, which went out of business in June 2006. The Gulbankian service provided two runs, not one, and originated in Hudson, not Marlborough.

**Table 4**
**Number of Bicycle and Pedestrian Crashes,**
**by Community, Boston Region MPO, and Statewide, per 1,000 Residents,**
**1995–2001 Inclusive**

| | 2000 Population | Bicycle Crashes | Bicycle Crashes per 1,000 | Pedestrian Crashes | Pedestrian Crashes per 1,000 | Fatalities | |
|---|---|---|---|---|---|---|---|
| | | | | | | Bicycle | Pedestrian |
| **Framingham** | 66,910 | 142 | 2.1 | 333 | 5.0 | 0 | 1 |
| **Sudbury** | 16,841 | 24 | 1.4 | 29 | 1.7 | 0 | 0 |
| **Total/Average** | 83,751 | 166 | 2.0 | 362 | 4.3 | 0 | 1 |
| **Boston Region MPO** | 3,078,989 | 5,462 | 1.8 | 11,844 | 3.8 | 24 | 265 |
| **Massachusetts** | 6,346,483 | 10,882 | 1.7 | 21,274 | 3.4 | 47 | 541 |

*Sources: 2000 U.S. census (population); MA Registry of Motor Vehicles (crashes)*

Also included in the table are corresponding data for the Boston Region MPO area (101 communities) and the commonwealth (351 communities). Both the regional and statewide bicyclist and pedestrian crash rates per capita are higher than the Sudbury rates, lower than Framingham's, and slightly lower than the average of both communities combined.

There is not enough information to determine why certain communities have higher rates of crashes than others do. Possible explanations are higher motor-vehicle volumes and/or higher levels of walking and bicycling. As noted earlier in this chapter, the census data suggest that there is more bicycling and walking in Framingham than in Sudbury.[7] Factors pertaining to specific locations might include excessive speed; disregard of traffic controls by motorists, bicyclists, or pedestrians; lack of space for pedestrians and bicyclists; and poor sight distance.

The crashes were mapped to see if there were concentrations in specific areas (see Figure 2). The reader is reminded that 33 percent of the Framingham crashes and 55 percent of the Sudbury crashes are not shown on the map because of insufficient location information in the accident reports.

The only at-grade crossing of the right-of-way where crashes occurred is Route 20 in Sudbury. There were two crashes involving pedestrians and one involving a bicyclist. This area of Route 20 is commercially developed, with significant traffic volumes and many turning movements. There were three crashes involving pedestrians at the intersection of Edgell Road with Water Street and Edmands Road (1,000 feet west of the right-of-way) in Framingham. In addition to the crashes at the two intersections, there were also four bicyclist crashes and one pedestrian crash at other points along the Edgell Road/Nobscot Road/Route 20 corridor.

[7] "Exposure rates," which take volumes into account and indicate the number of crashes per given level of traffic, have not been determined in this study. These measures could help highlight areas that have particularly high numbers of crashes due to factors other than high volumes of traffic.

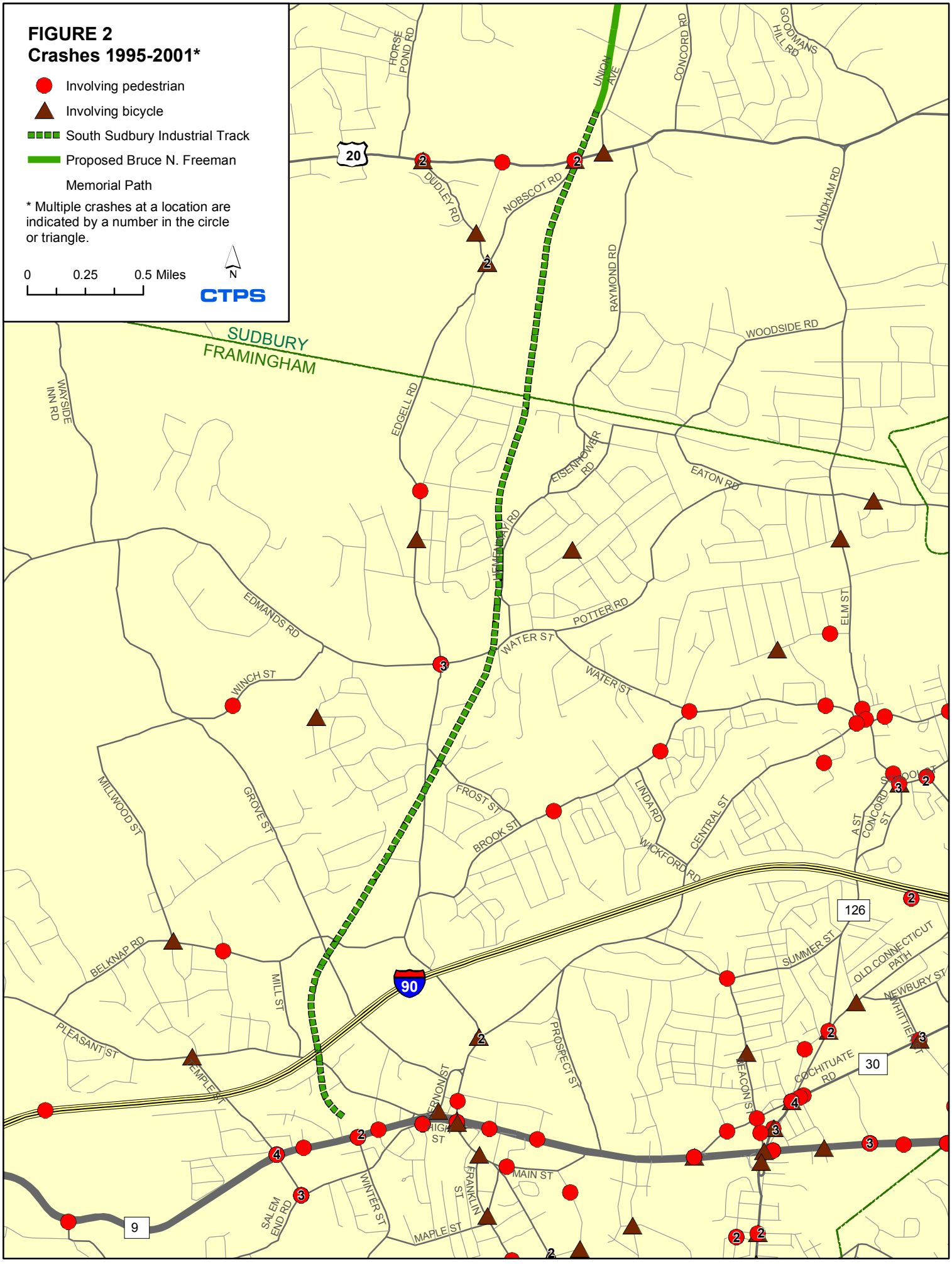
FIGURE 2
Crashes 1995-2001*
Involving pedestrian
Involving bicycle
South Sudbury Industrial Track
Proposed Bruce N. Freeman Memorial Path
* Multiple crashes at a location are indicated by a number in the circle or triangle.
0
0.25
0.5 Miles
N
CTPS
SUDBURY
FRAMINGHAM
HORSE POND RD
DUDLEY RD
NOBSCOT RD
UNION AVE
CONCORD RD
GOODMANS HILL RD
LANDHAM RD
RAYMOND RD
WOODSIDE RD
EATON RD
EISENHOWER RD
EDGELL RD
WAYSIDE INN RD
EDMANDS RD
WINCH ST
POTTER RD
WATER ST
ELM ST
MILLWOOD ST
GROVE ST
FROST ST
BROOK ST
LINDA RD
CENTRAL ST
WICKFORD RD
CONCORD ST
A ST
BELKNAP RD
MILL ST
PLEASANT ST
EMPLE ST
90
126
SUMMER ST
OLD CONNECTICUT PATH
NEWBURY ST
WHITTIER ST
30
COCHITUATE RD
BEACON ST
PROSPECT ST
VERNON ST
HIGH ST
MAIN ST
FRANKLIN ST
WINTER ST
SALEM END RD
MAPLE ST
9
20

# 2 The South Sudbury Industrial Track

This chapter provides a short history of rail service on the right-of-way, followed by a physical description of the corridor and the right-of-way width, and discussions of roadway crossings, environmental issues, and current corridor uses.

## A HISTORY OF RAIL SERVICE

This section presents a summary of past and present ownership of the line, as well as the history of its passenger and freight services. Appendix A contains more details. Historically, local freight and passenger traffic on the line was relatively light because of the rural nature of much of the territory through which it passed.

### Ownership

The original charter for the line was issued in 1870. The line opened the following year. It went through several ownership changes before becoming part of the New Haven system in 1893. The Penn Central took over in 1961 following the bankruptcy of the New Haven. Although the Penn Central went bankrupt within the decade, it continued to operate the line until 1976. In that year, the federally established Consolidated Rail Corporation (Conrail) took over the segment from South Sudbury to Framingham Center, which was named the South Sudbury Industrial Track in 1982. The Commonwealth of Massachusetts eventually purchased the line north of South Sudbury to Lowell through its Executive Office of Transportation and Construction (EOTC, now the Executive Office of Transportation).

The present owner, CSX Transportation, took over part of the Conrail system in 1999, including the South Sudbury Industrial Track.

### Passenger Service

During the first four decades of operation, passenger service typically consisted of three round-trips a day over the full length of the route: one morning, one midday, and one evening. One station, Nobscot, originally known as North Framingham, was located in the study area, south of Water Street. Two other stations were located barely outside the study area, at both ends: South Sudbury, just north of the Central Mass., and Framingham Center, just south of Route 9. The South Sudbury station is still standing.

In 1917 the midday round-trip was dropped to facilitate serving wartime freight needs; it was never restored. In 1932, during the Great Depression, service was cut in half, leaving a southbound morning trip and a northbound evening trip between Framingham and Lowell. All passenger service ended in 1933.

### Freight Service

Freight service in the early 1900s usually consisted of several daily trips in each direction. Service to Lowell included trains to and from New Bedford and Fall River. Through freight trips were operated six days a week; they ran from New Bedford to Lowell until about 1950, after which they were routed to Boston. Through freight service ended in 1973; local service continued five days a week.

When the Boston & Maine Railroad abandoned the Central Mass. Branch in 1980, a lumber dealer at South Sudbury that had used that line became a customer of the South Sudbury Industrial Track. In 1982, contiguous service north of South Sudbury was discontinued. The last train on the South Sudbury Industrial Track derailed in Sudbury on April 13, 2000. In June 2001, CSX applied to the federal Surface Transportation Board (STB) for approval to abandon the line. In October 2001 the STB approved the abandonment.

The Town of Sudbury filed notice with the STB to request that abandonment be postponed in order to allow negotiations with CSX for acquisition of the line for use as a rail trail, with a small section proposed for a highway bypass. CSX, as the property owner, has requested and received several extensions for implementation of abandonment. By August 2004, CSX had removed the rails and ties. Because the bridges would be used if a path were built, CSX left those in place.

## B DESCRIPTION OF THE SOUTH SUDBURY INDUSTRIAL TRACK

The South Sudbury Industrial Track is the 4.8-mile segment of the Lowell Secondary between the Central Mass. right-of-way in Sudbury and the active Fitchburg Secondary in Framingham.[8] Approximately 1.4 miles of the South Sudbury Industrial Track are in the town of Sudbury, and approximately 3.4 miles are in the town of Framingham. Land uses adjacent to the right-of-way differ significantly in the two communities. The Sudbury Water District owns much of the adjacent land in that town; there are only a few residential abutters. In Framingham, single-family homes abut almost all of the right-of-way; 16 homes are within about 50 feet of the corridor.

A brief description follows of the right-of-way, traveling north. All crossings are at grade unless otherwise noted. The locations of the culverts are taken from the Valuation (VAL) plans obtained from CSX.

### Framingham

The right-of-way begins at the junction with the Fitchburg Secondary, between Route 9 and Pleasant Street. (See Figure 3.) The surrounding land use initially is commercial. As the line approaches Pleasant Street, adjoining use becomes residential. There are single-family homes on the west side set back at least 75 feet. There are apartment and townhouse complexes on the east side that are also 75 feet or more from the right-of-way except the one closest to

8 This freight line, which extends to Leominster, averages one trip per day.

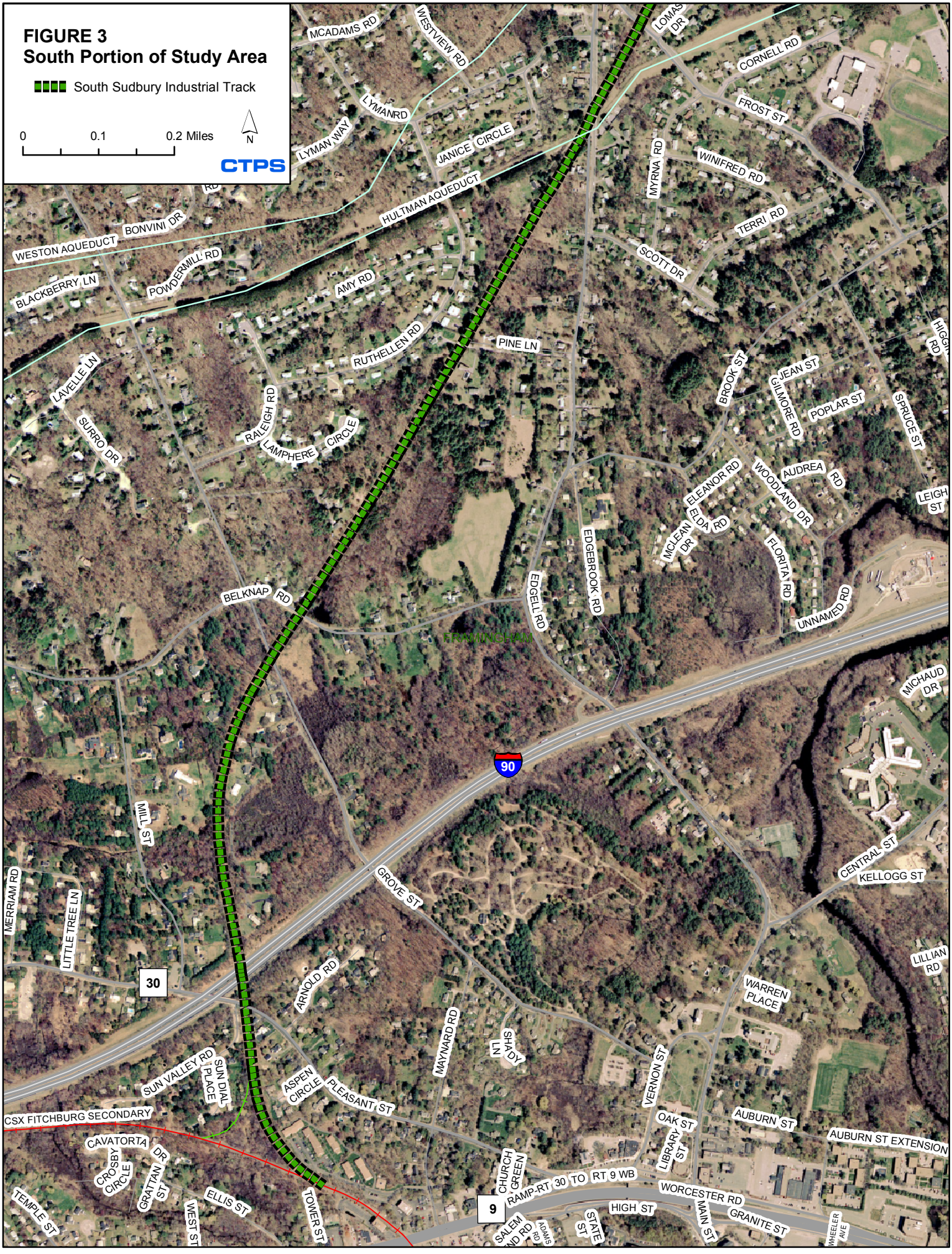
FIGURE 3
South Portion of Study Area
South Sudbury Industrial Track
0
0.1
0.2 Miles
N
CTPS
MCADAMS RD
WESTVIEW RD
LOMAS DR
CORNELL RD
LYMANRD
FROST ST
LYMAN WAY
JANICE CIRCLE
MYRNA RD
WINIFRED RD
HULTMAN AQUEDUCT
BONVINI DR
WESTON AQUEDUCT
TERRI RD
SCOTT DR
POWDERMILL RD
BLACKBERRY LN
AMY RD
RUTHELLEN RD
PINE LN
LAVELLE LN
BROOK ST
JEAN ST
GILMORE RD
POPLAR ST
SPRUCE ST
SURRO DR
RALEIGH RD
LAMPHERE CIRCLE
ELEANOR RD
WOODLAND DR
AUDREA RD
LEIGH ST
MCLEAN DR
ELDA RD
FLORITA RD
EDGEBROOK RD
EDGELL RD
BELKNAP RD
UNNAMED RD
FRAMINGHAM
MICHAUD DR
90
MILL ST
CENTRAL ST
KELLOGG ST
MERRIAM RD
LITTLE TREE LN
GROVE ST
30
ARNOLD RD
LILLIAN RD
WARREN PLACE
MAYNARD RD
SHADY LN
VERNON ST
SUN VALLEY RD
SUN DIAL PLACE
ASPEN CIRCLE
PLEASANT ST
CSX FITCHBURG SECONDARY
OAK ST
AUBURN ST
AUBURN ST EXTENSION
CAVATORTA DR
CROSBY CIRCLE
GRATTAN ST
CHURCH GREEN
LIBRARY ST
RAMP-RT 30 TO RT 9 WB
WORCESTER RD
TEMPLE ST
ELLIS ST
WEST ST
TOWER ST
9
HIGH ST
MAIN ST
GRANITE ST
SALEM ST
ADAMS RD
STATE ST
WHEELER AVE

Pleasant Street, which is about 20 feet away. The Jonathan Maynard Historic District runs east along Pleasant Street from the railroad crossing.[9]

The right-of-way crosses Pleasant Street (Route 30), then, about 20 feet further north, crosses I-90 (the Massachusetts Turnpike) on a bridge. Between I-90 and the next crossing, a bridge over Grove Street, all of the homes on the west side are set well back except one just north of I-90, which is about 30 feet away. On the east side, three homes near the Grove Street Bridge are between 20 and 50 feet from the right-of-way. There is a culvert located about 600 feet north of the I-90 bridge.

There is then a short section from Grove Street to Belknap Street; no houses are located here. There is one culvert about 75 feet north of Grove Street.

Between Belknap and Pine Lane, there is one house on the east, set back about 50 feet, and there are two on the west, about 25 and 50 feet away, respectively. There are two culverts, one about 200 feet north of Belknap Road and one about 1,050 feet further north. Pine Lane is essentially a driveway to a single home set back over 200 feet. Between Pine Lane and Edgell Road, there are three culverts. One is about 530 feet north of Pine Lane, one is 500 feet south of Edgell Road and the third is 50 feet south of Edgell Road. In this segment, the homes on the west side on Ruth Ellen Road are set back 200 feet or more, although the yards of some are within 50 feet. Further north there are a few more homes set back about 75 feet. There are two homes on the east side: one near Pine Lane set back about 75 feet and one near Edgell Road set back about 25 feet. The Hultman Aqueduct crosses the right-of-way at Edgell Road.

In the short section between Edgell Road and Frost Street, a home on the west side is about 40 feet away and a home on the east side about 60 feet away. There is a culvert about 400 feet north of Edgell Road.

Between Frost and Water Streets (see Figure 4), there are nine homes on the west side; two are set back about 50 feet, the others 75 feet or more. There are also nine homes on the east side, close to the Frost Street end, all of which are set back approximately 150 feet or more except the one closest to Frost Street, which is about 40 feet back. There are two culverts in this segment: one crosses 800 feet north of Frost Street and the next is 375 feet further north. Dunsdell Brook crosses under the right-of-way about 450 feet south of Water Street. The Weston Aqueduct crosses the right-of-way 150 feet further north, about 300 feet south of Water Street.

The Hemenway School is on the west side just after Water Street. There are wetlands on the east. Just past the school, there is a short path, now overgrown, that leads west from the right-of-way to another trail that connects to the school. Near the same spot is a short connection on the east side to Hemenway Road. Hemenway Road then parallels the right-of-way on the east side. A culvert is located at this point, which is about 1,300 feet north of Water Street. Five homes on the west side are set back 200 feet or more, and then there is a home within 50 feet. Further on, where the right-of-way veers away from Hemenway Road, there are wetlands on

[9] Town of Framingham, *Historic Preservation Plan*, July 24, 2002, p. 9. This district, created in 1994, includes thirty-two 19th-century properties. It extends east to Framingham Center, the original hub of the town.

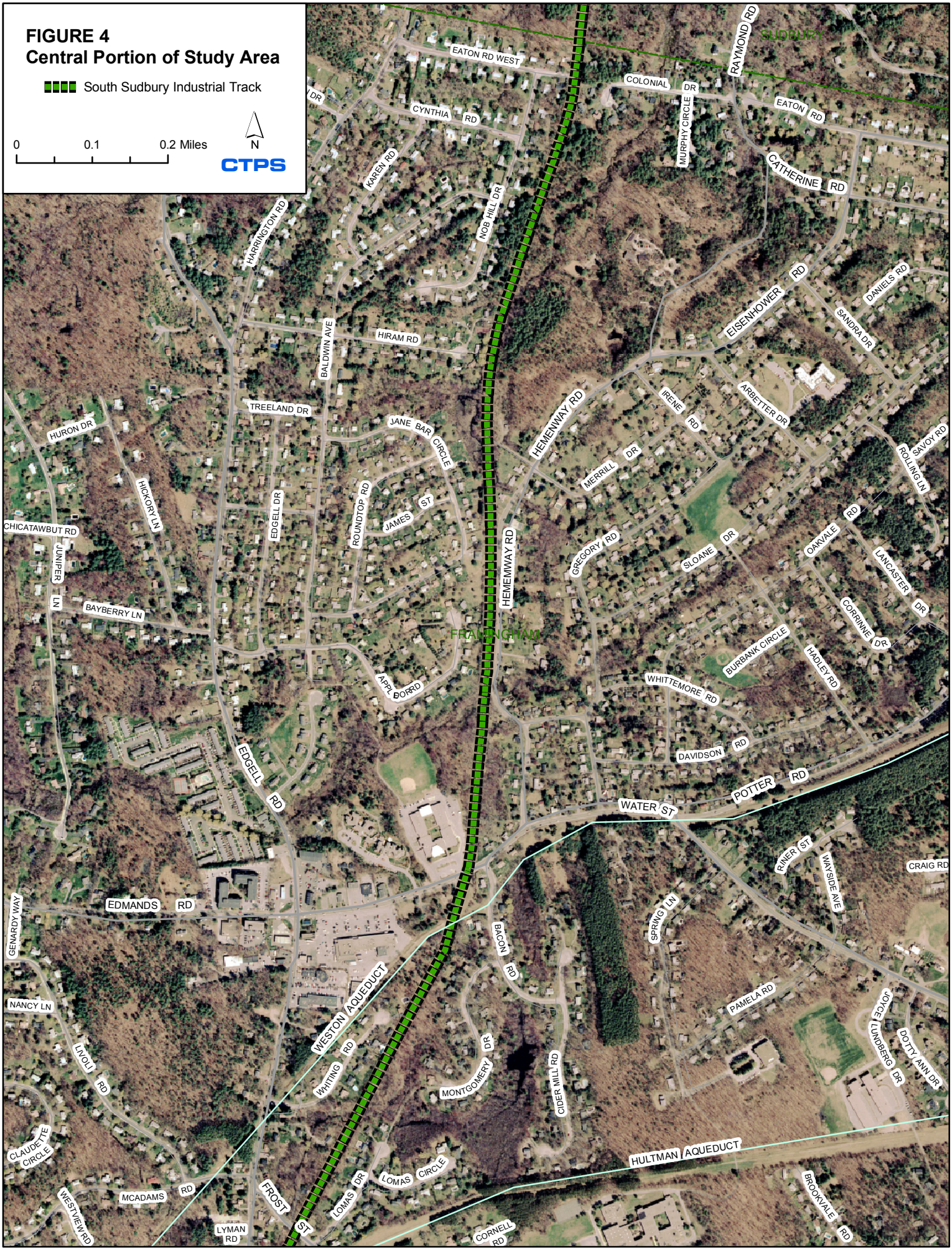
FIGURE 4
Central Portion of Study Area
South Sudbury Industrial Track
0
0.1
0.2 Miles
N
CTPS
SUDBURY
FRAMINGHAM
EATON RD WEST
COLONIAL DR
RAYMOND RD
EATON RD
MURPHY CIRCLE
CATHERINE RD
CYNTHIA RD
KAREN RD
NOB HILL DR
HARRINGTON RD
BALDWIN AVE
HIRAM RD
EISENHOWER RD
DANIELS RD
SANDRA DR
IRENE RD
ARBETTER DR
HEMENWAY RD
MERRILL DR
ROLLING LN
SAVOY RD
TREELAND DR
JANE BAR CIRCLE
HURON DR
HICKORY LN
EDGELL DR
ROUNDTOP RD
JAMES ST
CHICATAWBUT RD
JUNIPER LN
BAYBERRY LN
GREGORY RD
SLOANE DR
OAKVALE RD
LANCASTER DR
CORRINNE DR
BURBANK CIRCLE
HADLEY RD
WHITTEMORE RD
APPLEBORD
DAVIDSON RD
POTTER RD
WATER ST
EDGELL RD
RINER ST
WAYSIDE AVE
CRAIG RD
EDMANDS RD
GENARDY WAY
SPRING LN
BACON RD
NANCY LN
WESTON AQUEDUCT
PAMELA RD
JOYCE LUNDBERG DR
DOTTY ANN DR
LINCOLN RD
WHITING RD
MONTGOMERY DR
CIDER MILL RD
CLAUDETTE CIRCLE
HULTMAN AQUEDUCT
MCADAMS RD
WESTVIEW RD
LYMAN RD
FROST ST
LOMAS DR
LOMAS CIRCLE
CORNELL RD
BROOKVALE RD

the west. The homes on Hemenway are increasingly far from the right-of-way. There are then no homes on the east side until Colonial Drive, where one is within 50 feet.

On the west side, there are four abutting homes on Hiram Road, the closest of which is 60 feet away. The abutting homes on Nob Hill Drive are about 200 feet or more from the right-of-way. The last home in Framingham before the Sudbury line, on Eaton Road West, is about 50 feet away.

There are four more culverts before the Sudbury line, two for Hop Brook, which is the largest tributary of the Sudbury River. The first Hop Brook culvert is about 2,900 feet north of Water Street. There is then a culvert about 100 feet further north, and then another culvert for Hop Brook 900 feet further north. Just over 800 feet further north is a gas line (about 1,200 feet south of the Sudbury line). Another culvert is located 100 feet further north.

**Sudbury**

Land use adjacent to the right-of-way at the Sudbury/Framingham town line transitions from single-family homes to woods (see Figure 5). North of the town line, in Sudbury, woods transition to open fields and extensive wetlands. Further north, toward Route 20, commercial developments abut the east side. They are also found along Nobscot Road on the west. There are a few residential properties on Nobscot Road abut the right-of-way; these homes, however, are close to Nobscot and far removed from the right-of-way.

There are four culverts between the town line and Route 20. They are located approximately 1,870 feet, 2,350 feet, 3,450 feet, and 3,925 feet north of the Framingham line. There are also two public wells adjacent to the right-of-way, on the east side, about 3,200 and 4,100 feet north of the town line.

North of Route 20, the right-of-way continues about 1,100 feet to the Central Mass. line, where the study area ends. Commercial establishments abut both sides of the corridor. Just south of the Central Mass., a spur runs off from the west side. The former South Sudbury Station, now a commercial establishment, is at the northeast corner of the railroad junction. The Lowell Secondary continues north to Route 3 at the Lowell-Chelmsford line. This is the section owned by the Commonwealth of Massachusetts, through EOT.

## C RIGHT-OF-WAY WIDTH

According to federal[10] and state[11] guidelines, the recommended width for a shared-use path is 10 feet. An additional 2 feet on each side is recommended for clearance, yielding a total cleared width of 14 feet. Factors that affect trail width are discussed in Chapter 3.

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10 American Association of State Highway and Transportation Officials (AASHTO), *Guide for the Development of Bicycle Facilities*, 1999, pp. 35–36. Three feet is recommended for clearance from poles, fences, walls, trees, etc. Five feet is desirable for separation from slopes steeper than 1:3.

11 MassHighway, *Project Development and Design Guidebook*, 2006, Section 11.4.1.1. A width of 12 or even 14 feet is desirable "to accommodate substantial use by bicycles, joggers, skaters, and pedestrians, and to provide access for maintenance vehicles."

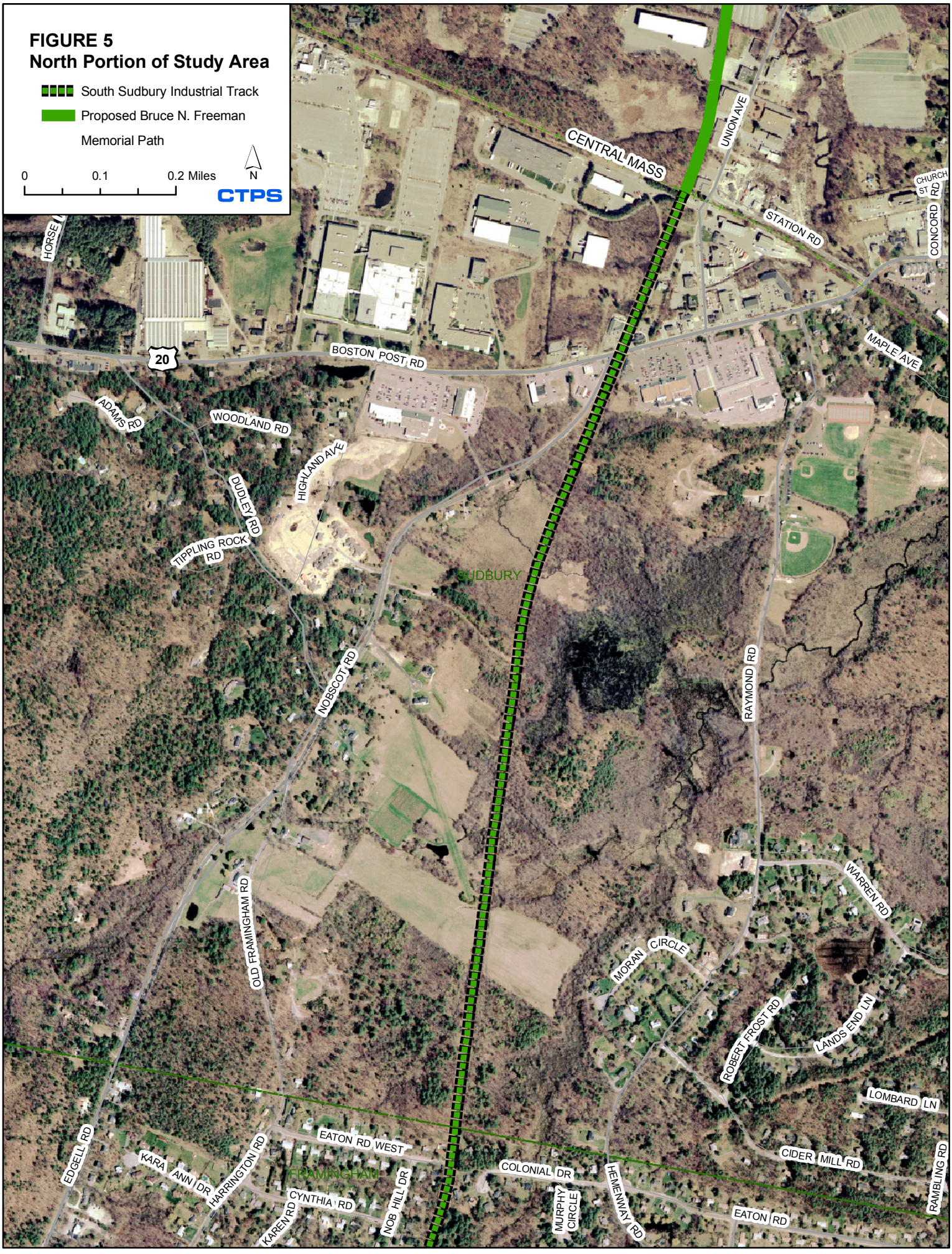
FIGURE 5
North Portion of Study Area
South Sudbury Industrial Track
Proposed Bruce N. Freeman Memorial Path
0
0.1
0.2 Miles
N
CTPS
CENTRAL MASS
UNION AVE
CHURCH ST
CONCORD RD
STATION RD
MAPLE AVE
BOSTON POST RD
20
ADAMS RD
WOODLAND RD
HIGHLAND AVE
DUDLEY RD
TIPPLING ROCK RD
SUDBURY
NOBSCOT RD
RAYMOND RD
WARREN RD
MORAN CIRCLE
ROBERT FROST RD
LANDS END LN
LOMBARD LN
CIDER MILL RD
RAMBLING RD
EATON RD
HEMENWAY RD
MURPHY CIRCLE
COLONIAL DR
EATON RD WEST
FRAMINGHAM
NOB HILL DR
CYNTHIA RD
KAREN RD
KARA ANN DR
HARRINGTON RD
EDGELL RD
OLD FRAMINGHAM RD

The South Sudbury Industrial Track has ample space for a trail; the narrowest width is 55 feet. Below are the width variations along the corridor, south to north, according to VAL plans obtained from CSX.

**Framingham**

| | |
|---|---|
| Junction with Fitchburg Secondary to Pleasant Street: | *65; 90 feet.* |
| Bridge over I-90: | *85 feet.* |
| I-90 to Grove: | *85; 130; 140; 145; 135; 110; 100; 75 feet; a triangular section on the west side, approximately 300 feet long, juts out to a maximum width of 230 feet; then the right-of-way tapers to 75 feet.* |
| Grove to Belknap: | *75 feet.* |
| Belknap to Edgell: | *75 feet.* |
| Edgell to Frost: | *75 feet.* |
| Frost to Water: | *75; 60 feet.* |
| Water to Sudbury line: | *75; 85; 95; 85; 75; 90; 75 feet.* |

**Sudbury**

| | |
|---|---|
| Framingham line to Route 20: | *75 feet except a triangular section on the east side, 90 feet long, that juts out to a maximum width of 290 feet, located about 1,600 feet south of Route 20.* |
| Route 20 to the Central Mass.: | *55; 65 feet.* |

A railroad bed must be relatively flat, while the adjacent land may not be. Thus the bed is sometimes cut into the land ("cut" section), is sometimes at grade, and sometimes rises above the adjacent land on an embankment. In some locations the land may be at grade on one side of the railroad bed, and below or above grade on the other.

In segments where the railroad bed is on an embankment, it typically occupies only a portion of the right-of-way width. Embankments were measured at several locations on the right-of-way and were found to be approximately 16 feet wide.

## D ROADWAY CROSSINGS

There are six at-grade roadway/right-of-way crossings. There are two grade-separated crossings: bridges over I-90 and Grove Street. Table 5 below compares the rate of occurrence of grade crossings on this right-of-way relative to major rail trails in Massachusetts.

The table illustrates that the incidence of at-grade crossings on the South Sudbury Industrial Track is comparable to the rates on the three trails cited. There are slightly fewer crossings per mile on this right-of-way than on the Minuteman Commuter Bikeway, and slightly more than

**Table 5**
**Comparison of Rate of Occurrence of At-Grade Intersections on South Sudbury Industrial Track and Major Massachusetts Rail Trails**

| Facility | Length (miles) | At-Grade Intersections | Miles per At-Grade Crossing |
|---|---|---|---|
| **Cape Cod Rail Trail** | 25 | 25 | 1.0 |
| **Minuteman Commuter Bikeway** | 11 | 17 | 0.6 |
| **Norwottuck Rail Trail** | 8 | 8 | 1.0 |
| **South Sudbury Industrial Track** | 5 | 6 | 0.8 |

on the Cape Cod and Norwottuck rail trails. On average, a traveler can go eight-tenths of a mile between grade crossings on the South Sudbury Industrial Track. The longest and shortest continuous segments are Water Street in Framingham to Route 20 in Sudbury (about two miles) and Edgell Road to Frost Street (about 500 feet). Chapter 3 includes details on the roadway crossings.

## E ENVIRONMENTAL ISSUES

According to Federal Highway Administration regulations, bicycle facilities are usually exempt from federal requirements for environmental impact statements. They are subject to the provisions of the Massachusetts Environmental Policy Act (MEPA). An Environmental Notification Form is required to determine whether an environmental impact report would be necessary for permitting a rail trail to be constructed on the right-of-way. The project also would need to meet state and local wetlands bylaw requirements, the requirements of the Natural Heritage and Endangered Species Program,[12] and the State Stormwater Guidelines.[13]

An environmental assessment of the right-of-way from the January 2004 Report of the Nobscot Trail Task Force, working on behalf of the Town of Framingham, is provided as Appendix B of this study.

### Noise and Air Quality

It is anticipated that modest noise and air emissions will be generated during construction of a trail. Once constructed, use of the right-of-way for a rail trail will generate minimal, if any, on-site air emissions and noise levels since motorized vehicles would not be permitted (except police and service vehicles, and motorized wheelchairs). The exclusion of snowmobiles and other off-road motorized vehicles would need to be enforced by police.[14]

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[12] This program seeks to protect the 190 species of animals, vertebrate and invertebrate, and 258 species of native plants officially listed as "Endangered, Threatened, or of Special Concern" in the Commonwealth. An initial review suggests that there are no core habitats in the study area.

[13] Administered by the Massachusetts Department of Environmental Protection.

[14] There is anecdotal evidence of motorized vehicles now using the right-of-way. Although this is trespassing, there is no enforcement: the right-of-way is owned by CSX and there is no agreement in place for local police jurisdiction. Based on past experiences, once a right-of-way is converted to a trail, such activities as loitering, use by motorized vehicles, and rubbish disposal become much less frequent or cease altogether.

The project should generate positive benefits to air quality and noise in the neighborhoods through which the right-of-way passes since the path is expected to eliminate some motor vehicle trips, especially short trips or so-called "cold starts," which contribute disproportionately to air quality degradation. The only additional noise should be conversations of trail users.

**Floodplain Areas**

CTPS reviewed Federal Emergency Management Agency (FEMA) maps to assess floodplain issues. Figure 6[15] indicates three FEMA classifications: (1) an area inundated by 100-year flood and with a Base Flood Elevation (BFE)[16] determined, (2) an area inundated by 100-year flood and no BFE determined, and (3) an area not considered in the Special Flood Hazard Area (SFHA) but inundated up to one foot in 500-year flood. Federal, state, and local policies direct proponents of most transportation projects to minimize construction and implement mitigation measures in areas categorized as within a 100-year floodplain.

As seen in Figure 6, the right-of-way enters a 100-year floodplain about 800 feet north of the Massachusetts Turnpike for a distance of 100 feet. It then enters another approximately 200 feet north of Water Street. It is at first on the western edge of the 100-year floodplain for about 1,000 feet and then passes through the floodplain for about 500 feet.

About 1,500 feet further north, about halfway between Water Street and the Sudbury line, the right-of-way enters another 100-year floodplain for a distance of 1,000 feet. Approximately 1,500 feet north of the Framingham/Sudbury line, the right-of-way is on the western border of a 100-year floodplain for about 3,000 feet.

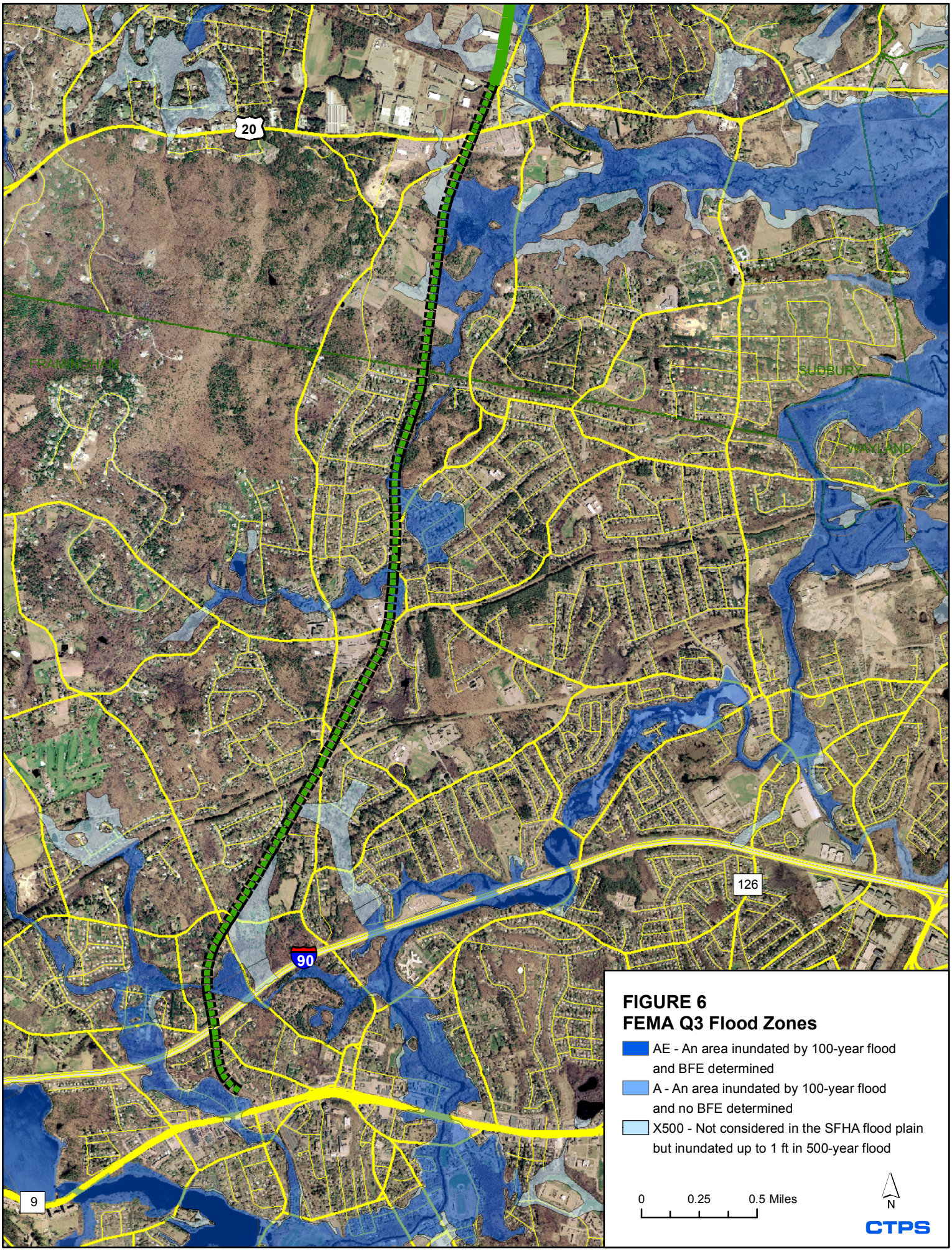
**Environmental Contamination**

The work scope for this study does not include soil testing for the presence of environmental contamination. Whoever purchases the right-of-way ought to test for contaminants prior to acquisition and the initiation of design and engineering work. CTPS has assumed that since the right-of-way supported both passenger and freight operations for many years, there is the potential for environmental contamination. Sources of potential contaminants may include: substances leached from tracks, ties, bridges, or signal infrastructure; illegal dumping; leaks or spills from railroad cars; substances deposited through the implementation of vegetation management programs; and derailments.

There have been at least two derailments in Sudbury, one in the summer of 1999 and one on April 13, 2000. The latter occurred on the last rail trip made on the line. The derailment resulted in "debris and parts of one box car" being "piled on the well head of public well

15 Figure 6 shows Q3 flood data, which are digital representations of certain features of FEMA's Flood Insurance Rate Maps (FIRMs).

16 Base Flood Elevations (BFEs) are the computed elevations to which floodwater is anticipated to rise during the base flood. They are shown on FIRMs. The BFE is the regulatory requirement for the elevation or flood proofing of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium.


20
FRAMINGHAM
SUDBURY
WAYLAND
126
90
9
FIGURE 6
FEMA Q3 Flood Zones
AE - An area inundated by 100-year flood and BFE determined
A - An area inundated by 100-year flood and no BFE determined
X500 - Not considered in the SFHA flood plain but inundated up to 1 ft in 500-year flood
0
0.25
0.5 Miles
N
CTPS

#7."[17] Testing done at the behest of the Drinking Water Division of the Department of Environmental Protection (DEP) found the presence of a volatile organic compound called trichloroethylene.[18] CSX and the Sudbury Conservation Commission subsequently reached a settlement concerning the derailment and its aftermath.[19]

## F CURRENT USES OF THE SOUTH SUDBURY INDUSTRIAL TRACK

Sixty-two years of passenger service on this line ended in 1933. One hundred and twenty-nine years of freight service ended in 2000. With no rail activity from 2000 to 2004, much of the land had become overgrown and difficult to pass through. The removal of tracks and ties in 2004 made the right-of-way much easier to traverse. Currently, hikers, snow-shoers, cross-country skiers, and snowmobilers use the corridor, as evidenced by their tracks and by anecdotal accounts. People have dumped trash in many areas.

As indicated earlier, any use of the right-of-way is illegal without an agreement with CSX. Local police enforcement also requires such an agreement. Although CSX has indicated to the towns that it is amenable to a lease that would allow interim use, including police access, no action has occurred to date.

CSX has advised CTPS that there is only one lease agreement recorded for the South Sudbury Industrial Track. This agreement provided for installation and maintenance of a sidetrack south of the Central Mass., on the west side of the South Sudbury Industrial Track. This lease was executed in 1931 as a tenancy-at-will with a 30-day termination clause.[20] It is a safe assumption that this lease is no longer in effect. There is a gas line crossing under the right-of-way about a quarter–mile south of the Framingham-Sudbury line.

Field reconnaissance to date has not recorded any right-of-way encroachments. A survey is necessary to determine this definitively.

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[17] Order of Conditions, Sudbury Wetlands Administration Bylaw File # 301-722, August 10, 2000.

[18] Letter form Richard P. Carroll, Superintendent, Sudbury Water District, to Deborah Dineen, Town of Sudbury Conservation Commission, October 30, 2000. The letter goes on to state that these "tests have been performed routinely for many years. This is the first time a positive result has been realized."

[19] CSXT v. Sudbury Conservation Commission, Civil Action No. 00-4687 (Middlesex).

[20] Correspondence from Lee Chastain, CSX, January 12, 2005.

# 3 Proposed Rail Trail

This chapter addresses several aspects of a proposed rail trail, including types and numbers of users; at-grade roadway crossings; potential destinations, including connections to other facilities; parking; community impacts; and costs.

## A USERS

In order to "railbank" a right-of-way, transportation use is required. This section discusses potential transportation users of the right-of-way, including their modes and trip purposes, and presents an initial estimate of demand.

### Mode of Travel

In general, a rail trail is open to all nonmotorized users and to people using motorized wheelchairs. The type of surface strongly affects use. Bicyclists, walkers, skaters, joggers, people using wheelchairs, and people pushing baby carriages could use a hard-paved surface. A soft surface that is compatible with Americans with Disabilities Act (ADA) requirements would be less attractive to skaters and those on bicycles equipped with narrow tires. Depending on snow removal policy, a trail could be used by snowshoers and cross-country skiers.[21] A comment at one of the public meetings indicated interest in equestrian use as well.

It is feasible to design different segments of a rail trail for different uses. For example, equestrian use might be accommodated in some segments, and separate jogging sections might be provided in others. Different designs and pavement material could also be applied depending on the anticipated types and volumes of trail use, adjacent environmental conditions, and cost considerations.[22]

Table 6 indicates the mode used on the Norwottuck Rail Trail in western Massachusetts and on the Minuteman Commuter Bikeway. The Norwottuck data are based on a 2002 survey; the Minuteman data are based on counts done on Tuesday, June 17, 1997, and on Patriots' Day, April 18, 2005.

The 2002 survey data from the Norwottuck Trail and the 2005 count from the Minuteman are more similar to each other than to the 1997 Minuteman count. In all three cases, however, bicycling was the choice of more than half the users. On the two later dates, bicyclists

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[21] The communities would determine whether to plow the rail trail. For example, the towns of Arlington, Lexington, and Bedford opted not to plow the Minuteman Commuter Bikeway. Cross-country skiing reportedly works only for a short time after each snowfall before walkers and snowshoers frequent the bikeway.

[22] The Cowboy Trail in North Nebraska, for example, which is over 100 miles long, is concrete in towns and stone dust in between. The use of different types of pavement can be a disadvantage to some users, such as skaters, if they can use only some segments of a trail system.

**Table 6**
**Type of Mode Used on Paths, by Percentage**

| User | Minuteman Bikeway *June 17, 1997*[23] | Norwottuck Trail *2002 Survey*[24] | Minuteman Bikeway *April 18, 2005*[25] | Average |
|---|---|---|---|---|
| **Bicyclist** | 54% | 72% | 79% | 68% |
| **Skater** | 29 % | 12 % | 9 % | 17 % |
| **Pedestrian** | 17 % | 15 % | 9 % | 14 % |

represented over 70 percent of users. Overall, the share of skaters was slightly higher than that of pedestrians. In one case there were more skaters than pedestrians, in another, more pedestrians, and in the third, the two modes were tied.

## Trip Purpose

Trips can be characterized as commuter (to work or school on a regular basis), utilitarian (to shops or the library, for example), or recreational. Adult commuters typically use trails on weekdays during regular commuter hours, although commuters who work during different shifts on other days of the week may also use such trails regularly. School children would use trails to travel to and from school, to access organized activities, and simply for fun. Retirees, stay-at-home parents, and those with flexible work hours might use trails from midmorning to midafternoon, when others are at work or school. An individual may have many reasons for making a trip on the proposed trail: to exercise, save money, avoid traffic, save time, refresh on the way to work, or unwind on the way home.

Regardless of trip purpose and time of travel, trail users have many reasons for choosing nonmotorized modes. At the societal level, bicycling, skating, and walking conserve energy, are nonpolluting, and are "renewable." While most trips on a trail might replace only short automobile trips, these can add up. And not burning only one gallon of fuel means not producing 20 pounds of carbon dioxide, which is linked to global warming. At the individual level, these nonmotorized modes are healthy, inexpensive, and fun, and sometimes can be the quickest way to get from one place to another. Trails may also help neighbors get acquainted, or reacquainted, with each other.

## Estimated Demand

It is difficult to project an authoritative user demand estimate for a trail, as there is no universally accepted method. By comparison, highway and transit system projections benefit from the use of a wide array of technical procedures.

Counts from the Minuteman Commuter Bikeway will be used to estimate use of this proposal. Two methods will be used. One will compare the number of people who now bicycle in the Framingham/Sudbury corridor with the number who bicycled in the Minuteman Commuter

23 June 17, 1997, Tuesday, 7:00 AM to 8:30 PM, at Bow Street, Lexington.

24 Pioneer Valley Planning Commission, *Survey of the Norwottuck Trail*, 2002.

25 April 18, 2005, Monday, 10 AM to 5 PM, east of Routes 4-225, Lexington.

Bikeway corridor before the path was built. The second will compare the bicycle and pedestrian modal splits for the two corridors, using pre-path numbers for the Minuteman Commuter Bikeway area.

Calculations for the two methods above are shown in Appendix C. The estimate yielded from the bicycle counts is 300 users per weekday. The estimate from the modal share method is 250 users per weekday. Taking the average yields an estimate of 275 daily users. The average modal split from Table 6 above can be used to estimate the types of users. Assuming 68 percent of the users would be bicyclists, 17 percent would be skaters, and 14 percent would be pedestrians yields an average daily estimate of about 190 bicyclists, about 50 skaters (assuming a hard-paved surface), and about 40 pedestrians. Not included in this estimate would be some joggers and people pushing strollers or using wheelchairs. The modal splits may, however, be very different for this proposed trail than for the Minuteman or Norwottuck facilities.

If evenly distributed over a 12-hour day, these estimates would yield almost 25 users an hour or one every two or three minutes. The use would vary considerably by season, day of the week, time of day, area of the trail, and weather. Use may be higher in Framingham, for example, because many more people live close to the right-of-way. These estimates are intended as an order-of-magnitude idea of future trail use, not a specific projection.

These estimates do not include people who might move into new housing facilities in the area. There is a potential development in Framingham, for example, southwest of the intersection of Edgell and Edmands Roads. Called Archstone, this 264-apartment proposal is less than a mile from the Water Street crossing of the right-of-way. A 66-unit affordable-housing development is planned in Sudbury on Route 20 at Landham Road, about a mile east of the track.

## B AT-GRADE ROAD CROSSINGS

There are two major advantages of a trail constructed on a former rail right-of-way, especially for youngsters and novice cyclists: (1) trail grade changes are gradual, and (2) the trail is generally separated from motor vehicles. Trail users share road space with motor vehicles only at road crossings. It is essential that these crossings be designed to be as safe as possible. As mentioned in Chapter 2, the average distance between intersections is 0.8 miles, with specific distances varying from two miles to 500 feet.

A trail user almost always has fewer intersections to cross per given trip compared to traveling on the roadway system. For example, the most direct on-road route comparable to using the South Sudbury Industrial Track would require a traveler to use Edgell Road, Nobscot Road, Boston Post Road, and Union Avenue. This route would require travelers to cross 21 intersections. Traveling on the proposed trail would reduce that number to 6.

Important factors that must be considered in designing trail-roadway crossings include roadway traffic volumes and speed, number of lanes, and width, as well as intersection geometry and sight distances. Table 7 quantifies three of these factors for each of the six at-

**Table 7**
**Two-Way Motor-Vehicle Traffic Volumes,**
**Sight Distances, Speed Limits, and Reaction Times at**
**Road Intersections with the South Sudbury Industrial Track**

| Roadway | Traffic Volume[26] (average hourly, two-way) | Sight Distance (feet) | Speed Limit (miles per hour) | Reaction Time (seconds, at speed limit) |
|---|---|---|---|---|
| **Route 20** | 1,786 | 500+ | 30 | 19+ |
| **Water Street** | 961 | 500+ | 25 | 23+ |
| **Frost Street[27]** | 167 | 500+ (WB)[28]<br>400 (EB) | -<br>- | 19+<br>15 |
| **Edgell Road** | 1,056 | 500+ | 30 | 19+ |
| **Belknap Road** | 333 | 250 | 25 | 11 |
| **Pleasant Street** | 382 | 350 (WB)<br>500+ (EB) | 40 (WB)<br>30 (EB) | 10<br>19+ |

grade road crossings of the proposed trail. The final column in the table indicates reaction time, calculated by dividing the sight distance by the roadway speed limit.

All of the crossing roadways are two lanes except for Route 20, where there is a third lane for left turns from Route 20 westbound onto Nobscot Road. The geometry at each crossing appears uniform since the railroad right-of-way intersects all the roadways detailed in this study at or close to a right angle. If right-of-way/roadway crossings were at angles less than or greater than 90 degrees, future trail users would have to traverse a wider roadway cross-section unless the crossing were realigned to reduce the crossing distance.

Low roadway volumes generally allow trail users to cross more easily and with less waiting. This would be the case at Frost Street, Belknap Road, and Pleasant Street (Route 30). The highest roadway volumes are encountered where the right-of-way crosses Route 20. Since this crossing is signalized, the wider roadway cross-section and higher traffic volumes are not likely to be issues for future trail users.

Traffic volumes on Water Street and Edgell Road are significant, and these intersections are not signalized. The sight distance and resultant reaction times appear to be acceptable at both of these crossings. At these locations, traffic controls may be considered, ranging from a flashing warning light that is activated by trail users to a traffic signal that stops roadway traffic. During the design process, traffic-calming measures ought to be considered at these intersections, particularly on Edgell Road.

Two major characteristics of crossings that affect safety are sight distance and speed of motor vehicles. The sight distance is the distance from which a motorist can see the trail before coming upon it, and vice versa – the distance from which a trail user can see an approaching

[26] The counts were done on a Saturday, at midday, as that is a time when a trail would likely receive most use. Leander Branham, Thomas Branham, Dennis Bowler, Betty Foley, Bob Hall, William Hanson, Ken Harvey, Nora Kelly, Anne Pratt, Joe Repole, Jim Scholten, Rich Whalen, Bill Williamson, and Dick Williamson did them.

[27] There was no posted speed limit. The indicated reaction time was calculated using a speed limit of 30 miles per hour.

[28] WB = westbound, EB = eastbound

motor vehicle. The sight distance at an intersection can be limited by roadway curves (horizontal sight distance), by rises and dips in the road (vertical sight distance), and by obstructions such as buildings and vegetation. Speed is a factor in two ways. The higher the speed, the less time both the motorist and the trail user have to react to each other. Additionally, greater speed usually contributes to more serious injuries in the event of a crash.

At Pleasant Street the eastbound sight distance is very good, well over 500 feet. The speed limit is 40 miles per hour about a quarter mile west of the right-of-way and decreases to 30 mph at the crossing. There is limited vertical and horizontal sight distance westbound, less than 400 feet, due to a hill and a curve. The speed limit is 40 mph (no decrease at the crossing).

At Belknap Road the sight distance is limited in both directions by curves in the road. It is about 250 feet in each direction. The speed limit in both directions is 25 miles per hour. Motorists heading eastbound are likely to be going fairly slowly because they are starting from a stop sign about 400 feet away and have only 150 feet to accelerate before coming in sight of the crossing.

At Edgell Road the sight distance in both directions is more than 500 feet. The speed limit in both directions is 30 miles per hour, although traffic seems to be moving at speeds closer to 40 miles per hour or more. Sight distances are good in both directions on Frost Street: 400 feet from Edgell Road and over 500 feet from the east. There are no speed limit signs posted.

On Water Street the sight distance in both directions is over 500 feet. The speed limit in both directions is 25 miles per hour. There is a crosswalk for the Hemenway School that is very close to the right-of-way.

The shortest sight distances are on the three roads with the lowest traffic volumes: Frost Street, Belknap Road, and Pleasant Street westbound. All of these sight distances are acceptable.[29] Traffic-calming measures could include implementation of a reduced, 30 mile per hour speed limit on Pleasant Street westbound, the same as the posted speed limit for eastbound traffic, thereby increasing the lowest reaction time.

Of course, the real reaction times are a factor of the actual speed of vehicles, not the speed limits. For example, a driver traveling at 50 miles per hour westbound on Pleasant Street, that is, 10 miles per hour over the speed limit, would have seven seconds to react, not ten.

## C POTENTIAL DESTINATIONS

Whether one would use a trail to reach a specific destination would depend both on how easy it is to reach the trail from one's home and on how easy it is to reach the destination from the trail. That ease of access in turn depends both on how far away the trail is and on the nature of the road and sidewalk system that connects to the trail. The suitability of nearby roads for bicycling and the availability of sidewalks in the area will affect trail usage.

[29] American Association of Highway and Transportation Officials, *Design of Highways and Streets*, 2001, Exhibit 3-3: Decision Sight Distance.

The MetroWest Growth Management Committee developed a suitability map for bicyclists in the area (see Figure 7).[30] That map assigned roadways to one of three categories: (1) best routes for bicycling, (2) OK for experienced bicyclists, and (3) not recommended for bicycling. Four of the roads that cross the right-of-way, Pleasant Street, Belknap Road, Edgell Road, and Water Street, are rated as "OK for experienced bicyclists." Minor roads such as Frost Street are not rated. Route 20 is rated as "Not recommended for bicycling."

The suitability ratings also can be used to evaluate the trips on the road system that might be eliminated by bicyclists who would use a trail. A bicyclist wishing to parallel the right-of-way on the road system could travel on Edgell Road (rated as OK for experienced bicyclists) to Nobscot Road (OK for experienced bicyclists in Framingham and Not recommended for bicycling in Sudbury) to Route 20 (Not recommended for bicycling) to Union Avenue (OK for experienced bicyclists). The southern end of Nobscot Road could be avoided by using Harrington Road/Old Framingham Road (Best routes for bicycling). The roads on the east side of the right-of-way, north of Water Street, are rated higher for bicycling: Hemenway Road (Best routes for bicycling) to Eisenhower Road (Best routes for bicycling) to Raymond Road (Best routes for bicycling) to Route 20 and Union Avenue.[31]

Figure 8 indicates sidewalks in the study area. As can be seen, many of the streets in the vicinity do not have sidewalks, making pedestrian access to the potential trail difficult. Of the streets crossing the right-of-way, there are sidewalks on Pleasant Street, Edgell Road, Frost Street, Water Street, and Route 20. There are no sidewalks on Belknap Road and Grove Street (pedestrian access would be via Belknap Road), which are quite narrow. The lack of pedestrian facilities on some roadways could either decrease use of the potential trail, or result in some people driving to the facility although it is within walking distance. Improvements to pedestrian safety could be made through education, strong enforcement of speed limits, and the construction of sidewalks. The latter would be difficult because of the expense as well as the limited availability of right-of-way.

Most people would reach the proposed trail at the existing grade crossings. Additional local access from neighborhoods can be provided. Direct abutters would have access from their property, unless they were to opt for fencing. Access could be provided to nearby residents who are not abutters by creating short paths to the trail from streets that are close to it. Connections could be made at Colonial Drive and Eaton Road West, for example, just south of the Sudbury/Framingham border. This would also have the effect of linking these neighborhoods to each other. At present, traveling between Colonial Drive and Eaton Road West requires a trip of several miles, although the neighborhoods are within 100 yards of each other.

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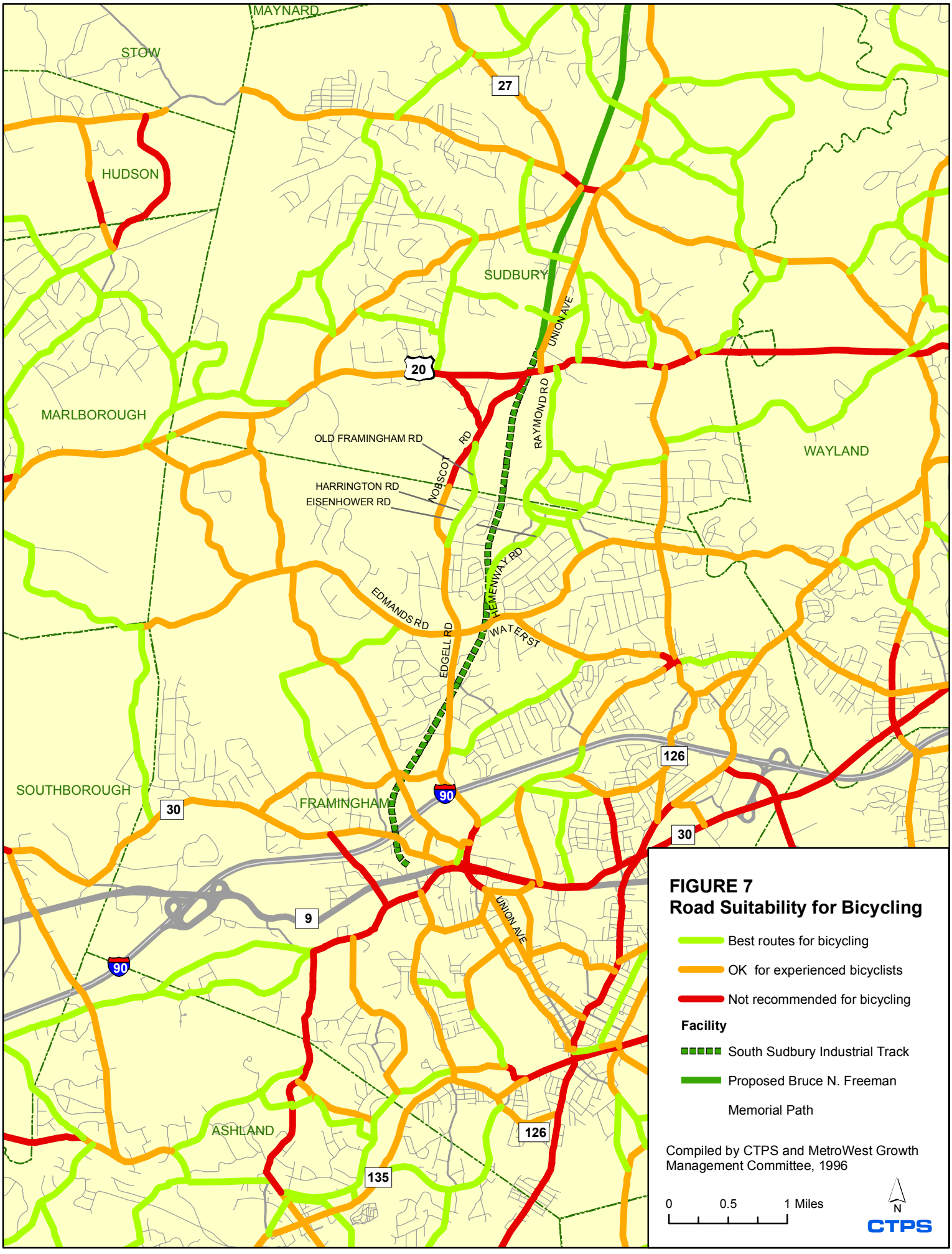
30 This map was developed as part of the *MetroWest Bicycle-Pedestrian Study*, produced by CTPS for MassHighway, October 1996.

31 Using Edgell, Harrington, Old Framingham, and Nobscot Roads to Route 20 to Union Avenue, a bicyclist would be using "Best routes" about 20 percent of the way, "OK for experienced bicyclists" roads about 60 percent, and "Not recommended" roads about 20 percent. While experienced bicyclists do use this route, the northern end may be particularly daunting.


MAYNARD
STOW
HUDSON
SUDBURY
MARLBOROUGH
WAYLAND
SOUTHBOROUGH
FRAMINGHAM
ASHLAND
27
20
90
30
9
126
135
UNION AVE
RAYMOND RD
OLD FRAMINGHAM RD
NOBSCOT RD
HARRINGTON RD
EISENHOWER RD
HEMENWAY RD
EDMANDS RD
EDGELL RD
WATERST
FIGURE 7
Road Suitability for Bicycling
Best routes for bicycling
OK for experienced bicyclists
Not recommended for bicycling
Facility
South Sudbury Industrial Track
Proposed Bruce N. Freeman Memorial Path
Compiled by CTPS and MetroWest Growth Management Committee, 1996
0
0.5
1 Miles
N
CTPS

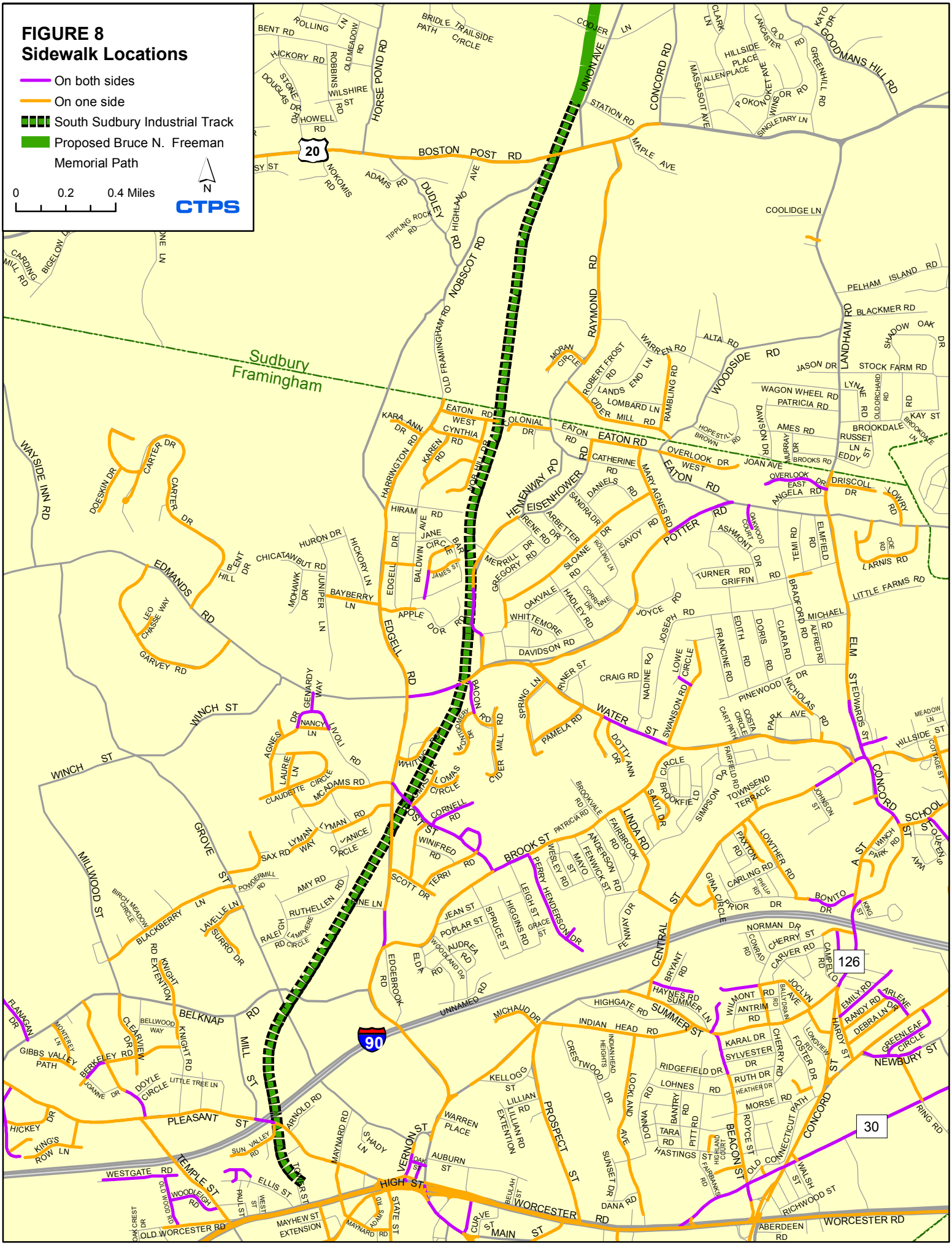


FIGURE 8
Sidewalk Locations
On both sides
On one side
South Sudbury Industrial Track
Proposed Bruce N. Freeman Memorial Path
0
0.2
0.4 Miles
N
CTPS
Sudbury
Framingham
BOSTON POST RD
20
126
30
90
I-90
UNION AVE
CONCORD RD
GOODMANS HILL RD
STATION RD
MAPLE AVE
COOLIDGE LN
HORSE POND RD
NOBSCOT RD
OLD FRAMINGHAM RD
RAYMOND RD
PELHAM ISLAND RD
BLACKMER RD
LANDHAM RD
WOODSIDE RD
ALTA RD
WARREN RD
JASON DR
STOCK FARM RD
WAGON WHEEL RD
PATRICIA RD
AMES RD
BROOKDALE RD
EATON RD
OVERLOOK DR
JOAN AVE
DRISCOLL DR
LOWRY RD
LARNIS RD
LITTLE FARMS RD
HEMENWAY RD
EISENHOWER RD
POTTER RD
TURNER RD
GRIFFIN RD
JOYCE RD
DAVIDSON RD
WHITTEMORE RD
OAKVALE RD
HADLEY RD
SAVOY RD
SLOANE RD
GREGORY RD
MERRILL DR
IRENE RD
ARBETTER DR
SANDRA DR
DANIELS RD
CATHERINE RD
MARY AGNES RD
HIRAM RD
HARRINGTON RD
KAREN RD
CYNTHIA RD
KARA ANN DR
COLONIAL DR
ROBERT FROST RD
LANDS END LN
CIDER MILL RD
LOMBARD LN
RAMBLING RD
MORAN CIRCLE
WAYSIDE INN RD
DOESKIN DR
CARTER DR
EDMANDS RD
BENT HILL DR
CHICATAWBUT RD
HURON DR
HICKORY LN
MOHAWK DR
JUNIPER LN
BAYBERRY LN
APPLE DOR RD
EDGELL RD
BALDWIN CIRC
JANE LN
JAMES ST
LEO CHASSE WAY
GARVEY RD
WINCH ST
GENARDY WAY
NANCY LN
AGNES DR
LAURIE LN
CLAUDETTE CIRCLE
MCADAMS RD
LOMAS CIRCLE
WHITNEY DR
BACON RD
MONTGOMERY DR
CIDER MILL RD
SPRING LN
RINER ST
CRAIG RD
NADINE RD
LOWE CIRCLE
SWANSON RD
PAMELA RD
DOTTY ANN DR
WATER ST
PINEWOOD DR
NICHOLAS RD
PARK AVE
COSTA CIRCLE
CART PATH
FAIRFIELD RD
CIRCLE
BROOKFIELD RD
SALVI DR
SIMPSON DR
TOWNSEND TERRACE
JOHNSON ST
FRANCINE RD
EDITH RD
DORIS RD
CLARA RD
BRADFORD RD
ALFRED RD
MICHAEL RD
ELM ST
EDWARDS ST
MEADOW LN
HILLSIDE ST
COTTAGE ST
SCHOOL ST
QUEEN ST
MAY ST
A ST
WINCH PARK RD
LOWTHER RD
PAXTON RD
CARLING RD
PHILIP RD
GINA CIRCLE
PRIOR DR
BONITO DR
WING ST
CENTRAL ST
NORMAN DR
CHERRY ST
CONRAD RD
CARVER RD
CAMPELLO RD
BRYANT RD
HAYNES RD
SUMMER LN
SUMMER ST
HIGHGATE RD
INDIAN HEAD RD
MICHAUD DR
UNNAMED RD
WILMONT RD
ANTRIM RD
BALLYDRAIN RD
JOCLYN AVE
EMILY RD
RANDY RD
ARLENE DR
DEBRA LN
HARDY ST
GREENLEAF CIRCLE
NEWBURY ST
LONGVIEW RD
FOSTER DR
CHERRY RD
KARAL DR
SYLVESTER DR
RUTH DR
HEATHER DR
MORSE RD
LOHNES RD
RIDGEFIELD DR
INDIAN HEAD HEIGHTS
CRESTWOOD DR
LOCKLAND AVE
DONNA RD
BANTRY RD
PITT RD
TARA RD
HASTINGS ST
COUNTRY HIGH RD
FAIRBANKS RD
ROYCE ST
BEACON ST
CONNECTICUT PATH
OLD CONNECTICUT PATH
RING RD
WALSH ST
RICHWOOD ST
ABERDEEN RD
WORCESTER RD
DANA RD
SUNSET DR
PROSPECT ST
KELLOGG ST
LILLIAN RD
LILLIAN RD EXTENSION
WARREN PLACE
AUBURN ST
OAK ST
VERNON ST
HIGH ST
MAIN ST
CURVE ST
BEULAH ST
STATE ST
ADAMS RD
MAYNARD RD
SHADY LN
ARNOLD RD
PLEASANT ST
SUN VALLEY RD
TEMPLE ST
WESTGATE RD
OLD WOOD RD
WOODLEIGH RD
PAUL ST
WEST ST
ELLIS ST
MAYHEW ST EXTENSION
OAK CREST DR
OLD WORCESTER RD
MILL ST
MILLWOOD ST
GROVE ST
BLACKBERRY LN
BIRCH MEADOW CIRCLE
LAVELLE LN
SURRO DR
KNIGHT EXTENSION
KNIGHT RD
BELKNAP RD
BELLWOOD WAY
CLEARVIEW DR
BERKELEY RD
MONTEREY LN
GIBBS VALLEY PATH
JOANNE DR
DOYLE CIRCLE
LITTLE TREE LN
FLANAGAN DR
HICKEY DR
KING'S ROW LN
SAX RD
LYMAN WAY
LYMAN RD
JANICE CIRCLE
POWDERMILL RD
AMY RD
RUTHELLEN RD
RALEIGH CAMPHERE RD CIRCLE
LANE LN
CORNELL RD
WINIFRED RD
TERRI RD
SCOTT DR
POST ST
BROOK ST
PATRICIA RD
BROOKVALE RD
LINDA RD
FAIRBROOK RD
ANDERSON RD
FENWICK ST
MAYO ST
WESLEY RD
PERRY HENDERSON DR
LEIGH ST
GRACE ST
HIGGINS RD
SPRUCE ST
JEAN ST
POPLAR ST
AUDREA RD
WOODLAND DR
ELDA RD
EDGEBROOK RD
FENWAY DR
CHAPEL ST
CHURCH ST
OLD SUDBURY RD
HOWELL RD
WILSHIRE RD
ROBBINS RD
OLD MEADOW RD
STONE DR
DOUGLAS DR
HICKORY RD
BENT RD
ROLLING LN
BRIDLE TRAILSIDE CIRCLE
PATH
TIPPLING ROCK RD
ADAMS RD
NOKOMIS RD
DUDLEY RD
HIGHLAND AVE
CARDING MILL RD
BIGELOW DR
ONE LN
HOPESTILL BROWN RD
DAWSON DR
MURRAY DR
BROOKS RD
OVERLOOK EAST
ANGELA RD
OAKWOOD COURT
ASHMONT DR
TEMI RD
ELMFIELD RD
OAK RD
ROLLING LN
CORRINNE DR
JOSEPH RD
MICHAEL RD
CLARK LN
LANCASTER RD
OLD LANCASTER RD
HILLSIDE PLACE
ALLEN PLACE
MASSASOIT AVE
PEQUOT AVE
PEQUOT RD
WINNEPESAUKEE RD
SINGLETARY LN
KATO DR
GREENHILL RD
OLD ORCHARD RD
LYNNE RD
KAY ST
BROOKDALE LN
RUSSET LN
EDDY ST

## Trip Generators

Figure 9 illustrates trip generators in the vicinity of the South Sudbury Industrial Track. Potential destinations in Sudbury include the Sudbury Crossing shopping area, 1776 Plaza, and the Mill Village shopping center, numerous restaurants, and other commercial establishments on Route 20. Sudbury's Goodnow Public Library is less than one-half mile east of the right-of-way. Feeley Park baseball fields are located east of the right-of-way on Raymond Road.

In Framingham, the track is adjacent to the Hemenway Elementary School; the Dunning School on Frost Street and Walsh Middle School on Brook Street are close by. The presence of a rail trail could encourage more children to walk or bicycle to school, the goal of the federal Safe Routes to School Program.[32] The right-of-way is close to the Nobscot Shopping Center on Water Street and Garden in the Woods on Hemenway Road. The Heritage Retirement Home is on Water Street, adjacent to the Hemenway School. Framingham State College is a quarter-mile from the southern end of the corridor. There are restaurants and other commercial establishments on Edgell Road both north and south of Water Street.

Callahan State Park is located about 2.5 miles west of the right-of-way in Framingham. Nobscot Scout Reservation, on Edgell Road, straddles Sudbury and Framingham. The reservation includes Nobscot Hill, at 602 feet the highest elevation between the Blue Hills and Wachusett Mountain. The Sudbury Valley Trustees own many parcels in the area, including some along Belknap Road adjacent to the Pike-Haven House at Belknap and Grove Streets.[33]

Finally, Figure 9 shows a large number of employment sites near the right-of-way.[34] Many of these are located near the ends of the corridor, along Route 20 in Sudbury and Route 9 in Framingham.

## Trail Connections

The proposed trail could potentially become part of a much larger network (see Figure 10). The South Sudbury Industrial Track is the southern segment of the Lowell-Sudbury right-of-way. Plans are underway to construct the Bruce N. Freeman Memorial Path on this right-of-way. Construction is expected to start in 2006 on the northernmost 6.8 miles, from the Chelmsford/Lowell line to the Westford/Carlisle/Acton line. Detailed engineering analyses have been done or are underway for all additional segments on the 13 miles of right-of-way between that northernmost section and the study area, traversing the communities of Westford, Carlisle, Acton, Concord, and Sudbury. The potential trail on the South Sudbury Industrial Track would be an extension of this Bruce N. Freeman Path. The total length, if the path were built through Sudbury and Framingham, would be 25 miles.

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32 Each state is mandated to have a full-time coordinator for this program. The Massachusetts coordinator works in the Mass*RIDES* office. For more information, call 1-888-4COMMUTE.

33 *Framingham Historical Preservation Plan*, July 24, 2002, p. 23.

34 The CTPS employment database is the source for the information on the employment sites.

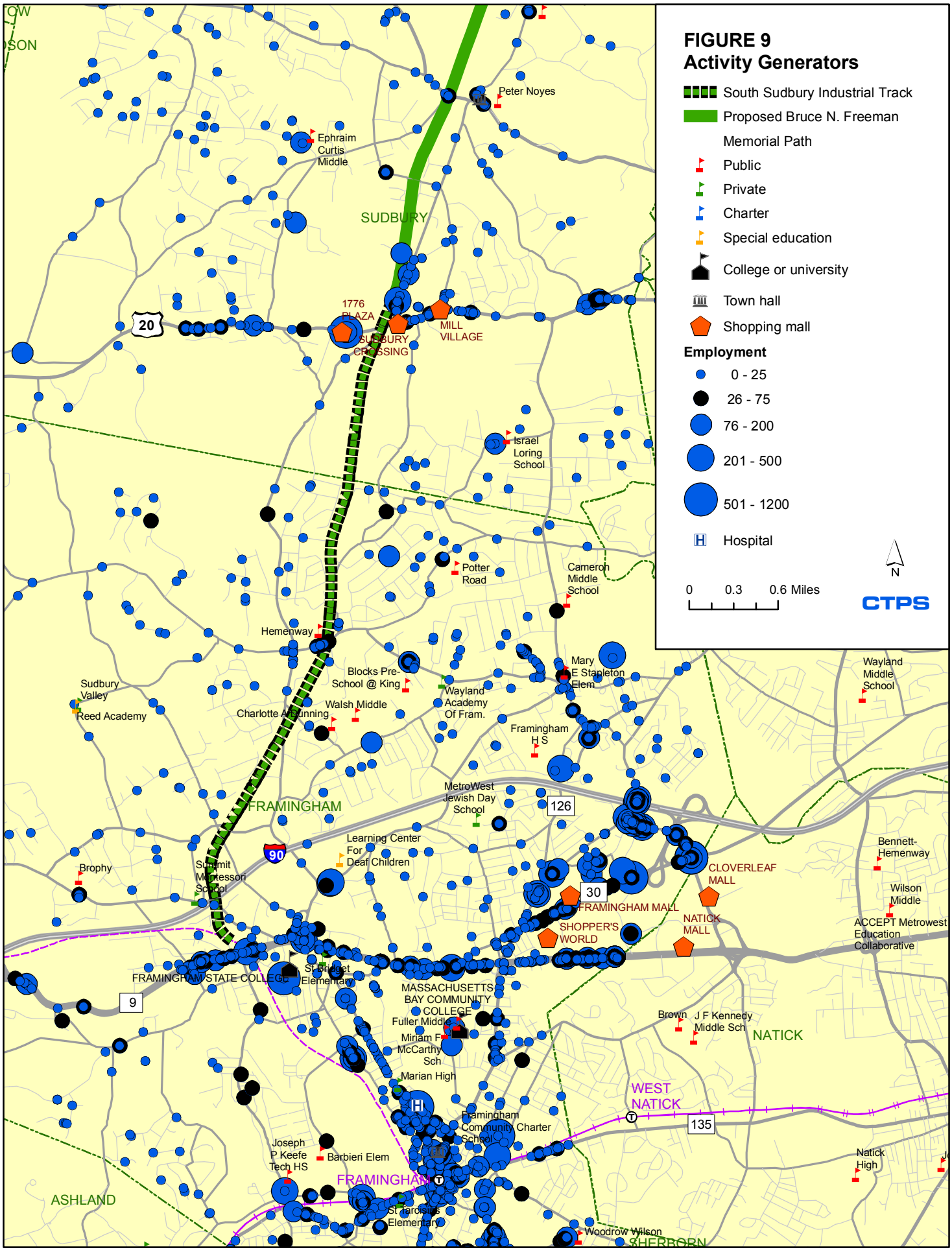
FIGURE 9
Activity Generators
South Sudbury Industrial Track
Proposed Bruce N. Freeman
Memorial Path
Public
Private
Charter
Special education
College or university
Town hall
Shopping mall
Employment
0 - 25
26 - 75
76 - 200
201 - 500
501 - 1200
Hospital
N
0 0.3 0.6 Miles
CTPS
Peter Noyes
Ephraim Curtis Middle
SUDBURY
1776 PLAZA
SUDBURY CROSSING
MILL VILLAGE
20
Israel Loring School
Potter Road
Cameron Middle School
Hemenway
Sudbury Valley
Reed Academy
Blocks Pre-School @ King
Walsh Middle
Charlotte A Dunning
Wayland Academy Of Fram.
Mary E Stapleton Elem
Framingham H S
Wayland Middle School
FRAMINGHAM
MetroWest Jewish Day School
126
Learning Center For Deaf Children
Brophy
Summit Montessori School
90
30
FRAMINGHAM MALL
CLOVERLEAF MALL
NATICK MALL
SHOPPER'S WORLD
Bennett-Hemenway
Wilson Middle
ACCEPT Metrowest Education Collaborative
FRAMINGHAM STATE COLLEGE
St Bridget Elementary
MASSACHUSETTS BAY COMMUNITY COLLEGE
Fuller Middle
Miriam F McCarthy Sch
Marian High
9
Brown
J F Kennedy Middle Sch
NATICK
WEST NATICK
135
Framingham Community Charter School
Joseph P Keefe Tech HS
Barbieri Elem
FRAMINGHAM
Natick High
ASHLAND
St Jerome's Elementary
Woodrow Wilson
SHERBORN

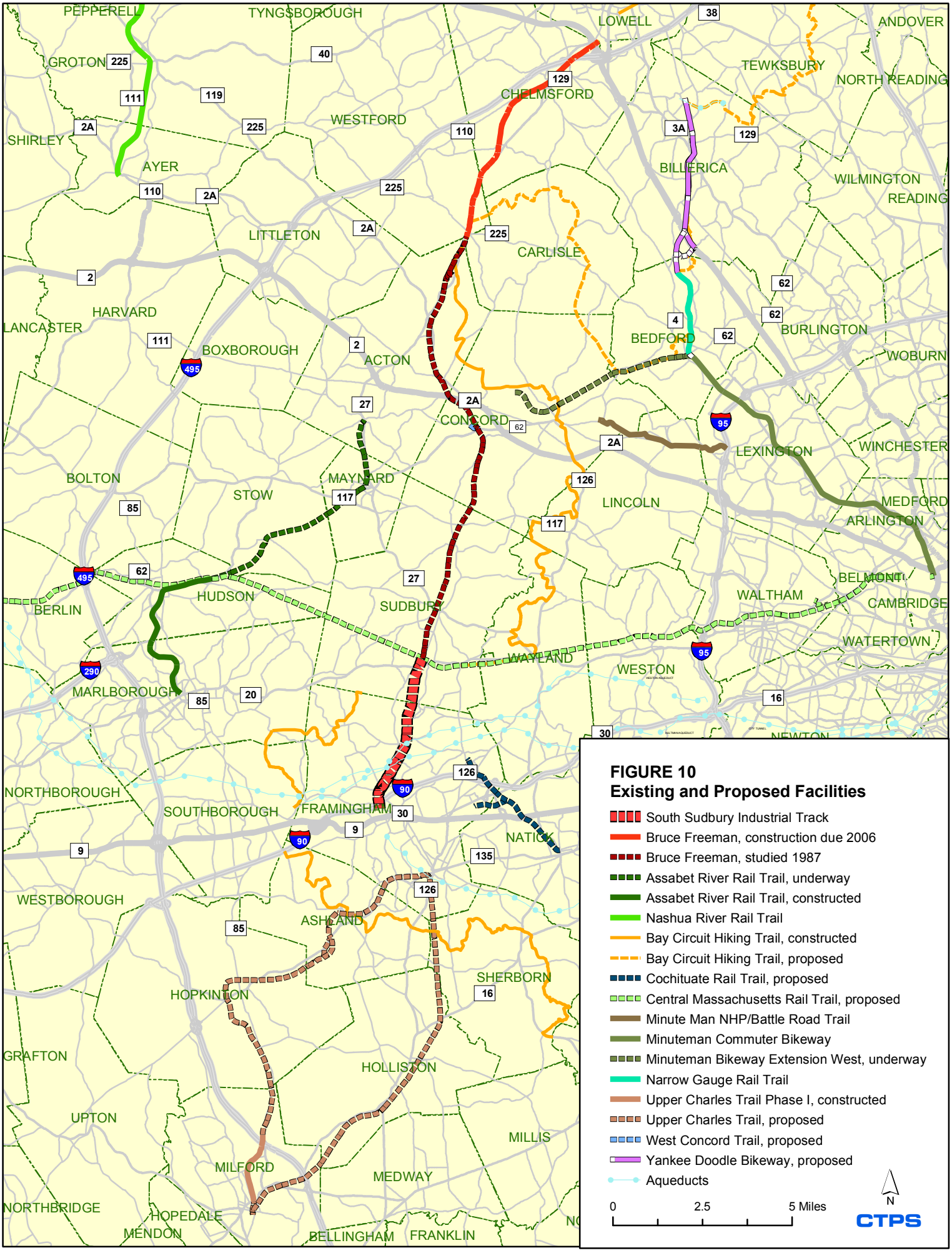


**FIGURE 10**
**Existing and Proposed Facilities**

- South Sudbury Industrial Track
- Bruce Freeman, construction due 2006
- Bruce Freeman, studied 1987
- Assabet River Rail Trail, underway
- Assabet River Rail Trail, constructed
- Nashua River Rail Trail
- Bay Circuit Hiking Trail, constructed
- Bay Circuit Hiking Trail, proposed
- Cochituate Rail Trail, proposed
- Central Massachusetts Rail Trail, proposed
- Minute Man NHP/Battle Road Trail
- Minuteman Commuter Bikeway
- Minuteman Bikeway Extension West, underway
- Narrow Gauge Rail Trail
- Upper Charles Trail Phase I, constructed
- Upper Charles Trail, proposed
- West Concord Trail, proposed
- Yankee Doodle Bikeway, proposed
- Aqueducts

0 2.5 5 Miles

N

CTPS

The northern terminus of the study area, where the South Sudbury Industrial Track reaches the Lowell-Sudbury, is also where the Central Mass. right-of-way crosses. The proposed path on the Central Mass., known as the Wayside Trail, would utilize an existing 23-mile right-of-way between Berlin and Belmont owned by the MBTA. West of Berlin, there are long-range plans to build a trail on the Central Mass. to Northampton. Some sections, such as the Norwottuck Rail Trail in Belchertown, Amherst, Hadley, and Northampton, have already been converted to trail use. From Belmont eastward, the Central Mass. would utilize another right-of-way to connect with the MBTA system at Alewife Station on the Red Line. The MBTA permits bicycles on the Red Line at all times except for weekday peak periods.[35] There are also many bus connections at Alewife Station. Two other paths connect to Alewife Station: the Minuteman Commuter Bikeway and the Linear Park in Somerville. There are plans to extend the latter southeastward towards Boston.

Heading west, the Central Mass. crosses the Assabet River Rail Trail in Hudson. That trail opened in October 2005 in Hudson and Marlborough. Work is underway in Stow, Maynard, and Acton to complete the entire 12-mile facility, with linkage to the MBTA's South Acton commuter rail station, where bicycle lockers and parking racks have already been installed.

The proposed Upper Charles Trail is four miles south of the right-of-way and could be connected via the roadway system. The proposed Cochituate Trail would extend from the Saxonville area of Framingham south to Natick along the Saxonville Branch. This proposed rail trail is two miles east of the South Sudbury Industrial Track.

The Bay Circuit Trail is a circumferential hiking trail that extends from Plum Island in Newburyport to Kingston Bay. Called the outer Emerald Necklace, the 200-mile greenway is 75 percent complete and traverses 34 communities. Its present routing crosses the northern terminus of the study area on the Central Mass. line in Sudbury. Going west, it passes through northwest Framingham into Southborough, then goes south and then east into Ashland.

Finally, the South Sudbury Industrial Track intersects property of the Massachusetts Water Resources Authority dedicated as right-of-way for the Hultman and Weston aqueducts. CTPS is scheduled to do a study to explore the potential of these and other aqueducts as paths.

There is also an on-road facility of historic interest in the study area. Massachusetts and New York established the Knox Trail in 1926 to commemorate the 150th anniversary of the transfer of artillery from Fort Ticonderoga in New York to Boston. Colonel Henry Knox, a Boston bookseller, came up with the idea of bringing the fort's armaments to Boston in order to dislodge the British from the harbor. The 300-mile route crosses the right-of-way three times: at Pleasant Street, on Edgell Road, and on Water Street.[36]

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[35] Weekday access hours are before 7:00 AM, between 10:00 AM and 4:00 PM, and after 7:00 PM. Two bicycles are allowed on each car of each train, one at each end. These rules and hours also apply to the Orange and Blue Lines. Bicycles are welcome on all commuter rail lines during off-peak hours. All weekend service is open to bicycles. No extra fare or special pass is required for bicycles. There is no bicycle access on the Green Line.

[36] The Continentals had just captured Fort Ticonderoga, and Colonel Knox, General Washington's artillery chief, came up with the idea of bringing the fort's artillery to Boston to use against General Howe's forces. Washington

## D PARKING

Users could reach the proposed trail in a motor vehicle or on a bicycle, skates, or foot. If the trail is built and remains local, most use probably would come from the local area. If it does become connected to a larger regional trail system, there may be more users from beyond the local area. On the other hand, these users might access the trail system at other points.

A survey of Norwottuck Rail Trail users found that on weekends two-thirds of users came to the trail by car and that on weekdays 44 percent came by car. The average vehicle occupancy was 2.0 on the weekend and 1.5 during the week.[37] While there has been no similar survey of users of the Minuteman Commuter Bikeway, there were 175 bicycles parked at Alewife Station, the southern terminus of the bikeway, on a weekday. Some of these bicyclists may have reached the station using another path, the Linear Park from Somerville, and some may have come on the local road system. There would be no direct connection to the train station in Framingham from the proposed trail, although on-road connections could be identified.

Suffice it to say that some people will want to park near the facility. There are secondary streets that intersect the right-of-way, or are nearby, that currently allow parking. It would be up to each community to determine how to best manage parking in the vicinity of the proposed trail. Where feasible, an inexpensive trail-specific parking strategy might include the use of existing parking areas proximate to the proposed facility. School and office parking lots, for example, are often empty on weekends, when trail-parking demand would be highest. Access from trail parking areas must be safe and direct. Secure bicycle parking is recommended in areas where bicyclists may want to leave their vehicles, such as near commercial areas and schools.

Given that the southern end of the right-of-way joins an active rail line, the trail's southern terminus would likely be at Pleasant Street. South of Pleasant Street the right-of-way extends about 1,000 feet. A small parking lot could be built here. The right-of-way south of any parking built here could be left as open space. This would not preclude an extension of the trail southward if freight use on the Fitchburg Secondary were to cease.

Locating parking is a community decision. Providing parking is not a requirement for trail feasibility. However, it is an aspect of project development that should be considered at the outset. If excess parking at schools and private facilities were made available, it appears that little if any parking would have to be built. The communities could decide whether or not to allow on-street parking, on a case-by-case basis. If trail users were to park in neighborhoods where it is not desired, then the Town could post signs and enforce the parking regulations.

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liked the idea and put the Colonel in charge. The Colonel succeeded, although the intense winter made the trip take four times as long as he had predicted. The artillery was placed on Dorchester Heights, where the British saw it the next morning, March 17, and evacuated. The route taken by Colonel Knox was secret: the path of today's trail is an educated guess. The route through Framingham goes east on Pleasant Street, north on Edgell Road, and then west on Water Street to Potter Road. There is a commemorative marker on Edgell Road at Route 9.

[37] Pioneer Valley Planning Commission, *Survey of Users on the Norwottuck Rail Trail*, June 2003, p. 9. The survey found that 48 percent of the weekday users and 25 percent of the weekend users arrived by bicycle.

## E COMMUNITY IMPACTS

Reports published by both Framingham and Sudbury have referred to the general topic of trails or to this specific proposal. The Town of Framingham's Community Development Plan stated that the town should "continue efforts to develop rail trails and other non-single-occupant-vehicle (SOV) modes and also improvements to the LIFT amenities (i.e., bus shelters)."[38] The same report recommended in its Natural Resources and Open Space section that in regard to the "CSX/South Sudbury Railroad" the town should "acquire in fee title or long-term leases for use as multiple purpose trail."[39]

The Sudbury Open Space Plan listed six goals, including "create trail linkages including new trails, bike paths, walkways, and greenways."[40] One of the plan's objectives included the transformation of "unused railroad beds to bike and pedestrian paths."[41]

The Open Space and Recreation Plan Committee of Framingham asked residents in a survey what recreational resources were most needed by the community. At the top of the list, tied with conservation areas, were bike trails. Hiking trails came next.[42]

The Town of Framingham's Rail Trail Task Force recommended that "the Town of Framingham pursue the development of the CSX South Sudbury Industrial Track into a community linear park and rail trail."[43] An ad-hoc committee of Framingham residents, the Committee Against the Rail Trail, issued a report stating that the potential costs, traffic, crime, parking, and loss of privacy associated with a trail outweighed its benefits.[44]

The potential impacts on the community, if a trail is built, are described below in terms of economics, health, and personal safety.

### Economics

A trail generally has positive impacts on a community. A nearby trail is seen as a benefit for homeowners. Newspaper listings of properties in Arlington, Lexington, and Bedford, for example, mention proximity to the Minuteman Commuter Bikeway as a plus. Studies have found that, overall, paths have a slight positive effect on home values.[45] Businesses such as

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38 *Town of Framingham Community Development Plan, Final Plan*, June 2004, prepared by the Metropolitan Area Planning Council, funded under EO 418, page v.

39 Ibid., p. 57.

40 Town of Sudbury, *Open Space and Recreation Plan*, 2000-2005, June 8, 1998, p. 39.

41 Ibid., p. 39.

42 Town of Framingham, *Open Space and Recreation Plan*, August 2003, by the Open Space and Recreation Planning Committee, Department of Parks and Recreation, and the Department of Planning and Economic Development, p. 6-1.

43 *Report of the Framingham Rail Trail Task Force*, January 2004, p. 35.

44 *The Rails-to-Trails Project Opposition Report*, June 2003.

45 A survey of homeowners in Schenectady, New York, found that a nearby trail either had no effect on or slightly increased the value of their property. Sixty-eight percent of abutters responded to the survey. Forty percent of abutters used the trail daily or significantly, 14 percent not at all. Source: Schenectady County Planning

restaurants and bicycle shops would attract path users. On extensive path systems, such as the one of which this facility might someday be part, tourists who stay in hotels or campgrounds may also be attracted.

The negative economic side for the community is the cost to local taxpayers of acquiring, designing, building, and maintaining the trail. These costs, discussed in the next section, can be offset by state and federal funding, as well as by private contributions.

### Health

Health and fitness are important reasons to use human-powered modes. Obesity is an increasing community health concern and is linked to heart disease, diabetes, and other ailments. From 1990 to 2004, the number of adults in Massachusetts characterized as obese rose 80 percent to over 18 percent of the population. The number afflicted with diabetes rose 50 percent.[46] Asthma rates in New England are higher than in the country as a whole. Between 2001 and 2004, 400,000 new cases developed.[47]

Disease and poor health in the U.S. cost billions of dollars a year in medical costs and lost productivity.[48] Exercise is a crucial ingredient in reducing weight and maintaining good health and personal fitness. Studies have shown that proximity to parks or paths promotes a healthier life style. Surveys on paths in Missouri and Indiana found that 55 percent and 70 percent, respectively, of users exercised more as a result of access to a facility.[49]

### Personal Safety

Trail opponents, both locally and nationally, have brought up the issue of crime. The Rails to Trails Conservancy conducted a study of 372 rail trails in regard to crime.[50] In three categories of trails, urban, suburban, and rural, it found crime rates to be low. A study in Pinellas County, Florida, found that crime rates along a trail there were the same or lower than

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Department, 1997. An April 2001 survey of recent purchasers of homes found trails to be the second most important community amenity, after highway access. Source: National Association of Home Builders and National Association of Realtors. A recent study examined homes sold in the communities traversed by the Minuteman Bikeway (Arlington, Lexington, Bedford) and the Nashua River Rail Trail (Ayer, Pepperell, Groton, Dunstable). Homes near the two trails sold at 99.3% of the list price compared to 98.1% for other homes in those towns. On average, homes near the trails sold in 29 days; the other homes sold in an average of 54 days. Source: Craig Della Penna, *Home Sales near Two Massachusetts Rail Trails*, January 25, 2006.

46 *Boston Globe*, March 23, 2006, based on Department of Public Health survey. The national figure for adult obesity is 23 percent.

47 *Boston Globe*, March 27, 2006, based on a report by the Asthma Regional Council.

48 Diabetes alone costs the U.S. $132 billion annually, according to the American Diabetes Association. It is estimated that one in three children born in the U.S. in 2001 will become diabetic in his or her lifetime. *New York Times*, "Diabetes and Its Awful Toll Quietly Emerge as a Crisis," N. R. Kleinfield, January 9, 2006.

49 Ross C. Brownson, "Promoting and Evaluating Walking Trails in Rural Missouri," Saint Louis University School of Public Health, 1999; Eppley Institute for Parks and Public Lands, School of Health, Physical Education and Recreation, Indiana University, *Indiana Trails Study: Summary Report*, November 30, 2001.

50 Tammy Tracy and Hugh Morris, *Rail-Trails and Safe Communities: The Experience of 372 Trails*, Rails to Trails Conservancy in cooperation with the National Park Service, January 1998.

countywide rates.[51] Police in the communities of Bedford, Lexington, and Arlington have indicated that the Minuteman Commuter Bikeway has not attracted crime. Law enforcement officers in other parts of the country indicate the same. Trails become part of the fabric of the community, attracting a wide range of users and bringing a sense of cohesion.

While a crime can occur anywhere, including on a path, those intent on committing crimes are more likely to seek areas of little or no activity. An abandoned right-of-way, for example, is subject to loitering, vandalism, and trash disposal much more than an area actively used by the community throughout the day.

## F COSTS

This section provides estimates of right-of-way acquisition, design, and construction costs, as well as of safety and maintenance expenses.

### Acquisition, Design, and Construction

The initial cost for a trail would be the acquisition of the right-of-way. The present owner, CSX, as well as the party or parties proposing to acquire the property, would do appraisals. The parties would then negotiate a sale price. Under the provisions of railbanking, the right-of-way could revert to rail use in the future. Congress created railbanking in 1983 to allow the construction of trails on railroad rights-of-way as an interim use (National Trails System Act, 16 USC 1247 (d)).[52] The trail use is called interim in that rail use would be allowed in the future if needed. Railbanking preserves the right-of-way intact as a transportation corridor.

Some railroad companies gained custody of all or portions of their rights-of-way through leases whereby the land would revert to the original owner upon cessation of rail service. (This type of acquisition is not as common in this part of the country as elsewhere). A preliminary look at the deeds suggests that most if not all of the right-of-way was purchased fee simple, meaning it was bought from the previous owner, not leased. Nevertheless, railbanking would ensure that no reversions would occur.

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51 Pinellas County MPO, *Pinellas Trail Community Impact Study*, September 2001.

52 National Trails System Act, 16 USC 1247 (d): "The Secretary of Transportation, the Chairman of the Interstate Commerce Commission, and the Secretary of the Interior, in administering the Railroad Revitalization and Regulatory Reform Act of 1976, shall encourage State and local agencies and private interests to establish appropriate trails using the provisions of such programs. Consistent with the purposes of that Act, and in furtherance of the national policy to preserve established railroad rights-of-way for future reactivation of rail service, to protect rail transportation corridors, and to encourage energy efficient transportation use, in the case of interim use of any established railroad rights-of-way pursuant to donation, transfer, lease, sale, or otherwise in a manner consistent with the National Trails System Act, if such interim use is subject to restoration or reconstruction for railroad purposes, such interim use shall not be treated, for purposes of any law or rule of law, as an abandonment of the use of such rights-of-way for railroad purposes. If a State, political subdivision, or qualified private organization is prepared to assume full responsibility for management of such rights-of-way and for any legal liability arising out of such transfer or use, and for the payment of any and all taxes that may be levied or assessed against such rights-of-way, then the Commission shall impose such terms and conditions as a requirement of any transfer or conveyance for interim use in a manner consistent with this Act, and shall not permit abandonment or discontinuance inconsistent or disruptive of such use."

The present position of the FHWA Massachusetts office is that no federal funds should be spent to build trails on railbanked corridors because the land is not held in perpetuity. Massachusetts is the only state where FHWA has taken this position. The policy is under review and is likely to change in the near future.

Actual or estimated construction costs of other paths are the basis for the estimate of the construction cost of this project. The need for items such as structural work on bridges, traffic signals, root barrier systems, etc., varies among projects. This results in significant variations among paths in terms of construction cost per mile.

The Assabet River Rail Trail was bid at about $750,000 per mile. That project included a high trestle bridge, a tunnel, and upgraded traffic signals. The northern portion of the Bruce N. Freeman Memorial Path is estimated to cost $760,300 per mile. This project includes a flashing signal, and structural work on four bridges.[53]

A slightly lower per-mile cost estimate of $700,000 will be used for this project. A primary factor is the fact that there are only two bridges[54] on this project, both of which carried freight trains as recently as 2000. This does not prove, however, that significant structural work will not be necessary; such work would raise the cost of the project.

This estimate is in 2006 dollars. Given the time necessary for acquisition and design, as well as the competition for funds, construction before 2010 is very unlikely. Construction costs, for roads as well as paths, are rising relatively rapidly at this time. This escalation may continue, or prices may even decrease.[55] The true cost of the project depends on the extent of work to be done and the prices in effect when the job is bid.

The construction of a 10-foot-wide, paved trail along the 4.8-mile right-of-way, at an estimated unit cost of $700,000 per mile, would cost about $3,300,000 (2006 dollars). A better estimate of construction cost would be known after final design. The actual cost would not be known until the project was to be bid for construction.

The cost is affected by the extent of various infrastructure needs:

- Fencing would be necessary or desirable along some embankments, on bridges, and to protect the privacy of some abutters.
- Detailed engineering would be necessary to determine the cost of any structural work on bridges, culverts, and drainage systems.
- Root barriers, used to prevent the buckling of pavement, ought to be considered on a selective basis. They are probably not needed for most of the right-of-way, as along most of it the trees appear to be far enough away from the corridor to not pose a threat.

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[53] The Minuteman Commuter Bikeway, built in 1992 and 1993, cost approximately $190,000 per mile. This included bridge work and intersection treatments.

[54] No structural analysis of the bridges (#2609 over the Massachusetts Turnpike and # 2566 over Grove Street) was done for this study.

[55] The cost to construct the Minuteman Commuter Bikeway was less than the estimate because construction costs had dropped.

> Two reasons to minimize the use of root barriers are (1) their expense and (2) the need to disturb soil down to a greater depth.[56]

The final decision on the amount of fencing to include and the extent of root barrier installation, in addition to any major items such as structural work on bridges and culverts, will affect the cost.

Lighting is a potential additional project cost, depending on local preferences. The Minuteman Commuter Bikeway communities, for example, all agreed not to light that facility, to lower the construction and operating costs and lessen the visual intrusion on neighbors.

Two major design factors that affect construction cost are trail width and pavement type. Constructing a trail less than 10 feet wide would be less expensive. A lesser width, however, would invite more conflicts among people using different modes. Likewise, a soft-surface, hard-packed trail might cost less to construct. On the other hand, such a trail would be more expensive to maintain. It also would preclude the use of skates and narrow-tired bicycles.

A general rule of thumb is that design costs for a project are about 10 percent of construction costs. Based on the above construction estimate of $3,300,000, a design cost of about $330,000 is projected. A portion of the design cost could potentially be paid for with state and/or federal dollars, as has been done on other paths.

The Town of Framingham might be interested in installing a sewer line along the right-of-way. This use is very compatible with a trail. It would make most sense, of course, to install the sewer line in conjunction with trail construction. The Town of Sudbury is considering using part of the right-of-way as a bypass road from Route 20 to Union Street. Under railbanking regulations, this use is acceptable as long as it does not interfere with the construction of the trail.

**Safety and Maintenance**

Each town would be responsible for operation and maintenance of its segment of the trail, as is the case for other town-owned facilities such as streets, sidewalks, parks, and playgrounds.

The maintenance expenses of the Minuteman Commuter Bikeway can help shed light on what to expect in Framingham and Sudbury. CTPS contacted police, fire/rescue, and public works departments in Bedford, Lexington, and Arlington to obtain operations and maintenance expense data associated with the Minuteman. Each responsible community sets its own policy in regard to the path. Officers in Bedford, for example, patrol the bikeway on summer weekends for four hours a day, on average. In Lexington, bicycle officers patrol 16 hours a week for 32 weeks each year (late March to November). Bicycle patrols also cover other

[56] These barriers are installed along a right-of-way to prevent roots from getting under a path and buckling the pavement. If the roots have alternative ways to grow, the barriers can protect the path. If not, root barriers may provide only temporary protection. The roots will eventually go under the barriers and then up to the pavement. The reconstruction of the Cape Cod Rail Trail includes root barriers along approximately 25 percent of the corridor, to a depth of two feet. Certain species such as the black locust tree are particularly troublesome.

areas in town, including Lexington Center. In Arlington, the trail is policed routinely within patrols, as are the roads in town; there was no tally of hours spent on the bikeway. There have been very few bikeway-related problems, except for an occasional snowmobile or dirt bike.

Estimates of annual medical emergency calls from the Minuteman ranged from 5 in Bedford to 30 in Lexington, most involving scrapes and bruises from falls. These numbers make sense in terms of the relative bikeway length in each town (about one mile in Bedford, about five miles in Lexington) and the larger user volumes in Lexington. The injured users, rather than the towns, are charged for ambulance calls.

Maintenance of the Minuteman includes mowing the shoulders and sweeping the surface a few times a year, cleaning up fallen leaves and branches, and restriping the centerline once every few years. There have been a few instances since the facility opened in 1993 in which the pavement needed patching, and some embankment erosion has needed to be controlled.

Cost estimates were obtained from the Town of Lexington for policing and maintenance in 1996. These estimates were increased by 2.5 percent per year to derive 2006 estimates. The resultant estimates are about $1,500 per mile for maintenance and $1,000 per mile for policing. Table 8 shows these estimated per-mile rates applied to Framingham and Sudbury.

**Table 8**
**Estimated Policing and Maintenance Costs,**
**by Community, per Year, Based on Lexington Estimates**

| | Length (mi.) | Policing | Maintenance | Total | Cost per Capita |
|---|---|---|---|---|---|
| **Framingham** | 3.4 | $3,400 | $5,100 | $8,500 | 13¢ |
| **Sudbury** | 1.4 | $1,400 | $2,150 | $3,550 | 21¢ |
| **Total** | 4.8 | $4,800 | $7,250 | $12,050 | 14¢ |

It should be noted that the Town of Lexington appears to expend more resources on the Minuteman Commuter Bikeway than the other two Minuteman communities; the estimates above may reflect more staff time than Framingham or Sudbury might incur.

# 4 Implementation

Constructing a trail on the South Sudbury Industrial Track is physically feasible. This chapter discusses the steps that will need to be taken, if the project moves forward, in terms of right-of-way acquisition, design, construction, and trail operation.

## A ACQUISITION OF THE RIGHT-OF-WAY

Interested citizens have met with officials of the Executive Office of Transportation to explore the possibility of state ownership of the right-of-way in Framingham and Sudbury. The Commonwealth now owns the right-of-way north of the Central Mass. line as far as Lowell, as discussed in Chapter 2. If the Commonwealth does not purchase this segment, then the communities would be responsible, unless other parties are identified.

Sudbury has Community Preservation Funds available, and those monies could be requested for acquisition. Framingham would have to appropriate or somehow find funds. There is a newly formed limited liability corporation expressly established to buy rights-of-way and hold them until public funds are available.[57]

Whatever the funding source, the land would be acquired under the rules of railbanking, which allows for future reacquisition of the right-of-way for rail purposes, by CSX or by another railroad. Whether the right-of-way would ever be needed for rail purposes is unknown, but rail use in the near future is extremely unlikely.

Based upon documents made available by CSX, it appears that this right-of-way was acquired in whole or predominantly by fee simple, meaning the railroad bought the land outright. It is recommended that the communities or any other entity purchasing the land complete a title search prior to acquisition. The title search will identify how the right-of-way was originally acquired and any easements that were granted.

A Phase I environmental assessment ought to be done prior to acquisition. This visual survey and review of records will help determine the location, types, and possible extent of any pollutants in the right-of-way. CSX and the purchasers would appraise the right-of-way and then negotiate the price.[58]

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[57] Central Highlands, LLC; Craig Della Penna, Principal.

[58] CSX has done recent right-of-way appraisals in two other areas in eastern Massachusetts: Holliston-Sherborn and Fitchburg. Appraisals for a six-mile length of right-of-way in Holliston and Sherborn were $670,000 per mile by CSX and $165,000 per mile by the communities. In Fitchburg, a 4.2-mile right-of-way was appraised by CSX at $8,900,000 and by the City of Fitchburg at $1,540,000: $2,119,000 and $367,000 per mile, respectively. These figures are not intended as indicators of per-mile appraisals for the right-of-way in Framingham and Sudbury. Rather, they are provided to indicate the significant disparity between local and CSX appraisals.

If the communities were to decide not to proceed with a trail, CSX most likely would sell the right-of-way to others, either abutters or other parties. Although the communities would have the option of pursuing easements in the future, that approach would be much more difficult and probably more costly.

## B Design and Construction

The next step after acquisition would be preliminary engineering and design. In this step, a design firm would survey the right-of-way, providing information on slopes, water tables, and wetlands. The preliminary engineering design plans would include a layout of where the trail would go, where fencing and buffering might be required, what types of drainage and bridge work would be needed, and wetland locations.

The final design plans would include detailed construction drawings that are used in the field to build the trail. They indicate what vegetation, if any, needs to be removed, what types of roadway crossing materials are required, and all the other details needed for construction. It is estimated that the design phase, from surveying through final design, would cost approximately $330,000 (as discussed in Chapter 3, section F).

The local share, if any, would depend on the type of funding used and the guidelines in effect.[59] The design of the Hudson-Marlborough segment of the Assabet River Rail Trail was paid for with Enhancement funds with no local share. Present guidelines for Enhancement funding require that communities pay for design through the 25 percent stage. The communities could apply for funds from other sources to help pay for their share of design, including urban self-help and recreational trail funds administered by the Executive Office of Environmental Affairs.

MassHighway paid for the design of the northern segment of the Bruce N. Freeman Memorial Path using Surface Transportation Funds. Enhancement funds were used to pay for the design of the Nashua River Rail Trail, which is on a right-of-way owned by the Massachusetts Department of Conservation and Recreation. There was no local match. A community may also seek High Priority Project funding, which earmarks money at the federal level.
One design issue is dealing with contaminated materials. The Department of Environmental Protection (DEP) has established best-management practices in regard to contaminants. DEP recognizes that there will be contaminants in a railroad right-of-way due to normal operations. These are deemed acceptable as long as they remain within the right-of-way. When a trail is built, the pavement acts as a cap, to contain any contaminants in the soil.

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[59] Chapter 90E, Bikeways: *Funding; expenditures; federal funds. Section 3. The commissioner shall expend …funds as are appropriated or authorized by the general court …Funds made available for the construction of bikeways shall be expended as follows: …(c) One hundred per cent for the cost of unique regional bikeways and bicycle parking facilities, as determined by the commissioner.* The language regarding regional bikeway facilities resulted from the planning of the Claire Saltonstall Bikeway in the late 1970s. Just as local communities are not asked to pay for the design and construction of regional highway or transit facilities, it was decided that they did not have to be responsible for funding regional bicycle facilities.

There are some embankment areas where it would be useful to remove soil so as to widen the embankment, allowing for a wider trail. Finding places within the right-of-way where this material could be placed would most easily accommodate this removal. If the materials have to be moved from the site, then disposal costs would be incurred. A separate issue from "normal" right-of-way contamination is a spill or other incident. As noted, there have been derailments on the line.

Another contamination issue is whether there are sites adjacent to the right-of-way that might have contaminated it. A review of DEP's database indicates that it is unlikely that any of this type of contamination occurred.

Major design concerns on the trail are the at-grade crossings. All trail users probably would be required to stop at all roadway crossings. Traffic control would need to be designed on a crossing-by-crossing basis. Some additional traffic controls on motor-vehicle traffic should be considered. These could include lowering some speed limits, increasing enforcement of the speed limits, and possibly narrowing the roadway at the trail crossings with the use of extended curbs, also known as bulb-outs.

The American Association of State Highway and Transportation Officials (AASHTO) design manual,[60] the *Manual on Uniform Traffic Control Devices* (MUTCD),[61] and MassHighway's *Project Development and Design Guidebook* would inform the design of intersections.[62]

The design contractors, through the Massachusetts Environmental Policy Act (MEPA) process, would work closely with local conservation commissions and other concerned parties to ensure that environmental impacts are avoided or minimized and all required permits are issued. Issues to be addressed would include the clearing of vegetation, the design of the trail through flood plain areas and wetlands, the removal or capping of any contaminants, and the provision of parking (if any).

A rough initial estimate for construction is $3,300,000, as discussed in Chapter 3, section F. As with funds for design, the communities could apply jointly for these funds through the MPO. It is expected that construction funds would be state or a combination of state and federal monies.

Although there are funds available from state and federal levels for design and construction, a community may decide to use local funds. This probably would give the community more flexibility and would most likely shorten the time required for design and construction.

## C OPERATION OF A TRAIL

Safety, security, and maintenance are paramount to the operation of a trail, as discussed in Chapter 3, section F. Enforcement and education are important components of safe

60 *Guide for the Development of Bicycle Facilities*, 1999.

61 Federal Highway Administration, U. S. Department of Transportation, 2003.

62 January 2006.

operations. Selective enforcement of speed limits at crossing locations would help reduce speeding. Education could be provided both to motorists who will cross the trail and to trail users. Parents and students, perhaps through parent-teacher organizations, the schools, and after-school programs, would need to be told that this trail, although separated from traffic for most of its length, does have crossings that require users to stop and cross as they would any road.

Maintaining the trail would be part of the community's overall responsibility, as occurs when a new street is added. Community-based organizations were formed along the Minuteman to take on some general maintenance and to provide a forum for discussion of issues that arose. On the Norwottuck Trail in western Massachusetts, many businesses are on a waiting list to sign on to the "Adopt-a-Trail" program. Such organizations could be formed in Framingham and Sudbury to help local staff. As indicated in Chapter 3, the local costs for maintenance and policing are estimated to be about $12,000 per year, about $8,000 for Framingham and $4,000 for Sudbury.

# Appendix A: History of Rail Ownership and Service

This appendix presents more detailed information on past ownership and use of the line.

**Ownership**

In 1870 the Framingham & Lowell Railroad was chartered to build a line from Framingham Center to Lowell. This line, opened in November 1871, was originally intended as a bypass route for freight and passenger traffic moving between points north and south of Boston. In 1881, the Framingham & Lowell was reorganized as the Lowell & Framingham Railroad (L&F), which then merged with the Old Colony Railroad in 1886, which in turn was leased to the New York, New Haven & Hartford Railroad (New Haven) in 1893. The New Haven used the L&F as a connecting route for freight traffic destined for points north of Lowell on the Boston & Maine (B&M) railroad system, but did not promote it as a through route for passengers.

The New Haven Railroad bankruptcy in 1961 ended with the sale of its assets to the Penn Central Corporation in 1968. Although the Penn Central Corporation declared bankruptcy in 1970, it continued to operate on the L&F right-of-way.

To deal with the problem of bankrupt railroads in the Northeast and Midwest, Congress passed the Regional Rail Reorganization Act of 1973. This act established the United States Railway Association (USRA), which was responsible for developing a plan for transferring viable lines to a new company to be known as the Consolidated Rail Corporation (Conrail).

The segment of the L&F between Framingham Center and South Sudbury was included in the Conrail System in 1976 because it seemed that that section had enough freight traffic to run without a subsidy. The former Massachusetts Executive Office of Transportation and Construction (EOTC), now the Executive Office of Transportation (EOT), leased the section between South Sudbury and the Chelmsford/Lowell line from the Penn Central Corporation. EOTC, in turn, contracted with Conrail to continue freight operations between South Sudbury and Chelmsford Center. The remaining segment of the L&F in Lowell was sold to the B&M.

In 1982 the Commonwealth of Massachusetts, through EOTC, purchased the segment between West Concord and North Acton, where freight operations were still active. Later that year, freight service between South Sudbury and West Concord was discontinued permanently, and EOTC purchased the rest of the right-of-way, track, and other fixed facilities between South Sudbury and State Route 3 in Lowell. These acquisitions were made to preserve the right-of-way for potential future transportation uses.

In the mid-1990s Conrail accepted a joint buyout offer for its entire system by the Norfolk Southern Corporation and CSX Transportation. Lines in Massachusetts were transferred to CSX, which assumed operation of its share of the Conrail system in 1999, including the right-

of-way segment between South Sudbury and Framingham that is now known as the South Sudbury Industrial Track, the subject of this report.

**Service**

Historical freight and passenger traffic on the Lowell & Framingham line was relatively light due to the rural nature of much of the surrounding territory.

*Passenger*

During the first four decades of operation, passenger service typically included three round-trips a day over the full length of the route: one morning peak trip, one evening peak trip, and one midday trip. All of these trains ran at least as far south as downtown Framingham, and most continued further south on the Old Colony/New Haven system. Arrival and departure times at Framingham Station (then called South Framingham) were usually scheduled to allow good connections for Boston-bound trains via the Boston and Albany Railroad (now the MBTA Framingham/Worcester line). One station, Nobscot, originally known as North Framingham, was located in the study area, north of Water Street. Two other stations were close to both ends of the study area: South Sudbury, just north of the Central Mass., and Framingham Center, just south of Route 9. Only the South Sudbury station remains; a commercial company uses it.

In 1917 the midday round trip between Lowell and Framingham was dropped to better serve wartime freight needs and was never restored. In 1932, during the Great Depression, the New Haven Railroad dropped many marginal or unprofitable services, including the northbound morning and southbound afternoon trips between Framingham and Lowell. In 1933, the Massachusetts Department of Public Utilities (DPU) authorized the New Haven to discontinue the two remaining passenger train runs between Framingham and Lowell, but required substitute bus service. A New Haven Railroad subsidiary operated this bus service until 1937, when the DPU allowed it to be dropped. An independent bus operator briefly revived the route in 1939.

*Freight*

Freight service on the L&F line in the early 1900s usually consisted of several daily trips in each direction. One of these trains would serve local customers while the remainder carried through traffic for interchange with the B&M at Lowell or West Concord. The connection with the B&M's Central Mass. Branch at South Sudbury was not a regular interchange point except during World War II. Through freight service to Lowell included trains to and from New Bedford and Fall River, which connected with New York–bound vessels operated by a New Haven Railroad subsidiary through the late 1930s. Through freight train service operated six days a week from New Bedford to Lowell until about 1950, when it was routed to Boston. Freight was then transported to Framingham via Readville and Walpole, where a local freight train from Framingham furnished service to L&F customers through the 1960s. From 1968 to 1973, Penn Central continued to operate through freight service from Boston to Lowell via the

L&F line, which it renamed the Lowell Secondary Track. Although through freight service ended in 1973, local service continued five days a week from Framingham.

In 1982, after discontinuance of contiguous service north of South Sudbury in 1982, the segment south from there to Framingham Center was re-named the South Sudbury Industrial Track. The line acquired a new customer in 1980, a lumber dealer at South Sudbury, when the B&M abandoned the Central Mass. Branch. The last train ran on April 13, 2000; it derailed in Sudbury. In June 2001, CSX applied to the federal Surface Transportation Board (STB) for approval to abandon the line. In October 2001 the STB approved the abandonment.

The Town of Sudbury filed notice with the STB to request that abandonment be postponed in order to allow negotiations with CSX for acquisition of the line for use as a rail trail, with a small section proposed for a highway bypass. CSX, as the property owner, has requested and received several extensions for implementation of abandonment.

By August 2004, CSX had removed the rails and ties. Because the bridges would be used if a trail were built, CSX left those in place.

# Appendix B: Excerpts from the Environmental Section of the Framingham-Sudbury Rail Trail Task Force Report[63]

There are a number of environmental, ecological and wetland resources located along the CSX ROW in the towns of Framingham and Sudbury, Massachusetts. Some of these are highlighted in this section of this report. This section also details the regulatory status of each of the wetland areas and the anticipated permitting requirements for development of the site. The descriptions and recommendations are the consequence of a preliminary inspection of the ROW for the presence of wetland resources as regulated by the towns' Wetlands Protection Bylaws, the Massachusetts Wetlands Protection Act, and the Federal Clean Water Act.

**Federal Wetlands Regulations**

Wetlands meeting the regulatory definition are subject to jurisdiction under Sections 401 and 404 of the federal Clean Water Act. All of the wetland areas identified on-site are subject to federal jurisdiction. Under Section 401 of the federal Clean Water Act, projects which fill less than 5,000 square feet of federally regulated wetlands do not require an individual 401 Water Quality Certification provided that the work is done with a valid Order of Conditions and that 1:1 wetland replacement is provided. Projects filling greater than 5,000 square feet of federally regulated wetlands require an individual 401 Water Quality Certification. Pursuant to Section 404 of the federal Clean Water Act, the placement of fill material and other alterations within federally regulated wetlands require authorization from the U.S. Army Corps of Engineers (ACOE). Projects filling less than 1-acre of federal wetlands may be covered under the Massachusetts Programmatic General Permit (PGP). Projects eligible for coverage under the PGP may be automatic (non-reporting) if total wetland impacts are less than 5,000 square feet and a valid Order of Conditions is obtained. Projects filling 5,000 square feet to one acre are classified as Category II and are reviewed by the ACOE and other federal agencies to determine if the project meets the conditions of the PGP. Alterations to regulated wetlands in excess of 1-acre are not eligible for the PGP and require an Individual Permit.

**Massachusetts Wetlands Regulations**

The Act defines wetland resource types including vegetated wetlands, streams, ponds and floodplains. The potential resource areas within the project area are regulated by the Act based on one or more of the resource definitions described below.

*Land Under Water Bodies and Waterways (LUWW):* As defined at 310 CMR 10.56 (2), LUWW is the land beneath any creek, river, stream, pond or lake. The boundary of LUWW is the mean annual low water level; therefore, intermittent streams do not contain the resource

63 This excerpt is from the task force report of January 24, 2004.

area LUWW. Work within LUWW must not impair the water carrying capacity of the stream channel, ground or surface water quality, or the capacity of the land to provide fisheries or wildlife habitat.

*Bank*: As defined at 310 CMR 10.54 (2), a Bank is the portion of the land surface, which normally abuts and confines a water body. The upper boundary of Bank is the first observable break in slope. Work within Bank may be allowed provided that it does not impair the physical stability of the Bank; the water carrying capacity of the channel within Bank; ground and surface water quality; and fisheries and wildlife habitat. If proposed activities alter 10 percent (or 50 feet, whichever is less) or more of the bank on this site, a wildlife habitat assessment would be required. Alterations above the 10 percent (or 50 feet) threshold may be allowed if there is no adverse effect on wildlife habitat.

*Bordering Vegetated Wetlands (BVW):* As defined at 310 CMR 10.55 (2), BVWs are freshwater wetlands, which border on creeks, rivers, streams, ponds, and lakes. Fifty percent or more wetland indicator plants and evidence of hydrology determine the boundary of BVW. Work proposed on a site may alter up to 5,000 square feet of BVW provided that the lost area is replaced according to standards provided at 310 CMR 10.55 (4)(b).

*Bordering Lands Subject to Flooding (BLSF):* As defined by 310 CMR 10.57(2)(a), BLSF is "an area with low, flat topography adjacent to and inundated by floodwaters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland." The boundary of BLSF is the estimated maximum lateral extent of floodwater, which will theoretically result from the statistical 100-year frequency storm.

*Riverfront Area*: As defined at 310 CMR 10.58 (a)(3), Riverfront Area is "the area of land between a river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away."

*Isolated Lands Subject to Flooding (ILSF):* subject to regulation if they annually support at least 1/4-acre foot of water to an average depth of 6 inches. This must be determined by engineering calculation to determine if the required storage volume and depth can be achieved within the depression. Furthermore, the watershed contributing to the wetland or rise in groundwater must also provide the required volume of runoff.

*Town Wetlands Protection Bylaw*: The Towns of Framingham and Sudbury have Wetland Protection By-laws. These bylaws provide additional protections to resource areas and extend Conservation Commission authority beyond the limits provided or regulated under the state and federal statutes.

**Regulatory Summary**

- A number of federal, state and locally regulated wetland areas were identified on the project site. Wetland resources identified on the site include: Bordering Vegetated

Wetland (BVW), Bank, Land Under Water Bodies and Waterways, Bordering Land Subject to Flooding, and possibly Isolated Land Subject to Flooding.

- The following perennial streams were identified within the project area or adjacent to it: Hop Brook, Dunsdell Brook, Landham Brook and Baiting Brook. Therefore, the resource Riverfront Area does exist within the project area.
- Review of FEMA mapping for Framingham and Sudbury has determined that designated mapped 100-year floodplain (Bordering Land Subject to Flooding) exists within the project area.
- A review of the 2000-2001 Massachusetts Natural Heritage Atlas has shown there are no certified vernal pools. Vernal pools do not have to be certified to be protected, however. The Sudbury Wetlands Bylaw presumes any area that holds 200 cu. ft. of water for two continuous months in the spring is considered a vernal pool. It is likely that there are several areas meeting these criteria along the ROW in Sudbury.
- There is an area of estimated rare species habitat within the project area.
- Any alteration or work proposed within the state and locally regulated wetlands would be limited to 5,000 square feet of alteration, although the permitting of this alteration is discretionary on the part of the Commission, unless the proposed work qualified as a "limited project" (310 CMR 10.53). A Notice of Intent would need to be filed with the town Conservation Commissions of each town under the Act and local bylaw for approval of alteration of a wetland resource area or for work within 100 feet of BVW or Bank, or, in Sudbury within 100' of any vernal pool or within 25' of any isolated land subject to flooding meeting the local criteria of 1/8 acre foot of water 6" deep in a one-year storm event.
- In Framingham, the criterion for review is 125'.
- Notification to the Corps of Engineers and individual Water Quality Certification in accordance with federal regulations would be required if greater than 5,000 square feet of federally regulated wetlands were to be altered. Any wetlands alterations on the site will require at a minimum 1:1 wetland replication that meets applicable performance standards.

**Potential Resource Areas**

*Deep marshes* located near the junction of the ROW with Belknap Road just north of Grove Street. Deep marsh may also be found along the westerly side of ROW in the Hop Brook area north of Water Street and west of Garden in the Woods. This site also includes a beaver lodge.

*Shallow marsh* or *shrub swamp* may be found along Grove Street and at the intersection of the ROW with Belknap Road, along the westerly side of the ROW in the Hop Brook area, and along the ROW in Sudbury between Water Street and Route 20.

*Deciduous wooded swamp* can be found in a number of sites along the project area in both Framingham and Sudbury. Specifically between Belknap Road and Edgell Road, between Frost and Water Streets, and in various locations north of Water Street to Route 20 in Sudbury.

The project area crosses four *perennial streams*. These include: Hop Brook, Landham Brook, Baiting Brook, and Dunsdell Brook. There is *100-year floodplain* associated with Landham Brook, Hop Brook and Baiting Brook.

The project area passes through *Zone II* and near *Interim Wellhead Protection Areas* near Hop Brook and Garden in the Woods and also on the east side of the ROW in Sudbury south of Route 20.

There is an *isolated wetland*, which may or may not be a certifiable vernal pool located north of Pine Street in Framingham and near the project area. There are several potential and two known vernal pools along the trail in Sudbury.

**Estimated Habitat of Rare Wildlife and Vernal Pools**

According to the 2000-2001 Edition of the Massachusetts Natural Heritage Atlas, the site does include an estimated habitat of rare wildlife located in the project area. This potential site is located north of Water Street and includes portions of Hop Brook and the Garden in the Woods. There are no certified vernal pools along the ROW, however there are two documented vernal pools in Sudbury and some isolated wetlands in both towns, which could include certifiable vernal pools. A conclusive evaluation of the project area for vernal pool habitat must be done in the springtime (between March and June) when vernal pool activity and hydrologic criteria are more evident. Should vernal pool habitat or state-listed rare species be identified on the site, it may present a constraint to development on the property.

**Outstanding Resource Waters**

According to the Surface Water Quality Standards (314 CMR 4.00) and the 1990 Designated Outstanding Resource Waters of Massachusetts, the site does not contain any known Outstanding Resource Waters; however, the vernal pools will be considered Outstanding Resource Waters.

Drainage from the project area discharges into Landham Brook along the northern portions of the project area and Baiting Brook and Dunsdell Brook in the southern portions of the project area. All flow eventually to the Sudbury River.

# Appendix C: User Demand

Estimates of demand have been made using counts from the Minuteman Commuter Bikeway. Two methods are used: comparing on-road bicycle counts in the corridors before path construction, and comparing journey-to-work data.

The number 3,000 will be used for a typical weekday use of the Minuteman at a given point.[64] Counts done on roads in the Minuteman corridor in September 1980 yielded a peak-period count of 220 bicyclists.[65] The Minuteman counts were done at four locations spaced along the 11-mile length of the corridor. Framingham/Sudbury counts, done at three locations along the 4.8-mile corridor, yielded a total of 21 bicyclists and 37 pedestrians. The Minuteman Commuter Bikeway corridor bicycle count is about 10 times as high as the Framingham/Sudbury corridor bicycle count. (Pedestrians were not counted in the Minuteman corridor.) This yields an estimate of 300 daily users for the Framingham-Sudbury facility (3,000 weekday Minuteman users times 10 percent).

For the second method, journey-to-work data are compared: the number of people in the two corridors who bicycled or walked to work. In the Minuteman corridor, of the 142,840 resident workers, 18,623 (13.0 percent) walked to work and 2,604 (1.8 percent) bicycled to work. In total, 21,227 (14.9 percent) bicycled or walked to work. The corridor numbers are from 1990, several years before the Minuteman was built. In Framingham and Sudbury, 1,015 (2.4 percent) walked to work and 90 (0.2 percent) bicycled to work. In total, of the 83,751 resident workers, 1,105 (1.3 percent) bicycled or walked to their jobs. The ratio of percentage of walkers and bicyclists in the two corridors is 14.9 to 1.3, or 11.5 times as high in the Minuteman corridor as in Framingham and Sudbury. This yields an estimated weekday use for the corridor of about 250 users.

The above results are reported in Chapter 3, section A.

64 Minuteman users were counted from 7:00 AM to 8:30 PM on Tuesday, June 17, 1997. The total number of users, 2,524, included bicyclists (1,376), pedestrians (422), and skaters (726). This number is rounded up to 3,000 to account for the hours not counted (before 7:00 AM and after 8:30 PM) and for possible increases from 1997 to 2006.

65 This number includes 68 bicyclists at the Alewife terminus, 79 at Arlington Center, 49 at Massachusetts Avenue and Marrett Road in Lexington, and 24 at Hartwell Avenue and Routes 4/225 in Bedford.