Prepared for the Town of Milton, Vermont

Alternative Transportation Master Plan

Final Report

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I. INTRODUCTION

A. Purpose and Goals of Study

In April 2001, the Town of Milton contracted with a team of consultants led by Wilbur Smith Associates (WSA) of Shelburne, Vermont, to develop an "Alternative Transportation Master Plan." The goals of this effort were to:

- Develop a "vision" plan for linking existing or planned development and transportation facilities in the Town of Milton; and
- Improve overall mobility and accessibility to the Town Core Area and other locations inside and outside of Milton.

B. Background and Issues

Based on background research, examination of preceding plans and reports, discussions with the Town of Milton Planning Commission and staff, as well as professional judgment, the consultant team identified a set of key issues facing the residents of Milton that this Alternative Transportation Master Plan needed to address. Exhibit 1 provides a synopsis of these issues along with a depiction, where appropriate, of specific areas of the Town where these issues are most relevant.

In the context of this planning effort, the term "alternative transportation" has been defined to encompass transportation options, or modes, that are not primarily based on use of single-occupant automobiles or trucks. While this approach does not entirely exclude passenger cars as an important means of transportation, it looks at them more as only one piece of the transportation equation, rather than as the primary piece. For example, it is important that this plan consider how people will access an alternative transportation facility, such as an express bus station, in order to take advantage of that alternative transportation option. In many cases, this first leg of a trip may be by automobile. What is important from this perspective of this plan is that the main part of the entire trip is by alternative means, such as walking, biking, transit, snowmobile, or horseback.

C. Report Organization

The first part of this report, after this introduction, presents the recommendations for Milton's Alternative Transportation System. The remaining sections of this report provide the background information that led to the development of the final recommendations. These later sections include descriptions of the overall study process, the current condition of alternative transportation in Milton, the recommendations of other relevant studies as they relate to alternative transportation and a description of the analysis process used to prepare the final recommendations.

II. ALTERNATIVE TRANSPORTATION FACILITIES AND ROUTES

A. Overview

For the past few years, the Town of Milton has been working to reinforce its Town Core Area, not only to foster the creation of a vital Town Center, but also to help preserve the rural landscape found elsewhere in the Town. This factor plays an important role in the overall organization of the Alternative Transportation System. A complete, easily accessible pedestrian and bicycle network, within the Town Core Area, a major component of an alternative transportation system, is also an essential component of a vital Town center. Thus, at the heart of the Alternative Transportation system recommended in this plan is a complete sidewalk system throughout the Town Core Area, and an easily accessible bicycling network, consisting of bicycle routes, bicycle lanes and separated shared use paths as appropriate.

Figures 1 and 2 provide a graphic representation of the overall recommendations of this study. Beyond the Town Core Area, the recommended system has been organized to connect identified origins and destinations (O & Ds) within and beyond the Town Core Area that users of the Alternative Transportation system, including pedestrians, bicyclists, snowmobilers, transit users, and/or equestrians, may want to reach. This study identifies five general types of origins and destinations: Business/Commercial; Institutional; Recreational; Residential; and Industrial. Figures 3 & 4 show the locations of the identified origins and destinations.

While these origins and destinations are located throughout the Town, there is a significant concentration of them in the Town Core Area. This concentration in the Town Core Area reinforces the creation of a complete alternative transportation system within the Town Core Area. It also suggests that the most appropriate organization of the Town-wide system would be radial, with the Town Core Area as the center of the system. This type of radial system will not only further emphasize the Town Core Area's importance to the Town and the region but will also directly address most of the current and projected future alternative transportation needs of the residents and visitors to Milton. (Section IV of this report provides information on the types of users of the system, along with their specific needs, that form the basis of the system.)

The radial arms of the system would constitute the primary alternative transportation corridors in the Town. They would radiate outward from the Town Core Area, connecting it to the outlying destination points elsewhere in the Town. The specific type of facility to be developed in each corridor is again based on the needs of the users who will be using the corridor. In some instances, two different types of facilities are recommended. The recommended alternative transportation system also includes two secondary corridors that connect outlying destinations without connecting with the Town Core Area.

B. Primary Alternative Transportation Corridors

Based on the number and distribution of O & Ds for alternative transportation identified around the Town, this study identified eleven separate alternative transportation corridors outside of the Town Core Area for upgrading. These corridors provide a comprehensive network of alternative transportation

facilities throughout the Town, providing access to places that people using alternative transportation would want to go. The specific type of facility recommended for each corridor is meant to meet the needs of the users in the most appropriate and financially responsible manner. Figures 5 and 6 show the general locations of the corridors. Table 1 presents the primary corridors and Town Core Area and the types of facility recommended for each. The corridor list starts with the corridor that heads east from the Town Core Area and continues in a clockwise direction. Section IV.E. of this report presents a detailed discussion of the various types of Alternative Transportation Facilities that the project team considered as part of the overall project.

Table 1: Alternative Transportation Corridors

Corridor Number	***Primary Corridors***	***Recommended Facilities***
*	Town Core Area Area	Shared-use paths for key connections, sidewalks, Bike Lanes, Designated Bike Routes, and transit stops
1	Town Core Area to the Town Forest	Designated Bike Route on Westford Road and Trail
2	Town Core Area to Essex	Designated Bike Route on McMullen & Duffy Roads, Inter-town Commuter Service (Bus and/or Rail), and Trail
3	Town Core Area to Colchester	Designated Bike Route on Mc Mullen and East Roads and Trail
4	Route 7 South of Town Core Area	Shared Use Path and Inter-town Commuter Service Bus
5	Town Core Area to Sand Bar State Park	Designated Bike Route
6	Town Core Area to Eagle Mountain	Designated Bike Route and Trail
7	Lake Road	Bike Lanes and Sidewalk Within Residential Areas, Designated Bike Route Outside Residential Area
8	Route 7 North of Town Core Area	Bike Lanes and Sidewalks Within Residential Areas, Designated Bike Routes outside Residential Area and Inter-town Commuter Service Bus
9	North Road	Sidewalks and Bike Route
	Secondary Corridors	
10	US Route 2	Bike Lanes or Designated Bike Route
11	Lake Champlain Shoreline (Lake Road Boat Access to Sandbar State Park)	Trail

C. Estimate of Probable Construction Costs

Table 2 presents current unit cost estimates of probable construction costs for the various types of alternative transportation corridor improvements included in the recommended system for Milton. Table 3 presents order of magnitude estimates of the recommendations for each corridor.

Table 2: Estimates of Probable Unit Construction Costs

Type of Alternative Transportation Facility	***Estimated Unit Cost***
Designated Bike Route	$4/Linear Foot in Town Core Area, $2/Linear Foot outside Town Core Area (does not include widening)
Bike Lane	Variable Depending on Re-striping or New Pavement
Shared-Use Path	$100/Linear Foot (10 Feet Wide with 2 Foot Gravel Shoulders Each Side)
Sidewalks	$45/Linear Foot (Five Foot Wide Concrete)
Trail	Variable Depending on Width, Topography and Surface Material

Table 3: Estimate of Probable Construction Costs by Corridor

Number	***Corridor***	***Recommendations***	***Estimated Unit Costs***	***Length***	***General Construction Cost Estimate****
*	Town Core Area	Three shared-use paths, sidewalks, bike lanes, designated bike routes, and transit stops	Shared-use Path $100/LF	HS to Park – 2,640 ft GS to Park 7,200 ft Across River 5,300 ft Route 7 12,250 ft	$264,000 $720,000 $700,000 (w/bridge) $1,225,000
1	Town Core Area to the Town Forest	Designated Bike Route on Westford Road and Trail	Route - $2/LF	19,000 ft	$38,000
2	Town Core Area to Essex	Designated Bike Route on McMullen & Duffy Roads, Inter-town Commuter Service Bus and/or Rail, and Trail	Route - $2/LF	16,900 ft	$33,800

Number	*Corridor*	*Recommendations*	*Estimated Unit Costs*	*Length*	*General Construction Cost Estimate**
3	Town Core Area to Colchester	Designated Bike Route on Mc Mullen and East Roads and Trail	Route $2/LF	16,000 ft	$32,000
4	Route 7 South of Town Core Area	Shared Use Path and Inter-town Commuter Service Bus	Shared-Use Path $100/LF	17,000 ft	$1,700,000
5	Town Core Area to Sand Bar State Park	Designated Bike Route	Route $2/LF	25,000 ft	$50,000
6	Town Core Area to Eagle Mountain	Designated Bike Route and Trail	Route $2/LF	22,000 ft	$44,000
7	Lake Road	Designated Bike Lanes and Sidewalk Within Residential Areas and Designated Bike Route	Sidewalk $45/LF Route $2/LF	5,300 ft 29,000 ft	$238,500 $58,000
8	Route 7 North of Town Core Area	Designated Bike Lanes and Sidewalks Within Residential Areas, Designated Bike Route and Inter-town Commuter Service Bus	Sidewalk $45/LF	5,300 ft 7,500 ft	$238,500 $15,000
9	North Road	Sidewalks and Bike Route	Route $2/LF	9,250 ft.	$18,500

*These costs do not include R.O.W. acquisition costs.

D. Financial Strategies

1. Potential Public Funding Sources

The various funding sources that could possibly be used to help Milton implement this plan include public funds, private funds, and a combination of both types. In the public funding category, sources include federal, state, regional, and local. The lists and information below focus on non-local sources, and are intended to provide guidance to the Town, but should not be considered exhaustive, as funding source eligibility, restrictions, amounts, and requirements change from year to year. The consultant team

recommends that the Town consult the CCMPO's "Funding Sources for Transportation Projects" guide on a regular basis to ensure the Town has the most current information.

Federal Funds

Surface Transportation Program (STP) funds have the most flexible uses of any federal transportation funds. STP funds may be used for highway, transit, and non-motorized facility construction and improvements. Facilities must be classified by the Chittenden County Metropolitan Planning Organization (CCMPO) and state as eligible for federal-aid, although sidewalk projects on local roads that are not on the federal-aid system may also be eligible for STP funding. Since 1992, when the flexibility provisions took effect, Vermont has been a national leader in "flexing" funds from traditional highway uses to transit uses. The non-federal match requirement is 20 percent.

Enhancement Program funds are another potential source of federal funds for alternative transportation projects. In Vermont, the final decisions on Enhancement funding are made by VTrans, and the CCMPO must endorse and prioritize candidate Enhancement projects in Chittenden County before VTrans will consider them for funding. Generally, Enhancement funding awards are made once per year through the competitive application process, although the state has, in recent years, made an additional round of awards after the end of the Legislative Session. The non-federal match requirement is 20 percent.

The **"**Transportation and Community and System Preservation**"** (TCSP) pilot grant program is another potential source of funding for the alternative transportation system. In 1998, under the new TEA-21 legislation, Congress established the TCSP competitive grant program to provide funding to states, regions, and localities for planning and implementing transportation projects that improve the efficiency of the transportation system, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments, ensure efficient access to jobs, services and centers of trade, and examine development patterns and identify strategies to encourage compatible private sector development patterns. In Vermont, the City of Burlington has received a TCSP grant for a corridor improvement project in the North Street area of the Old North End. Applications are accepted once per year, typically in late January, with awards made toward mid-year by the Federal Highway Administration (FHWA). Applications must be endorsed by and submitted through the MPO. It should be noted that for the last three years, virtually 100 percent of all TCSP grants across the country have been made through the Congressional earmarking process, despite the original stated intent that this be an open competitive process. Thus, the direct involvement of one or more members of Vermont's congressional delegation would be necessary for a Milton application to have a chance of success. Although matching funds are not required, priority is given to projects that leverage non-federal funds and take advantage of in-kind contributions, such as maintenance agreements, land donations, and volunteer time.

Federal Transit Administration (FTA) funds are another potential source of federal funding for alternative transportation in Milton. To the extent the alternative transportation system adopted by Milton includes public transit services and facilities, including park and ride lots and intermodal centers, funds from the FTA that support CCTA and Vermont Transportation Authority (VTA) services could also be used by those agencies to facilitate extending service to Milton. In addition, FTA funds, through its "New Starts" program, have been a source of capital financing in Chittenden County and Vermont for a variety of transit-supportive facilities, including the planned Burlington Multimodal Center and the proposed Essex Junction Intermodal Center. It should be noted that the New Starts funds for both of these facilities were secured in large part through the direct efforts of Vermont's Congressional delegation through the

"earmarking" process during the annual federal appropriations cycle. The non-federal matching requirement varies depending on the precise source of funds, but typically averages at least 20 percent.

The Congestion Mitigation and Air Quality (CMAQ) program is yet another possible federal source of funding. In general, federal law requires that CMAQ funds be targeted for addressing congestion problems and associated vehicle emissions that result in air quality problems, primarily in urban areas. In Vermont, because the entire state is currently considered to be "in attainment" of federal air quality standards, VTrans controls the distribution of CMAQ funds throughout the state. VTrans has mainly used CMAQ funds to support start-up of new transit services, including the VTA's Champlain Flyer rail service and the College Street Shuttle service in Burlington, and park and ride lot construction. Because VTrans is currently developing a new statewide transit policy, it is uncertain how CMAQ funds may be used or distributed in the future. A 20 percent non-federal match is required.

State Funds

The State of Vermont, generally through VTrans, could provide funds to Milton for implementation of elements of the alternative transportation plan. In most cases, federal funds comprise part of the grant, and a non-federal match would thus be required. Also, federally funded projects must be approved by the CCMPO and be placed on the regional TIP. Among the most applicable funding opportunities are:

The VTrans Bicycle and Pedestrian Facility Grant Program, which provides competitive grants to municipalities and other entities for bicycle and pedestrian facilities. In order to apply for a grant under this program, the applicant must have completed a "Conceptual Alignment Analysis" (CAA) of the proposed facility. The annual application deadline is typically in May. The local match requirement is 10 percent.

The Vermont Recreational and Trails Grant Program, which is administered by the Vermont Trails and Greenways Council, provides competitive grants for maintenance, restoration and construction of recreational trails. Eligible projects include almost any trail facility on public or private land. Applicants must submit their proposal by February of each year. Federal funds often comprise part of the grant, and so the CCMPO must approve any grants and place the project on the regional TIP. A 20 percent local match is required.

Regional Funds

The following describes some of the funds available through the CCMPO that are relevant to implementing the Alternative Transportation Master Plan. It should also be noted that, in Chittenden County, any federally funded transportation activity must be formally approved by the CCMPO as part of the annual work program, the TIP, or, in some cases, both.

The Transportation for Livable Communities (TLC) grant program is managed and funded by the CCMPO. TLC grant funds could potentially be used for additional required planning work on various elements of the alternative transportation plan, such as development of Conceptual Alignment Analyses (CAA) for bike paths. The CCMPO solicits grant applications in the summer, with grant funding becoming available on October 1. A minimum 20 percent non-federal match is required.

The CCMPO Project Definition program is another potential source of funding for detailed planning and pre-engineering work on specific elements of the alternative transportation plan. By requesting inclusion in the CCMPO's program and receiving these funds, Milton would also be moving projects into the regional and state "pipeline" for inclusion in the Transportation Improvement Program (TIP) for construction funding. The CCMPO typically requests Towns to provide project definition candidate projects in a February/March timeframe through the annual work program update process for funding starting in October. A non-federal match may be required, and the Town could expedite funding access by providing that match. However, a municipality may not be required to provide the match itself, depending on the CCMPO's overall budget.

2. Public-Private Partnership Opportunities

As transportation needs have grown in recent years at a rate that has outpaced public funding availability, particularly at the local level, innovative approaches to paying for transportation projects have emerged. Once such approach entails creative partnerships between the public and private sectors. In Vermont, these types of arrangements have typically involved roadway intersection and capacity improvements associated with commercial developments, such as in the Tafts Corner area of Williston. The common thread in any public-private partnership is that all involved parties receive some benefit from their resource contribution. While these partnerships could not fund 100 percent of Plan implementation, they could represent an important piece of the overall funding framework.

Regarding implementation of the Alternative Transportation Master Plan, one approach might be for the Town of Milton to work directly with businesses and potential developers of the Milton Crossroads Downtown project to ensure that key elements of this Plan are incorporated into and funded, at least in part, by the developers and/or their tenants. The benefit for the developers and business would be enhanced access to their locations; the benefit for the Town would be tangible progress toward make the Plan a reality and improved alternative transportation options.

This is just one example of options for designing public-private partnerships targeted at implementing the Alternative Transportation Master Plan. Many other arrangements are possible, and, in light of continuing constraints on public funding sources, the Town should aggressively pursue such arrangements to add another tool to the Town's funding "toolkit."

3. Summary

Table 4 summarizes the funding sources described above and also gives the consultant's assessment of how easy or difficult each source may be to use for implementing this Plan. Based on this assessment, it is clear that a coordinated funding strategy that pulls from a variety of these, and possibly other, sources should be developed prior to initiating Plan implementation efforts.

Table 4: Possible Funding Sources for Implementation of Milton Alternative Transportation Master Plan Summary Information

Funding Source	Most Applicable To	Entities Involved	Assessment of Ease of Funding Access/Use
Surface Transportation Program (STP) (federal)	Design, engineering and construction of facilities	VTrans, CCMPO, Milton	Difficult
Enhancement Program (federal/state)	Design, engineering and construction of facilities	VTrans, CCMPO, Milton	Moderate
Transportation and Community and System Preservation (TCSP) Grant (federal)	Planning and implementation of facilities or services	CCMPO, Milton, Congressional Delegation	Moderate (with Congressional support)
Federal Transit Administration (FTA) funds	Public transit operations; development of new transit-supportive facilities (New Starts program)	CCTA, VTrans, CCMPO, Milton, Congressional Delegation	Difficult
Congestion Mitigation and Air Quality (CMAQ) program grant (federal)	Public transit operations (new services); park and ride lot development	VTrans, CCMPO, CCTA, Milton	Difficult
VTrans Bicycle & Pedestrian Facility Grants (state)	Development of new bike and pedestrian paths and facilities	Milton, VTrans, CCMPO, other key supporting entities	Moderate
Vermont Recreational & Trails Grant Program (state)	Recreational trail upkeep and development	Milton, CCMPO, CCRPC, state, other key supporting entities	Moderate
Transportation for Livable Communities (TLC) grant (regional)	Planning of projects and services to provide access and mobility in community centers	Milton, CCMPO, other key supporting entities	Easy to Moderate
CCMPO Project Definition Program (regional)	Detailed planning and pre-engineering/design of specific transportation projects	CCMPO, VTrans, Milton	Moderate
Public-Private Partnerships	All aspects of implementation	Milton, private entities, non-governmental organizations	Moderate

E. Phasing of Corridor Improvements

Due to the number and concentration of users, destinations, origins and activity centers in the Town Core Area, improvements in the Town Core Area should be the immediate focus of initial phases of the implementation process. The Town Core Area includes several short corridors: between the Recreational Park and the High School and between the Park and the Herrick Avenue School. Additionally, the Town Core Area includes a pedestrian crossing of the Lamoille River.

Subsequent actions can alternately focus more effort on the Town Core Area or begin to implement some of the Primary Corridor facilities. The participants of the Public Work Session recommended that each of the primary corridors be considered of equal importance. Since it is not possible to financially develop all of the corridors at the same time, the consultants reviewed the corridors to determine the variety and amount of use each would get, to help in prioritizing expenditures for the Alternative Transportation system. Table 5 shows the priority ranking of each corridor. The consultants, using this evaluation, have created four priority levels of work, shown in Table 6. These priority levels can serve as a guide in how to pursue the implementation of this plan. Unforeseen changes in the corridors, in the development patterns in the Town, or in various other factors may affect the actual order of implementation. Thus, if interest arises and the Town is able to access adequate funding for implementation, this priority ranking should not preclude the development of projects in lower priority levels until after elements of the higher priority level are incomplete.

(Table 5, "Relative Corridor Importance," is included as a fold out table at the end of the text.)

Table 6: Alternative Transportation Corridor Priorities

Priority Level	First Priority	Second Priority	Third Priority	Fourth Priority
Alternative Transportation Corridors	Town Core Area	(4) Route 7 South of Village Core (8) Route 7 North of Village Core (7) Lake road	(2) Town Core Area to Essex (9) North Road (10) US Route 2	(1) Town Core Area to Town Forest (3) Town Core Area to Colchester (5) Town Core Area to Sand Bar State Park (6) Town Core Area to Eagle Mountain (11) Lake Champlain Shoreline

III. EXISTING INFORMATION

A. The Study Process

Under a CCMPO grant, the Town of Milton engaged the services of Wilbur Smith Associates and Kathleen Ryan, Landscape Architect, to assist it in preparing its Alternative Transportation Master Plan. Working together, they developed the details of the process they followed to develop this plan.

The work began with the inventory of existing conditions. This included both actual extent and condition of existing alternative transportation facilities in the Town and existing recommendations, goals, policies and plan at the local and regional level. The Consultant also worked with the town to hold several public work sessions to gather input on the project from the public. The first session focused on the existing conditions within the Town; items discussed included the inventory of existing conditions, the types of users to be served by an alternative transportation system, the places users would want to go and from where they would come; and other comments or concerns about the project or the process.

Using the information on existing conditions, the consultants looked at the various origins and destination points, the types of users to serve and developed recommendations for a two tier level system of alternative transportation corridors through the Town. Using estimates on the types and frequency of users of each corridor, they then made initial recommendations as to what types of alternative transportation facilities would be most appropriate for each corridor. They also developed a method for evaluating the relative priority of each corridor to help the Town know where to begin allocating funds for development. The consultants carefully reviewed the recommendations with the public at a second public work session and discussed revisions to the recommendations with them as appropriate.

Following the second public work session, the consultants refined the recommended alternative transportation system and began to prepare a draft plan to package and convey the information. The draft report was presented to the Selectboard for review and comment after which it was refined and accepted by the Town to help direct the development of an alternative transportation system for Milton.

B. Existing Facilities

A recent inventory conducted by the Chittenden County Metropolitan Planning Organization (CCMPO) as part of the development of the *Pedestrian Policy and Sidewalk Plan for Chittenden County* documented 13 miles of existing public sidewalk in Milton. Using this as a starting point, the project team conducted an inventory of the Town regarding sidewalks, bicycle facilities, utility corridors, VAST (Vermont Association of Snow Travelers) trails, rail lines, protected open space and Town land. The team also mapped the location of previously planned alternative transportation facilities. Working with the Town staff and residents, they verified the accuracy of the information and added local details to create as complete a picture of relevant existing conditions as possible. Figures 7 and 8 illustrate the information collected.

The sidewalks in Milton are found primarily in the Village and Town center, although there are also several isolated sidewalks in newer, outlying subdivisions. The sidewalk system in the Town Core Area is

not complete and there are major gaps in the system. Particularly noticeable is the lack of sidewalks between several of the major residential neighborhoods and the Town Core Area.

There is one shared use path in the Town Core Area. It is in a new residential neighborhood and begins a link from the neighborhood to the High School and some of the commercial areas along Route 7 south of the Village area.

C. Existing Conditions

1. Roadways.

Milton contains more than 97 miles of local highways and over 18 miles of state or federal highways. The most heavily used highway facilities in Milton include the northbound and southbound lanes of Interstate 89, US Route 7, and US Route 2, all of which are state-maintained facilities carrying several thousand vehicles per day.

Heavily used local highway facilities include the southern (eastern) end of Lake Street (with 4700 vehicles per day), Main Street (3300 vehicles per day), Railroad Street (2900 vehicles per day north of the intersection with Cherry Street), and Middle Road (2700 vehicles per day north of Austin).

A recently completed study (*US 7 Winooski to Georgia Corridor Study, 2001*) provides detailed information about the condition of US 7 and other routes in Milton. According to that study, the physical condition of US 7 – as measured using "Sufficiency Ratings" – is Fair. Highway Sufficiency Ratings are measured based on three criteria: structural condition, safety, and service. These three criteria achieve maximum scores of 50, 25 and 25 respectively, thus the highest sufficiency rating a highway can achieve is 100. Highways considered Fair have scores between 70 and 80.

None of the highways parallel to US 7, such as North Road and Railroad Street, are identified as deficient. However, the report notes that these roads are combing under increased pressure. The report also indicates that bridges on parallel routes are generally "structurally and functionally inadequate." Railroad crossings are generally in good condition as well, except for one location on East Road where the railroad overpass restricts travel to one lane.

In terms of highway safety, there are no locations identified as high accident locations (HALs) in Milton. HALs are highway segments or intersections where the rate of accidents exceeds a threshold known as the critical rate. Nevertheless, according to the *US 7 Corridor Study*, a segment of US 7 between Railroad and Barnum Streets has a relatively high number of accidents due, most likely, to a lack of access control.

2. Bicycle and Pedestrian Crash Locations

As part of the examination of existing conditions, the consultants acquired and mapped the latest data on location of reported accidents in the Town, with a specific note as to which ones involved pedestrians or bicyclists. There were three recorded accidents, all on Route 7.

3. Utility Corridors

Several electrical and gas utility corridors cross Milton. These corridors are already cleared and in several instances have a maintenance trial on them. When the study began, it was thought that these corridors might provide opportunities for creating alternative transportation facilities. Increased security concerns have dampened the possibilities of using these corridors for transportation purposes, however, as appropriate, they have still been considered for possible inclusion in the Alternative Transportation system.

D. Existing Reports & Studies

1. Milton Comprehensive Plan

This document sets the vision for growth and development with the Town of Milton. Several sections of the Plan contain information or directives relevant to this study.

Parks and Recreation

Applying the Vermont Guidelines for Community Recreation and Park Services results in an estimated demand for 3 to 4 miles of recreation paths in Milton. The existing trails at the Town Forest and Eagle Mountain are considered to address this demand.

Planning Areas

The Comprehensive Plan describes nine Planning Areas in the Town. Figure 9 shows their general locations. Relevant portions for bicycle-pedestrian planning within these areas are summarized below.

Town Core Area This is the most densely settled area of Milton and contains the majority of municipal and civic uses including schools, post office, churches and residential and commercial uses. "There are sidewalks along Route 7, but no interconnected network for convenient pedestrian use."

Goals in the Town Core Area related to the Alternative Transportation Plan include:

> "Any future development within this area should be served by the full range of public services including … sidewalks, and street lighting. Those already developed portions which are not served by all these services should be permitted to be served through … the installation of sidewalks and street lights."
>
> Sidewalks should connect to the existing sidewalk system along Route 7 and within the Village and extend to other densely developed areas in the community. This entire area is within walking distance of Bombardier Park. However, the lack of connecting sidewalk network is a serious hindrance to optimal use of the park and the adequate provision of recreation services to residents."

Goal 2: Enhance all aspects of transportation opportunities

Objective 2: Develop fully linked systems to include sidewalks, bike paths, and bus and rail service.

Objective 3: Enhance pedestrian friendly environments incorporating streetlights, street trees, signage and public spaces. Develop design standards for these streetscape elements.

Objective 4: Encourage passenger rail service to Milton. Develop potential railroad station locations in the Main Street area.

Goal 3: Ensure a well integrated, aesthetically pleasing mix of uses by promoting pedestrian connections.
Objective 1: Develop design standards to look at such items as requiring structures be placed close to the roads with parking areas on the side or rear of lots to improve aesthetics and enhance pedestrian connections.

Checkerberry Area. This area contains both commercial and residential uses but is primarily commercial. "At present … sidewalks are virtually non-existent."

Goals in the Checkerberry Area include:
"Development should be served by a sidewalk system and should be connected to the sidewalk system in the Town Core Area. It is recommended that a low intensity bike and pedestrian path be provided separate from Route 7."
Goal 2: Enhance all aspects of transportation opportunities
Objective 2: Develop fully linked systems to include sidewalks, bike paths and bus service.
Goal 3: Ensure a well integrated, aesthetically pleasing mix of uses by promoting pedestrian connections.
Objective 1: Develop design standards to look at such items as requiring structures be placed close to the roads with parking areas on the side or rear of lots to improve aesthetics and enhance pedestrian connections.
Objective 2: Enhance pedestrian friendly environments incorporating streetlights, street trees, signage and public spaces. Develop design standards for these streetscape elements.

North Road Area. This is primarily an industrial area where the Husky facility is located. "Sidewalks exist within the planned residential developments, but they are not connected with any other areas. There are plans to extend a sidewalk along the west side of north road to link the Husky campus to the Town Core Area." This sidewalk has now been installed.

"Developments shall be encouraged to connect roads, utilities and drainage facilities, and to provide sidewalks and other recreational and open space linkages."

Catamount Area. This area contains a mix of industrial (including the Catamount Industrial Park), commercial and residential uses. "Sidewalks have been required in new residential subdivisions in this area, but there are no sidewalks along this stretch of Route 7."

West Milton Neighborhood Area. This area is primarily composed of low-density residential and agricultural uses. "There is the potential for bicycle and pedestrian linkages from the Town Core Area and Checkerberry areas along established roadways and the Lamoille River."

Arrowhead Mountain Neighborhood Area. The area is comprised primarily of single-family homes with some condominium uses. "Few sidewalks exist in the area …" "There is potential for bicycle and pedestrian linkages from the Town Core Area along established roadways and possibly the Lamoille River."

Beaver Brook Neighborhood Area. The area is comprised of mainly single-family homes in subdivisions. "Their lack of sidewalks and suburban style of development have not fostered a pedestrian environment." "There is potential for bicycle and pedestrian linkages from the Town Core Area along established roadways."

Georgia Mountain Area. The area contains primarily forested lands, low density residential and agricultural uses. Natural resource protection and preservation of the rural character of the area are high priorities.

Miltonboro Area. The area contains primarily agricultural and low-density residential uses.

Implementation (Chapter 9). The implementation plan lists 'Sidewalks' and 'Alternative Transportation Paths (Bicycle and Pedestrian)' as needed improvements and 'As soon as possible, ongoing' as the time frame for implementation.

2. Long Range Access and Mobility Plan (LRAMP) (January 2001)

The purpose of the LRAMP is to "help the Town of Milton develop a long range Transportation Plan emphasizing safety, accessibility and efficiency for all residents and visitors incorporating the natural features and cultural heritage of the community." Bicycle and pedestrian concerns figure prominently in the Report. Two specific tasks out of the list were to evaluate:

3) The feasibility, cost and scheduling of sidewalk improvements beyond the Village grid.

4) The desirability and potential locations of bike paths and other off-road pathways to move people from one part of the community to another.

Related to Task 3 above, the two highest sidewalk priorities were identified as:

- Extending the sidewalk along Route 7 from the Grand Union (now Hannaford's) to Checkerberrry.
- Middle Road from Railroad Street to Russell Circle.

The Conclusions urge the Town to pursue the implementation plan as presented and to seek State and Federal funding sources to match a local annual contribution.

Related to Task 4, the report identifies several current planning initiatives that should be pursued by the community. These include:

- "Riverside walkway along the south bank of the Lamoille River between the CVPS parking area off Ritchie Avenue and the Peterson Dam"
- "Cross-river foot/bike path to the Poor Farm Road area on the north side of the [Lamoille] River"
- "Any future road improvements include Class Two bikeways"
- "Clear need to provide both pedestrian and bicycle movement across Route 7 in a straight line between the high school and the Rec. park" and "installation of a short divider [median/pedestrian refuge] on Route 7 which could act as a safety island for such crossing movements might make sense in conjunction with improvements to the Centre Drive intersection"
- "The proposed sidewalk pattern is a partial template for addressing [bike-pedestrian paths]".

The Conclusions identify future planning efforts to include:

- Including pathway considerations in all transportation plans or they will emerge haphazardly;
- Develop paths where utility rights-of-way are located and in conjunction with residential development;
- Develop "an inventory of existing VAST trails, known pedestrian pathways, the proposed riverwalk, transmission rights-of-way and other existing fragments of off-road passageways to ensure that they are integrated into a coherent grid."

The LRAMP identified a 9.5-mile sidewalk investment plan with an estimated cost of $1.14 million dollars. The Plan identified four levels of priorities. The priority one sidewalks comprised 73% of the recommended network and 70% of the total estimated cost.

3. Town Core Area Master Plan (December 2000)

Results from the public forums conducted for the development of the Town Core Area Master Plan listed these bicycle-pedestrian related comments (those with asterisks were "Top Selections" or top ranked items from the forum):

- Downtown for pedestrians - most important
- Access: convenient, safe, provide access for all*
- More lighting - street lights
- Need grid system for roads in Town Core Area
- More sidewalks, sidewalks that connect, pedestrian friendly*
- Bike lanes - on existing roads
- 4-season trails in Town Core Area; trail head in center
- Trails, networking - connect all areas Town wide not necessarily in core.

In the survey distributed as part of the planning process, almost all respondents Strongly Agreed (67%) or Agreed (31%) with the statement that "The Downtown Area should be a pedestrian and bicycle friendly area that safely connects businesses, schools and residences."

The "Vision Concept" plan for the Milton Crossroads Marketplace envisions a mixed use commercial-residential district with town center gateways, tree lined streets, boulevard retro-fit for Route 7 and a dense pedestrian network with high quality connectivity to all parts of the center.

4. Chittenden County Regional Plan (October 2001)

The Chittenden County Regional Plan was developed to "help guide growth and development in Chittenden County".

Key aspects of the plan for Milton include:

- Identification of future land uses through Planning Areas -- Metropolitan, Village, Transition, Special Uses and Rural all of which are contained in Milton.
- Metropolitan Land Use Area Goal 6 and Village Land Use Area Goal 4: "An appropriate mix of automotive, rail, ferry, bicycle, pedestrian and other transportation options should provide access to the different land uses"
- Transportation Goal 3: "Improve the mass transit system by the expansion of the Chittenden

County Transportation Authority service area and frequency of operations, introduction of passenger and commuter rail and construction of multi-modal centers, transit-oriented developments, and park-and-ride lots with express bussing."

- Transportation Goal 5: "Expand the network of sidewalks and bike paths where appropriate to improve the mobility and safety of pedestrians and bikers"
- Recreation Goal 2: "Establish a region-wide system of interconnected walking trails, bicycle paths and natural areas"
- Regional Bus and Bike Map that identifies Existing and Proposed Class I and Class II Bike Path facilities (no existing or proposed facilities are shown for Milton).

5. Pedestrian Policy and Sidewalk Plan for Chittenden County, CCMPO (September 2000)

In 2000, the CCMPO completed the region's first Pedestrian Policy and Sidewalk Plan that addressed policies, programs and sidewalk/pathway design. The adopted Regional Pedestrian Policy included the following objectives:

1. Increase pedestrian mobility
2. Improve the safety and comfort of pedestrians
3. Provide pedestrian accessibility to all destinations
4. Systematically program pedestrian improvements in the Transportation Improvement Program (TIP)
5. Encourage pedestrian activity.

On a regional basis the plan shows municipal sidewalks, sidewalk planning status and need and discusses implementation issues including funding.

The Plan documented 13 miles of existing public sidewalk in Milton and estimated the cost for "sidewalk improvements/maintenance" at "$2.8 to $3.1 million for 21.8 miles of new sidewalk". Existing and proposed sidewalks are shown on a GIS base map.

The plan concludes with a discussion of "Selection Criteria" that project reviewers will use to prioritize sidewalk construction proposals for TIP funding. These criteria are:
"Will the project …

1. Address a community identified sidewalk priority?
2. Contribute to an integrated sidewalk system that includes other pedestrian facilities, to increase pedestrian travel?
3. Link existing or proposed sidewalk networks, communities and/or residential neighborhoods?
4. Connect in a logical manner village/town centers, schools, public buildings, employment sites or other popular trip origins and destinations?
5. Be a part of a grid street layout with short blocks in business districts and town centers?
6. Address safety and the needs of all non-motorized travelers?
7. Provide buffers from moving motor vehicles and delineate, sign, and mark the facilities as appropriate and ensure a secure environment, e.g. consider lighting, increased visibility, open sight lines, and access to police and emergency vehicles?
8. Provide street trees and other landscaping to bring a human scale to the street environment?
9. Contribute to an equitable geographic distribution of funding for sidewalk projects?
10. Maximize opportunities to leverage project funding from a variety of sources?

11. Bring an existing sidewalk into compliance with the Americans with Disabilities Act (ADA)?"

6. Chittenden Greenways Project (May 1991)

This project identifies 'Community Greenways' and 'Conservation Greenways' throughout Chittenden County. Community Greenways are more relevant for this plan because they "focus on the need for continuous, safe, off-road bike path and pedestrian corridors to interconnect community destinations such as neighborhoods, parks, schools, workplaces and shopping districts."

The 'Milton Line' "runs from South Burlington north to Milton and the Lamoille River Valley." A 'high route' and 'low route' were identified as very conceptual at the time of the plan's development.

7. Lake Champlain Byways Hike and Walk Study (October 31, 1999)

This Study was sponsored by the Lake Champlain Byways Project and is an inventory and assessment of the hiking and walking resources in the Lake Champlain Shoreline communities. It identifies the trails in the Eagle Mountain Natural Area in Milton as a resource that has no connection to public transportation.

8. A Twenty Year Vision for Transportation in Chittenden County (1997)

The CCMPO adopted *The Twenty Year Vision…* in 1997. It focuses on the long rang transportation issues that the region will face and on the solutions recommended to address them. While much of the report is general in nature, there are specific items that apply to Milton's alternative transportation plan. In fact, it is this report that recommends that an alternative transportation plan be developed for Milton.

The report strongly endorses the improvement of alternative means of transportation. It recommends that a basic regional bike and ped path be developed that consists of four spines, one of which flows north towards Milton from the core, the Burlington Bike Path. As expansions of this general recommendation, the report call for alternative transportation paths from Milton Village to the commercial area south along Route 7 and from the Village to Mayo Road.

9. Town of Milton Growth Management Plan (Draft December 15, 2000)

Milton's Growth Management Plan looks at what types of growth can be expected in the Town in the next twenty years, based on current regional growth trends and the Town's current zoning regulations and what how the growth should be managed on a yearly basis. The Plan is based on the recommendations of the Town Core Area Master Plan and how the implementation of the recommendations is contains will affect the Town.

The report concludes that the residential growth in the Town Core Area will increase by almost 350% over the existing potential with a total of 1,687 estimated residential units in the Town Core Area. Commercial growth in the Town Core Area is estimated to be over 3,700,000 square feet with the implementation of the Town Core Area recommendations, only 114 % larger than existing zoning in the same area. Both numbers indicate a much higher concentration of development, which can only happen with the implementation of infrastructure that includes pedestrian and bicycle facilities.

10. Milton Conservation Commission Survey (March, 1998)

The Milton Conservation Commission organized a community survey to examine attitudes alternative transportation within the Town. They received 109 responses that represent a 1.16% return based on population, or 3.3 % return based on households. In general, the responses indicated support for the expansion of the sidewalk system as well as the creation of bike paths within the Town. One portion of the survey asked for suggested locations for bicycle or pedestrian paths in Milton, and the survey results contain the list of locations suggested.

11. Milton in the New Millennium (May 7-8, 1999)

Milton conducted a visioning sessions to provide ideas on how Milton will move into the future. During the event, there were large group discussions with all participants and small group discussions focusing on specific assigned topics. A summary report was produced for the sessions, which provides a recording of the main ideas generated in the sessions. Three of the four initial key goals developed by the transportation small discussion group centered on the ideas of improving alternative transportation in the Town. As the larger group refined these goals, a more specific goal of facilitating smooth and safe traffic flow along Route 7, as well as providing safe pedestrian crossings was developed, as became one of the projects to emerge from the sessions.

12. Pavement Management Plan Analysis (October, 2000)

The Pavement Management Plan Analysis explores the most cost effective means of managing pavement in the Milton. While various options are discussed, none of the options appear to include widening the roadway base to allow for greater bicycle or pedestrian use.

13. Lake Champlain Byways Corridor Management Plan (January, 2000)

The Lake Champlain Byways Corridor Management Plan is a collection of documents prepared by the eight counties on either side of Lake Champlain in the United States. There are also two general sections to the plan that serve a unifying features, tying the rest of the pieces together. A portion of the Lake Champlain Byways passes through Milton on US Route 2, with an alternate route located on smaller roads west of Interstate 89. Several theme bike routes are proposed within Milton as well. The Chittenden County portion of the management plan contains several references and suggestions for Milton.

- Support improvements for bicycle-friendly travel along US Route 2/7 in Milton.
- Establish parking/trailhead for walking trails at Eagle Mountain in Milton.
- Explore walking tour concept and other pedestrian improvements to Milton's Town Center.
- Support Milton's efforts to develop a walkway connecting Sandbar State Park and the Town's natural areas and Village.
- Support creation of additional local walkways.
- Create a "Mode Node" in the Town Center along US Route 7 near mouth of Arrowhead Lake. (Mode Nodes are multi-modal transportation centers that include travel facilities and visitor information.)

14. Operational Analysis, System Plan, and Funding Alternatives for the Chittenden County Transportation Authority (March, 1999)

This joint CCMPO/CCTA report suggested two types of bus transit to service Milton:

- Express Bus Service; Milton Village to Burlington: An express bus from Milton to Colchester, Winooski and Burlington has been identified by KFH as one of its priority regional commuter routes. This route, traveling via I-89 could provide commuting options from Milton town center directly to Colchester Exit 16, Winooski, and Burlington via Chimney Corners/Exit 17.

- Transit Feeder Service; Milton Village: Because the service/feeder area for the Milton commuter bus line would be relatively large, KFH has identified the Milton Village area as appropriate for feeder transit service. The Feeder service could consist either of on-call route deviations by the main bus line or demand-responsive jitney style service separate but providing a connection to the main bus line.

E. Transit

Currently, no regularly scheduled public transit service serves Milton. Although Milton is not now part of the CCTA service area, long-term strategies for regional public transit expansion developed by the CCMPO and CCTA call for the eventual implementation of bus transit service within, to, and from Milton. No timetable for implementing bus transit service to Milton has been established. The New England Central Railroad (NECR) mainline runs through the center of the Town in a north/south direction, passing directly through the Village and Town Core Area. VTrans is currently investigating possible establishment of commuter rail service between Burlington/Essex and St. Albans as an extension of the Burlington-Essex rail project current under development by the CCMPO. This northern service would travel through and presumably stop at least once in Milton. Funding has not yet been approved for this project, however, and there is as yet no timetable for securing funding and establishing service.

IV. USERS. ORIGINS, DESTINATIONS, ACTIVITY CENTERS AND CORRIDORS

A. Users

In conducting this study, the consultants assumed that alternative transportation facilities in the Town should be available to all types of potential users. They initially included pedestrians of all ages and bicyclists of all abilities. During discussions with Town Residents at the public work sessions, two other user groups emerged: snowmobilers and equestrians.

Each of these types of users has its own needs and places it would like to go via alternative transportation routes. These differences can affect the locations and types of alternative transportation facilities being considered for this project. Table 7 lists the different users of the Milton Alternative Transportation system and presents the basic differences between the different users. This information helps in the evaluation of the origins and destinations discussed in Section V of this report.

Table 7: Alternative Transportation Facilities Users

Type of User	Destinations	Ability Level	Comfort Level	Comments
Pedestrian				
Pre-School	Very Close to Home	Basic	Low to no other Nearby Vehicular traffic	Needs supervision and an isolated sidewalk or path
Grade School	Close to Home	Basic	Low nearby vehicular traffic levels acceptable	Separated sidewalks or paths preferred.
H. School/Adult	Town Wide	Intermediate to Advanced	High nearby vehicular Traffic levels potentially acceptable	Can use shoulders or trails
Elderly	Variable	Intermediate to Advanced	Variable	
Bicyclist				
Basic Skills	One Mile Radius	Variable	Some adjacent Vehicular Traffic Volumes Acceptable	Usually Younger Riders – Only Separated paths or Very wide shoulder appropriate
Intermediate	Town wide	Intermediate	Variable	Separated paths or 4-foot wide shoulders appropriate
Skilled	Regional	Advanced	High Adjacent Vehicular Traffic Volumes Acceptable	Narrower Shoulders and All types of facilities acceptable
Equestrian	Town Wide	Variable	Little to no nearby Vehicular Traffic acceptable	Off-road facilities preferred;
Snowmobiler	Town Wide and Regional	Variable	Little to no nearby Vehicular Traffic acceptable	Off-road facilities preferred; Seasonal Use

B. Origins and Destinations

The various types of users of alternative transportation facilities in Milton have a variety of locations to or from which they may wish to travel. At a public participation work session, the consultants and town residents developed a list of these potential origins and destinations of non-vehicular transportation trips. The list included residential, commercial, recreational, industrial, and civic locations. After listing the various locations within the town, the attendants at the work session evaluated them to see which types of

users they would mostly likely attract. This helped establish a relative value among the various locations, those that would be visited by more types of users would require a wider range of alternative transportation facilities than one that did not attract as many different types of users.

C. Activity Centers

The civic destination points were grouped together and labeled as Activity Centers. These are locations where civic activities are on going and potentially appealing to numerous types of users. The list includes the schools, the post office, the library, the Town Offices, the fraternal organization halls and the churches in the Town Core Area and village.

D. Alternative Transportation Corridors

The location of the various destinations and activity centers in the Town began to suggest the location of alternative transportation corridors in the town. The consultant, initially with no indication as to which type of facility would be best for each corridor, generally depicted the locations of these corridors. The designation of the corridors indicated that a need existed to facilitate movement on alternative transportation facilities between the town end points. Further evaluation described in the following sections helped to determine how this movement could be best accommodated in each particular corridor.

It was the strong belief of the Town residents and endorsed by the consultant that the Town Core Area should serve as the focal point of the alternative transportation system. This implied that the various alternative transportation corridors in the Town should ideally link through the Town Core Area. This radial pattern of contains the primary alternative transportation corridors in the system. Two secondary corridors that do not link directly with the Town Core Area are also included in the system.

E. Typical Alternative Transportation Facilities

1. Pedestrian Facilities

Pedestrian facilities are an essential part of the downtown streetscape, critical for serving transit and important for business and civic vitality. There are many aspects to creating an attractive pedestrian environment that go beyond the application of concrete or asphalt. Important considerations include the following:
Location - The sidewalk network should connect people on a continuous and direct route to where they want to go such as schools, shopping areas, public services, recreation and transit.
Placement - of the sidewalk at the edge of curb or behind a planted buffer will depend on the type of roadway and the site. Greenbelts are preferable because they separate the pedestrian from the roadway, but also because they provide a location for utility poles, hydrants and signs as well as planting. However, if on-street parking is allowed cars can also provide the needed buffer between pedestrians and traffic.
Safety - Sidewalk corridors should be designed to give pedestrians a sense of safety and predictability. The threat of adjacent, fast moving traffic can be diminished by adequate separation from the traveled way. Crosswalks should be clear and visible to both drivers and pedestrians. Signalized crossings should not require undue waiting and should allow adequate crossing time.

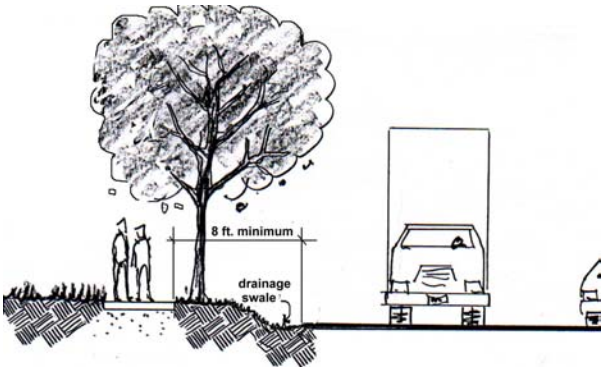
Landscaping - While not always necessary or appropriate, landscaping typically enhances the pedestrian way with shade in summer, the rustle of leaves, a year round canopy and enclosure that provides visual and psychological comfort.
Lighting – Lighting allows the pedestrian corridor to function safely after dark, can keep residential areas inviting and the downtown active into the evening hours.
Character of Place – Materials, details and amenities of the sidewalks corridor can be important to the character of an area. Benches and gathering spots lend opportunities for social interaction.
Accessibility – The pedestrian corridor should be easy to use for all residents of the community.

Safety is primary in pedestrian design. While Vermont surpasses most states in the nation in pedestrian safety, averaging 5th over the last 2 years, over 6 percent of traffic fatalities in the state are pedestrians. Slowing vehicle speeds creates a much safer environment in pedestrian areas. The likelihood of a vehicle/pedestrian crash being fatal goes from 85% to 5% when the vehicle speed is reduced from 40 to 20 miles per hour. As drivers slow down they become more aware of other activities in the roadway corridor and they can respond and stop more quickly.

The following are design options for sidewalks and greenbelts. The advantages and disadvantages of each are noted.

Sidewalk with Greenbelt Without Curb. – Sidewalks can be built along a roadway with no curb if the walk is located well away from the edge of road. In this case a wide greenbelt between the roadway and the pedestrian space creates a buffer from traffic. Part of the greenbelt can serve as a swale for stormwater. For safety reasons, planting in the greenbelt may be restricted on state highways with no curb. This option is best suited for rural areas where there is no parallel parking allowed.

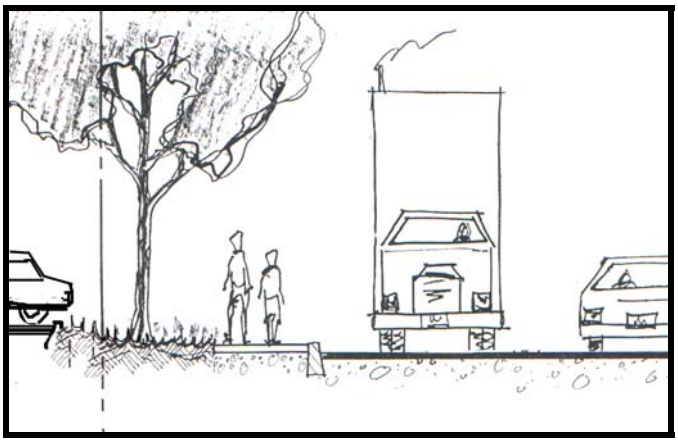
Swale and planting installed on the private property side of this low volume road. Sidewalk built above road grade.



Alternative design that places swale and planting on roadway side enhances streetscape. Sidewalk built above road grade.

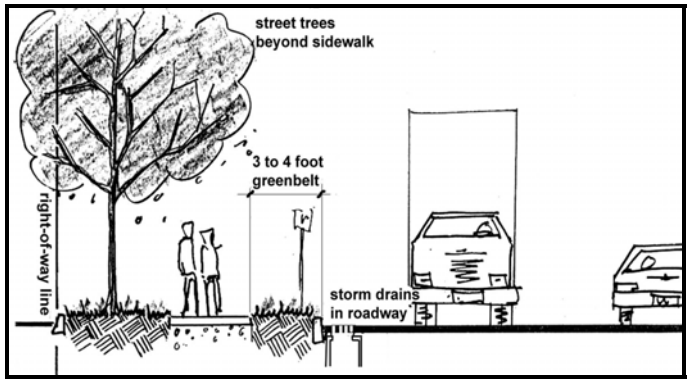
Advantages	Disadvantages
Wide greenbelt separates pedestrian from traffic	Requires wide ROW and wide greenbelt
Can be installed without structured drainage if topography allows.	Requires width and topography for drainage swales
Least cost Wide greenbelt provides room for street trees in low speed areas	Not for use on streets with parallel parking No curb allows vehicles to park on greenbelt which impacts planting and creates erosion.
Appropriate for use at edge of town centers and residential neighborhoods where no parallel parking occurs	Grass and trees require maintenance by town or adjacent property owners.
	Requires particular grading conditions that allow good surface drainage.

Sidewalk at Curb, no Greenbelt. – This design option offers the least protection and comfort to the pedestrian and should only be considered where no other option is possible.



Advantages	Disadvantages
Easy option for very narrow right-of-way	Requires curb and storm drainage system
	No buffer between sidewalk and traffic
	Unpleasant environment for pedestrians especially on roadways with high traffic volume
	Does not encourage pedestrian use.
	No snow storage area.

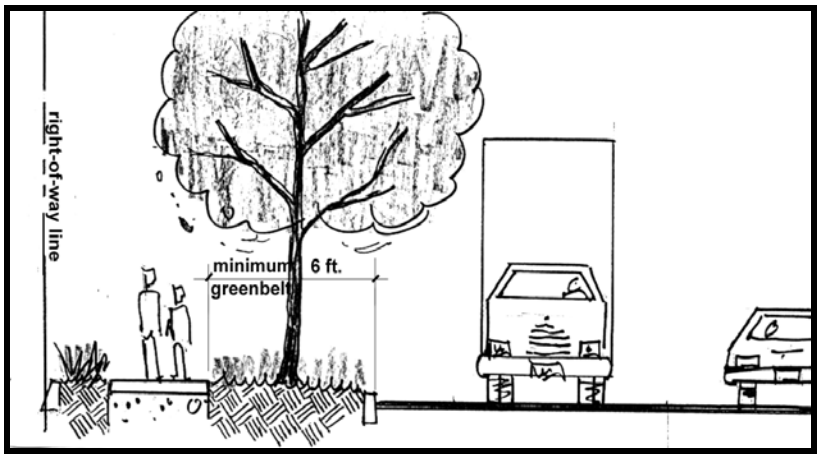
Sidewalk with Greenbelt without Trees. – A narrow greenbelt, even three feet in width offers some buffer between pedestrians and vehicles. A curb is essential to protect the greenbelt. However, since street trees need at least a six feet of greenbelt to be viable, for this option street trees must be installed at the edge of the right-of-way or, with permission, on private property. If parallel parking is allowed and is heavily used, the greenbelt may not withstand the impact of foot traffic and brick or other textured paving should be substituted for grass.



Trees on private property screen sidewalk from parking lot. Narrow greenbelt provides space for utilities, signs and snow storage.

Advantages	Disadvantages
Greenbelt provides some buffer between pedestrians and traffic	Requires cost of curb and drainage.
Curb protects greenbelt and separates sidewalk and pedestrians from roadway	Green belt too narrow for trees.
Greenbelt provides location for signs, utility poles, and some snow storage.	Not for parallel parking conditions where heavy foot traffic will impact greenbelt
Trees planted in lawns behind sidewalks, away from road salt may stay healthier.	Grass and trees require maintenance by town or adjacent property owners.

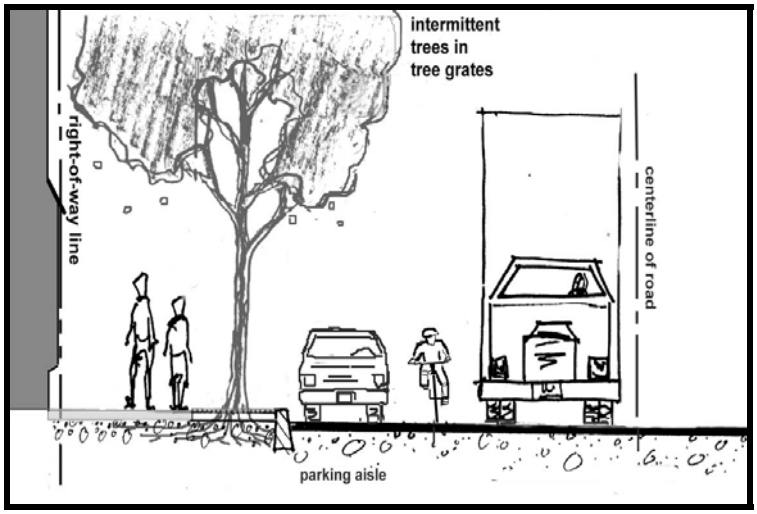
Sidewalk with Planted Greenbelt. – A wide greenbelt is ideal for creating an inviting pedestrian space and growing healthy street trees that will withstand the roadway environment. This option is particularly appropriate for residential areas where trees can enhance a neighborhood and calm traffic. Narrowing the travel lane to gain greenbelt space is sometimes an option and has a similar traffic calming function.



Wide greenbelt buffers pedestrians from street traffic and provides space for shade trees.

Advantages	Disadvantages
Provides excellent buffer from roadway traffic	Requires wide right-of-way
Wide greenbelt allows large trees that shade sidewalk and roadway.	Grass and trees require maintenance by town or adjacent property owners.
Creates boulevard effect for roadway	Requires storm drainage system
Provides generous snow storage area	

Town Center Sidewalk at Curb. – In a town center or other areas where a sidewalk is next to heavily used parallel or diagonal parking the sidewalk should be next to parked vehicles. In such locations the sidewalk should usually be wider than the standard five-foot width. In town centers sidewalks are important public spaces that can be used for benches, sidewalk cafes, and display space. Trees in a paved sidewalk need special soil. Standing objects should be outside of the cleared space.



Advantages	Disadvantages
Creates best environment for pedestrians and businesses in downtown commercial blocks	Requires storm drainage system Cost relatively high
Pedestrian traffic does not compact greenbelt.	Tree require pruning by town
Supports parallel or angle parking	
Allows use of sidewalk for retail uses such as display, outdoor dining, and sandwich boards.	Sidewalk plows must avoid tree stems Requires careful design.
	Snow should be removed from sidewalk where parallel parking abuts sidewalk

2. Bicycle Facilities

Although bicycle facilities should be designed and built to meet the needs of local bicyclists and the community it should be recognized that new and improved facilities often increase bicycle use simply by providing a new or safer transportation option to a previously untapped (and sometimes unknown) group of users.

Like sidewalks bike facilities should connect to places that people want to go and should be continuous. Partial routes that end and leave cyclists on an unmarked and/or unsafe road can be dangerous. Bike racks at destinations; stores; schools, offices, can be a requirement new development.

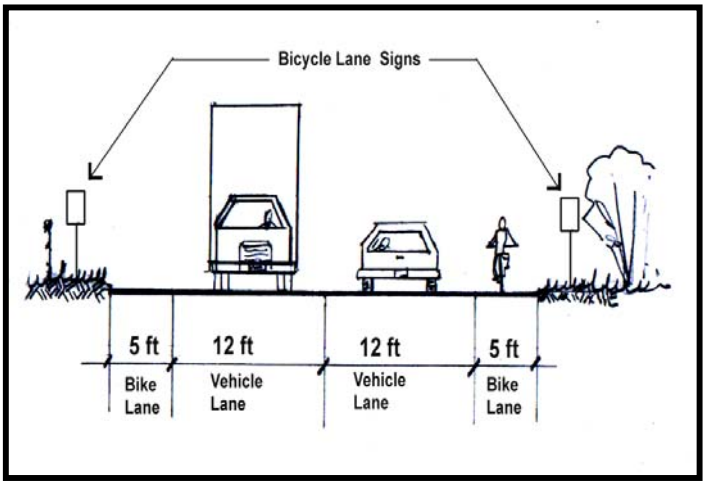
Facilities for cyclists can be on-road or off-road. Although off-road facilities are considered by the general public to be safer, fatal on-road crashes in Vermont are relatively rare. Vermont ranks below the national average (34th from '91-96) with an average of a little over one fatal accident per year. Last year (2000) there were no "pedalcycle" fatalities and 79 vehicle fatalities.

The photos and illustrations of these typical options for on-the-road bicycle facilities are shown in Attachment B. Widths shown are those recommended by 1999 edition of *Guide for the Development of Bicycle Facilities*, AASHTO.

Options for on-road facilities for cyclists include:

Bike lanes – Dedicated bike lanes are generally reserved for areas where there is (or will be) significant bicycle travel on-road. This could be a dense urban area, an area with a high school age population, or high bicycle traffic generated by a nearby trail system. Dedicated lanes require added roadway width which if not frequently used by cyclist can result in increased vehicle speeds. Provision for left turn bike lanes should also be considered.

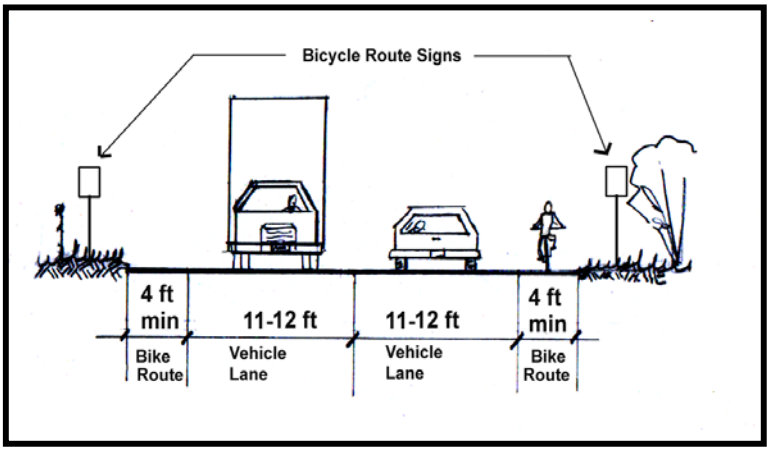
Well-marked, dedicated bike lane on both sides of local road



Dimensions recommended where curb exists. Four feet width is allowed where no curb and stable shoulder exists.

Advantages	**Disadvantages**
Highest on-road comfort/protection for cyclist	Requires most ROW and pavement width
On-road lane accesses most destinations	Left turn lanes recommended. This results in wider intersections
Best for high volume bicycle use	Highest cost alternative for on-road options

Designated Bike Routes – An on-road bike route is a sufficiently wide, marked shoulder for use by cyclist. The shoulder may also be used by vehicles on occasion for instance as a breakdown lane. Most Vermont cyclists use this type of facility; most are not signed as such. Some roads serve this segment of the cycling public better than others. The shoulder along a rural bike route should usually be marked with a white "fog line" demarking the shoulder width. The pavement should be smooth, free of potholes, gravel and sand, and dangerous catch basin grates. The route should be signed to make drivers aware they need to watch for and safely pass cyclists.

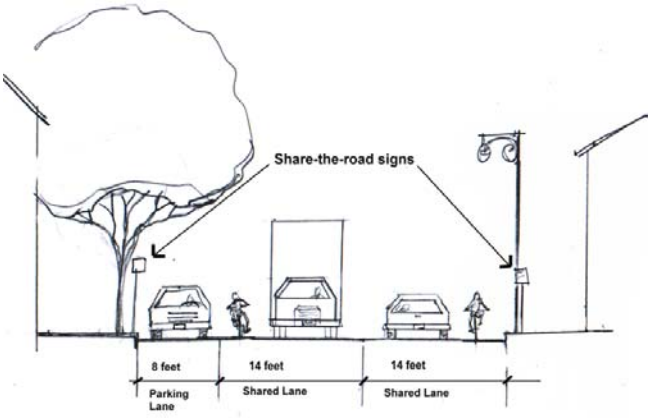


Dimensions allowed for bike ROUTE

Advantages	Disadvantages
Provides bicycle route with more flexible requirements	Requires ROW and minimum pavement width to meet State standards
On-road route accesses most destinations	Left turn lane not usually provided

Shared use Lanes – A slightly wider outside lane in a slow moving traffic environment can be a safe environment for most skilled cyclists. With "Share-the-Road" signs drivers can learn to expect and accommodate bicycles traveling beside them and drivers parked parallel learn to look before opening driver's side doors. Share the road routes should be located where traffic speeds do not in fact exceed 25 miles per hour.

Roadway dimensions Allowed by of VTrans -*Vermont State Standards*



Share-the-road signs alert drivers to the presence of cyclists

Advantages	**Disadvantages**
Used in downtown areas where traffic is 25 mph or less	Requires speed control and driver awareness
On-road route accesses most destinations	Requires good cyclist practices and awareness
Least costly	

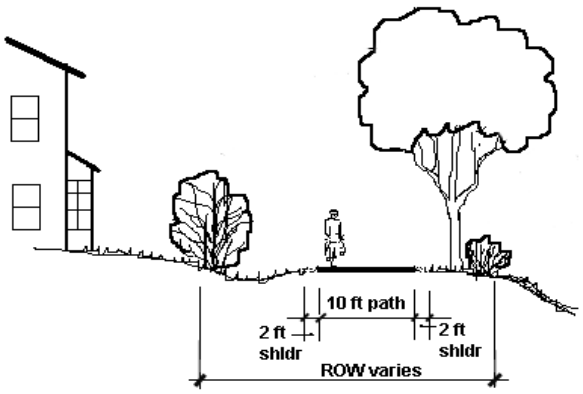
3. Shared-Use Facilities

Many off-road paths originally built to serve cyclists have quickly attracted a range of users from dog walkers to in-line skaters. They are now called “shared use” paths, and they are seen primarily s recreation facilities. However, these paths can save vehicle trips by providing an off-road short cut to high-use destinations such as schools and a pleasant, non-motorized route to recreation facilities. They can serve the younger population who may be developing biking skills and confidence to become on-road cyclist.

Shared use paths should be seen as a supplement, not a substitute for on-road bicycle routes. Most skilled cyclists find it inconvenient to ride shared-use paths for utilitarian trips and find that high speed biking on shared-use paths can create conflicts with others users when the path is heavily used.

Shared-Use Path -Shared use paths are built on an exclusive right-of-way, in most cases substantially separate from a roadway. When shared-use paths are located parallel and adjacent to the roadway there are numerous functional problems and potential vehicle/bike conflicts that can arise. With appropriate separation between roadway and path this type of facility is permissible but should be used only when other options are not available and functional problems can be addressed.

Shared use path and bridge in South Burlington



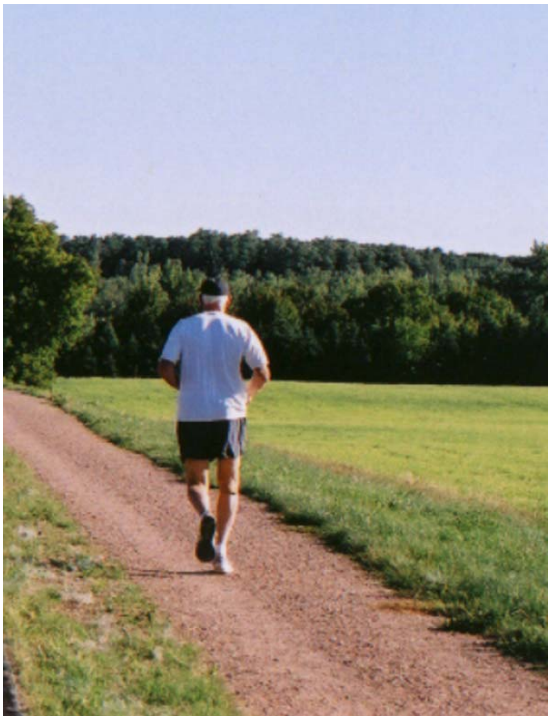
Dimensions recommended by federal and Vermont guides

Advantages	Disadvantages
Off-road safest environment for all users.	Less access to a variety of destinations
Quality recreational environment possible	Most costly
	Approvals sometime difficult
	ROW acquisition sometime difficult
	Generally used for recreation more than transportation

Trail – The term trail generally refers to a gravel or unpaved path and it covers a wide range of facilities from Rail-to-Trails to woodland trails. Gravel paths are not suitable for on-road bicycles and in-line skates, although they can, if properly maintained be usable by wheelchairs and baby carriages if grades are not too steep. Trails are more likely to attract recreational users and are generally funded as such. Rail-to-trail may be an acceptation. Some towns allow snowmobiles on their trails and funding sources allow this use in some cases.

Trails may be designed to accommodate horse travel and snowmobiles in season.

Most of the non-motorized transportation options discussed in this section will be part of a new publication by the Vermont Agency of Transportation entitled *Vermont Pedestrian and Bicycle Facility Planning and Design Manual*, due out in the summer of 2002. This valuable resource for Vermont towns will establish a statewide approach for the design of pedestrian and bicycle facilities.



Trail specifications and dimension may vary depending on setting, type of user and funding source.

Advantages	**Disadvantages**
Off-road safest environment for all users.	Less access to a variety of destinations
	Not usable for some modes- such as roller blades and some bicycles
Quality recreational environment possible	Costly
	Approvals sometime difficult
	ROW acquisition sometime difficult
	Generally used more for recreation than transportation.

4. Transit

As described in the 1999 CCMPO report, "Operational Analysis, System Plan, and Funding Alternatives for the CCTA" prepared by the KFH Group, three types of transit services could make sense in Milton:

- Regional Routes - Commuter Services: The routes would provide weekday peak hour express service oriented toward employment and school trips, from outlying areas into downtown Burlington and the university/college areas (major employment areas with parking issues). Service frequency is estimated to be three morning and three evening runs per weekday. Service would be hourly.

- Regional Trunk Lines - Local Line Haul Service: These routes provide frequent, all day base fixed schedule service in corridors with high population and trip densities. These services connect local residential areas with high densities to downtown.

- Community Connectors: These routes provide intra-community local service in local towns and connect to regional routes. Two different types of community connectors might be possible in Milton.

  Cross County Direct Connectors -- This type of service provides outer loops connecting outlying hubs without requiring a transfer downtown -- suburb to suburb. This type of service is envisioned between larger activity centers.

  Feeder Zones for Route Deviation or Demand-Responsive Connector Services -- These routes serve the lower-density areas surrounding and connecting to line-haul services. The zones are designed around what one vehicle can do within one zone. Feeder service will be provided during the hours and days that fixed route services are operated -- all day and evening for feeder to trunk lines; peak periods for feeders to commuter lines.

F. Specific Corridor Facilities

As part of the analysis process, the consultant developed an informal analysis process that could be used to determine which type of facility or facilities would be most appropriate for each corridor. Table 5 presents the basic information used in the analysis. The process is a method of evaluating what types of users would be traveling each corridor, and how often they would be doing so. The table is weighted to give slightly more importance to pedestrian and bicycle users over equestrian or snow mobile users.

The table also presents recommendations for the most appropriate types of facilities for each corridor. The recommendations are based on the following principles as well the particular conditions of each corridor:

- Where there will be a wide variety of uses and users, including children, and the number of users will be heavy, a separate facility would be appropriate.

- Where there will be a wide variety of uses and users, but few children, and the number of users will be medium to heavy, sidewalks and bicycle lanes would be appropriate.

- Where there will be fewer types of users and the use is primarily transportation to work or recreational, a bicycle route with roadway shoulders wide enough to provide a walking space would be appropriate.

- Where there will be considerable equestrian users, or recreational walkers, a Cross Country Trail would be appropriate.

- Where there will be a significant number of commuters using a corridor, a bus route would be appropriate.

V. CORRIDOR EVALUATION

A. Overview

In the discussions with Town residents at the public work session, they expressed the belief that each of the primary corridors in the alternative transportation system be considered of equal importance. While such designations would place importance on the entire system rather than on any specific corridor, it does not help the Town sort its priorities for developing or funding improvements to the system. Consequently, some form of ranking is needed to prioritize the development of the system.

The same information that helped to determine what type of facility is most appropriate for each corridor also assisted in the development of prioritization of the corridors. Simple rankings were given to each of the various items in the list, to determine how many different types of users were likely to user the corridor and the total number of expected users. Other factors that were considered included the number of destinations served by the corridor, and the number of references to the corridor in other studies.

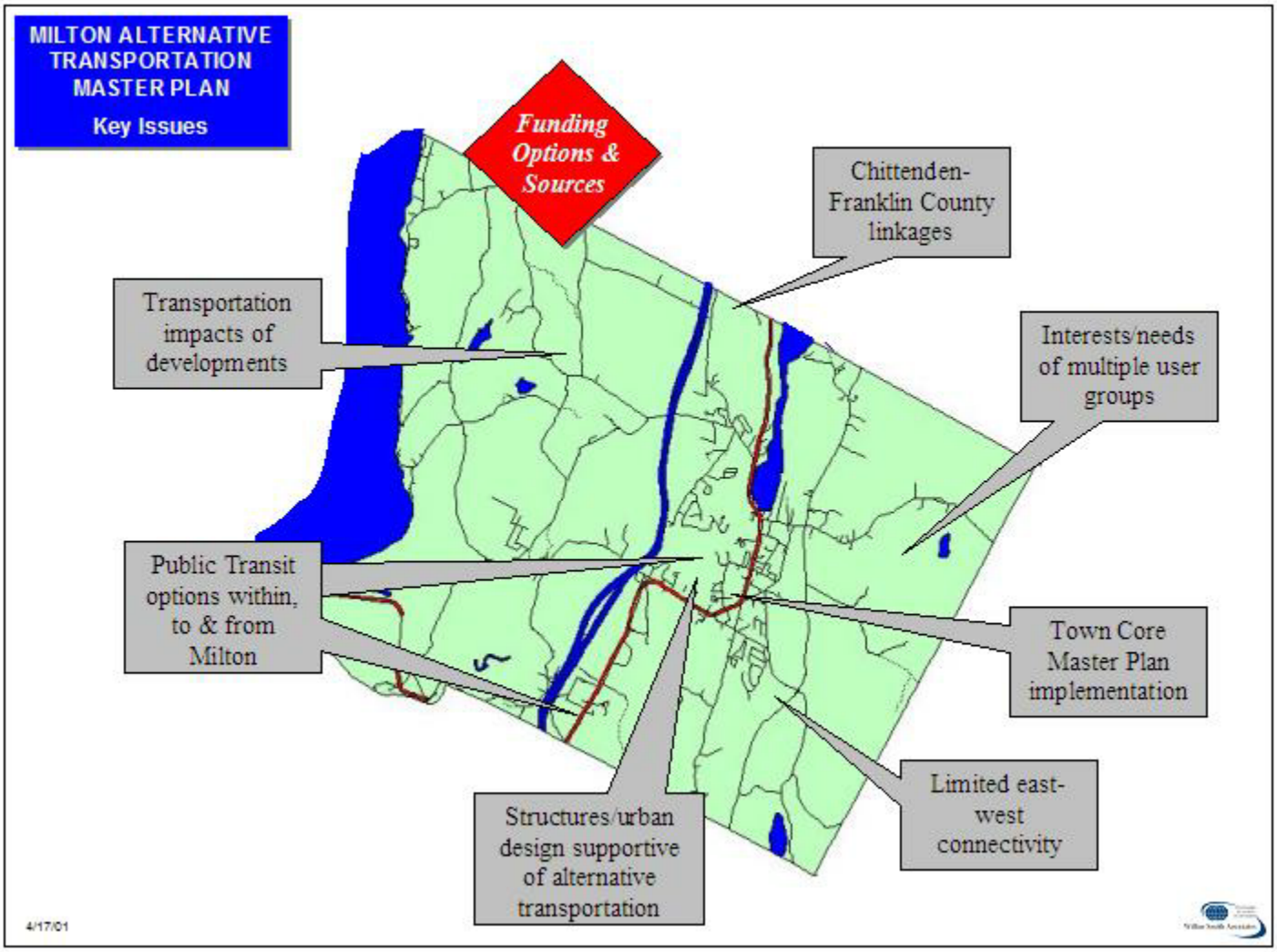
The consultants recommend four priority levels to be considered for the alternative transportation system. The four levels give a general breakdown of importance of each corridor to the overall system. The actual implementation of the recommendations may vary depending on changes to conditions and opportunities that may arise. Thus, elements of level two may be funded or pursued before all elements in level one are complete. Table 6 presents the priority levels for the various corridors.

Table 5 presents the information used in this analysis. The overall rank at the bottom of the table shows how the various corridors performed in the evaluation.

Milton Alternative Transportation Plan

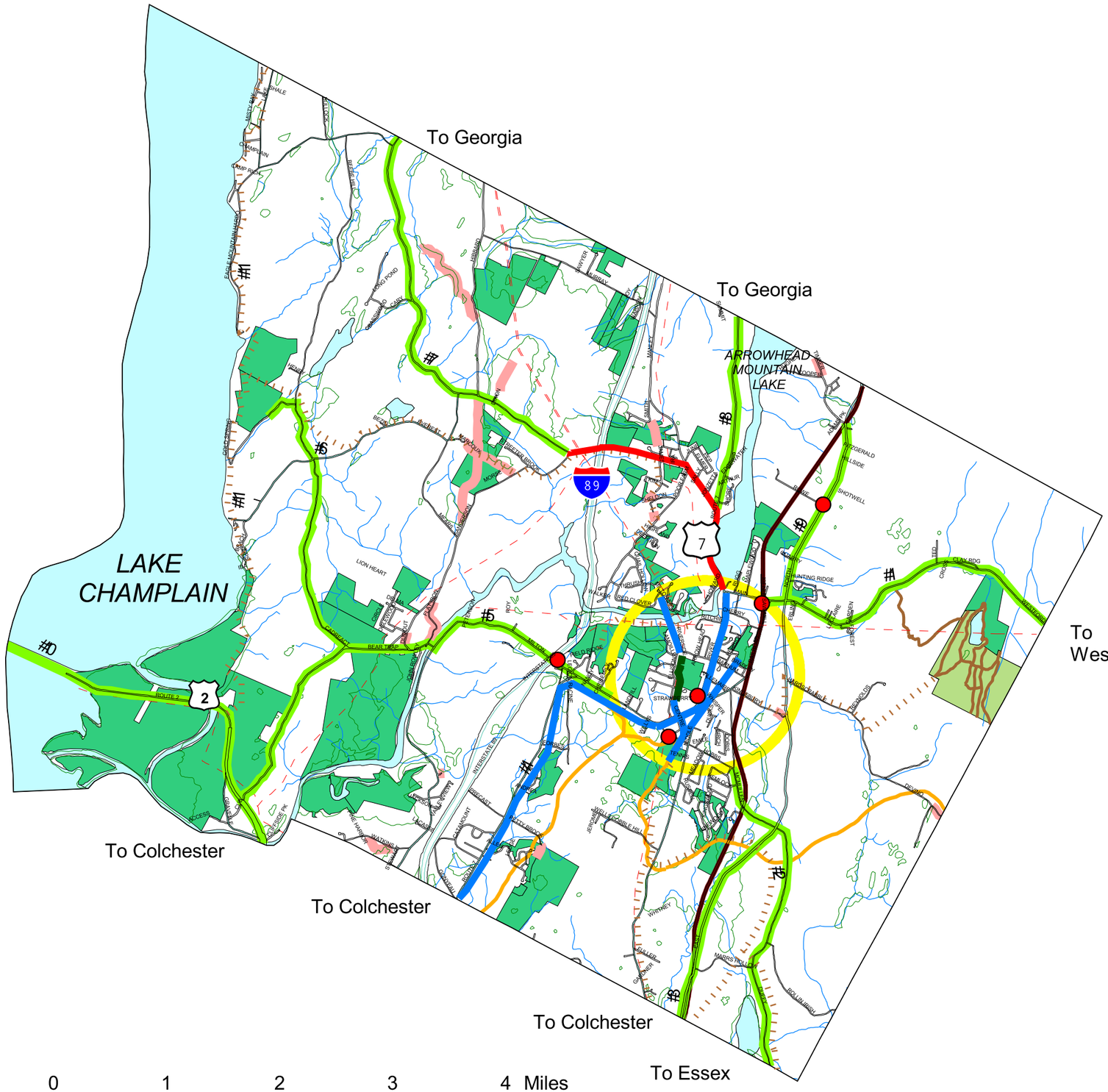
Relative Corridor Importance

			1	2	3	4	5	6	7	8	9	10	11
	Assigned	Town	TC Area to	TC Area	TC Area		TC Area to	TC Area	Lake Road		North Rd		Lk. Champlain
ATTRIBUTE	Points	Village Core	Town Forest	to Essex	to Colchester	Rt. 7 South	Sandbar SP	to Eagle Mt.	to Georgia	Rt. 7 North	to Georgia	Rt. 2	Shoreline
USE:													
Transportation to Work	2	2		2		2			2	2	2		
Transportation to Transit	2	2				2			2	2	2		
Transportation to School	2	2				2			0	2	2		
Transportation to Recreation	2	2	2	2	2	2	2	2	2	2		2	
Transit Use	2	2		2		2		0		2			
Recreational Use	2	2	2	2	2		2	2		2		2	2
Subtotal	**12**	**12**	**4**	**8**	**4**	**10**	**4**	**4**	**6**	**12**	**6**	**4**	**2**
POTENTIAL # OF USERS:													
Heavy/medium/light	**3, 2, or 1**	**3**	**1**	**2**	**1**	**3**	**1**	**1**	**3**	**3**	**2**	**3**	**1**
TYPES OF USERS:													
Pre-K & Elementary School	1	1											
Middle and High School (6-12)	1	1	1	1	1	1	1	1	1	1	1	1	1
Adult	1	1	1	1	1	1	1	1	1	1	1	1	1
Commuter	1	1	0	1		1			1	1	1	1	
Pedestrian	2	2				2							2
Cyclist	2	2	2	2	2	2	2	2	2	2	2	2	2
Equestrian	1		1	1	1			1					1
Snow Mobiler	1	1	1	1	1				1	1		1	
Subtotal	**10**	**9**	**6**	**7**	**6**	**7**	**4**	**5**	**6**	**6**	**5**	**6**	**7**
OTHER FACTORS													
Use of Existing Utility Corridor	0 or 1		1		1								
Number of Destinations	1 to 3	3	1	1	1	3	1	1	2	1	1	1	1
Referenced in Other Studies/Plans	0 or 1	1				1	1	0		1	1	1	
Ease of Implementation	1, 2, or 3	2	3	2	2	2	1	1	2	2	2	3	1
Subtotal	**8**	**6**	**4**	**3**	**3**	**6**	**3**	**2**	**4**	**4**	**4**	**5**	**2**
SCORE	**33**	**30**	**16**	**20**	**15**	**26**	**12**	**12**	**19**	**25**	**17**	**18**	**12**
		Shared use											
Recommendation		or	Route & Trail	Route & Trail	Route & Trail	Shared Use	Route	Route & Trail	Sidewalk/Lanes	Sidewalks/	Sidewalk/Lanes	Route	Trail
		Sidewalks /		Ex. Bus Route		Sidewalk/Lanes				Lanes			
		Routes		Train		Ex. Bus Route				Bus Route			


MILTON ALTERNATIVE TRANSPORTATION MASTER PLAN
Key Issues
Funding Options & Sources
Chittenden-Franklin County linkages
Transportation impacts of developments
Interests/needs of multiple user groups
Public Transit options within, to & from Milton
Town Core Master Plan implementation
Limited east-west connectivity
Structures/urban design supportive of alternative transportation
4/17/01

AlternativeTransportation Master Plan Milton, Vermont

Proposed Alternative Transportation System



Legend

- Transit stop
- New Bike Lanes
- New Shared Use Paths
- New Trails
- Village Bike Path
- ROW boundary (1997 parcel data)
- New Bike Routes
- Utility Corridors
- VAST Trails
- Town Forest Trails
- Railroads
- Wetlands
- Town Core
- Class 4 Roads
- Streams
- Town Forest
- Open Spaces

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Kathleen Ryan, Landscape Architect

May 2002

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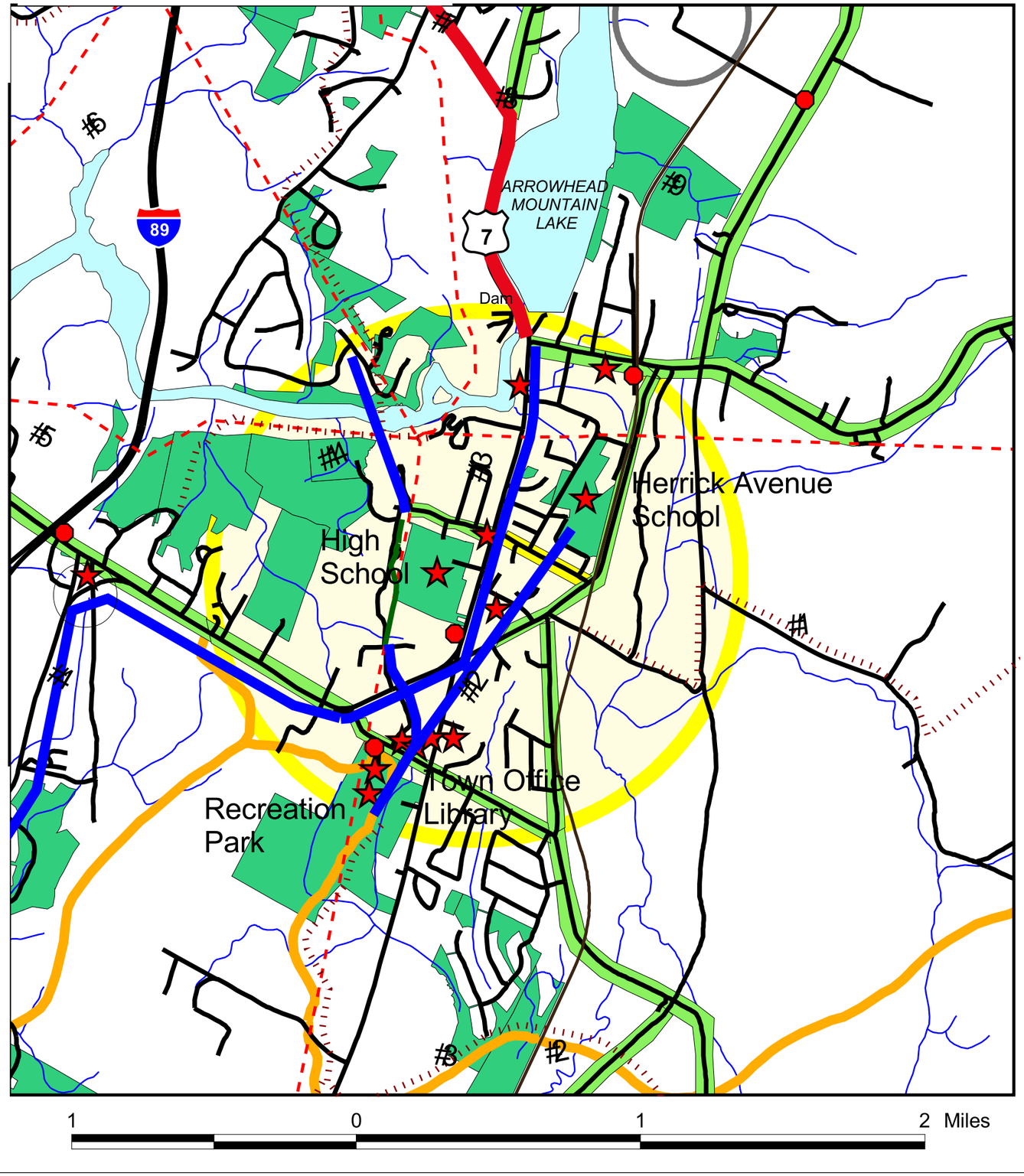
Figure 1

Alternative Transportation Master Plan
Milton, Vermont

Proposed Alternative Transportation Plan (Town Core Area)



- New Shared Use
- New trails
- Bike Lanes
- Transit stop
- Activity Center
- Village Bike Path
- Railroads
- Utility Corridor
- Roads
- Bike Routes
- Industrial Center
- VAST trails
- Streams
- Open Spaces (from Town GIS)
- Town Core Area

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Figure 2

AlternativeTransportation Master Plan Milton, Vermont

Origins and Destinations

Based on Public input and Analysis

Legend

- Gasline
- Utilitiy Corridors
- VAST Trails
- Town Forest Trails
- ROW boundary (1997 parcel data)
- Railroads
- Class 4 Roads
- Residential Neighborhoods
- Recreation Centers
- Commercial Activity Centers
- Industrial Centers
- Streams
- Town Core
- Town Forest
- Open Spaces

Lake Access

Georgia

South Hero

LAKE CHAMPLAIN

Eagle Mountain

ARROWHEAD MOUNTAIN LAKE

Milton

West Milton

Westford

Sand Bar State Park

Town Forest

Colchester

Colchester

Essex

1 0 1 2 3 4 Miles

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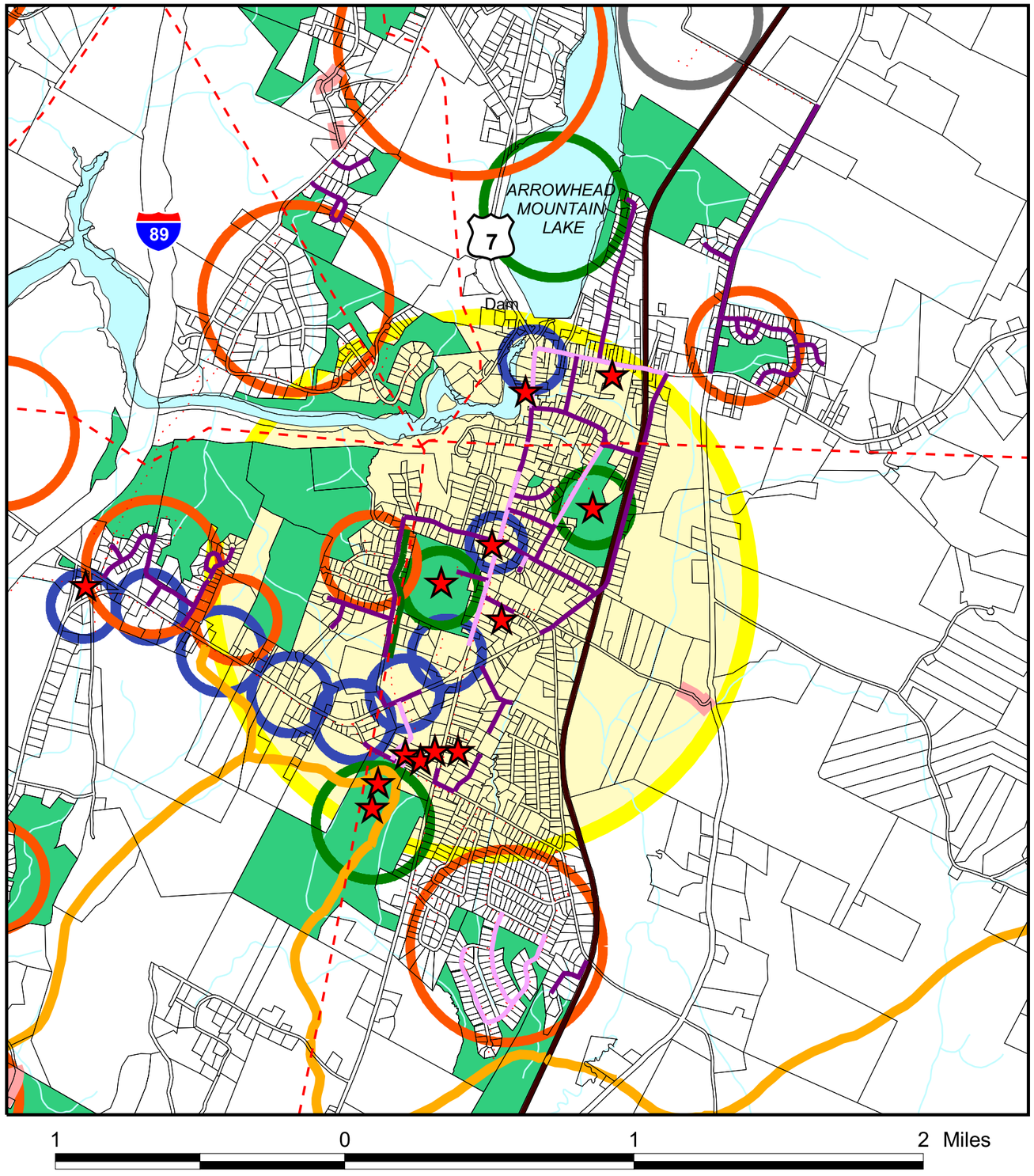
Figure 3



Alternative Transportation Master Plan Milton, Vermont

Origins and Destinations (Town Core Area)

Legend

- Activity Center
- Utility Corridor

Sidewalks

- 1 Side
- 2 Sides
- Village Bike Path
- Gas Line
- Parcels (1997 Information)
- Class 4 Roads
- VAST trails
- Railroads
- Residential Neighborhoods
- Recreation Center
- Commercial Activity Center
- Industrial Center
- Streams
- Open spaces
- Town Core Area

Activity Centers include municipal buildings, churches, schools and other gathering places.

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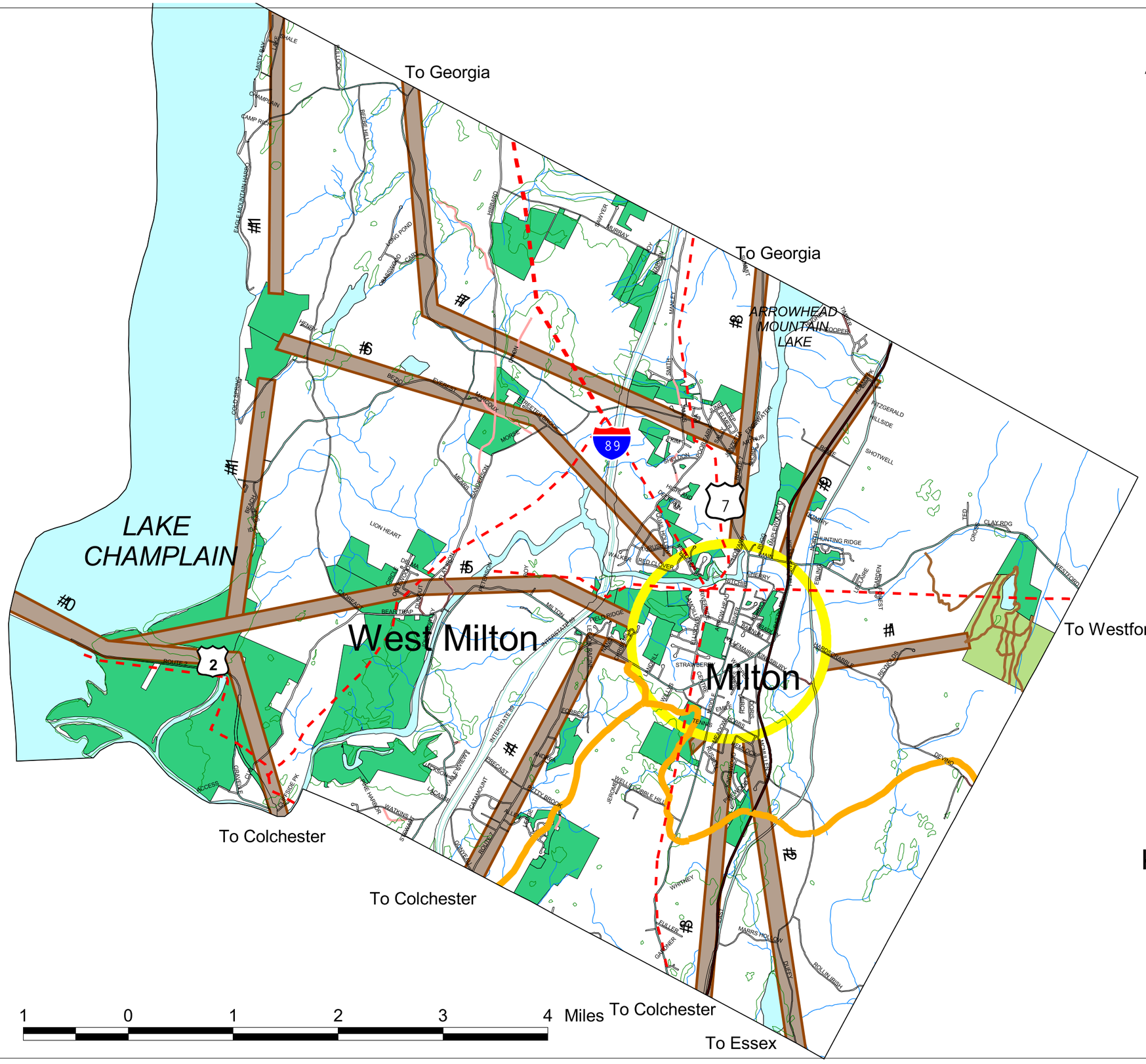
Figure 4

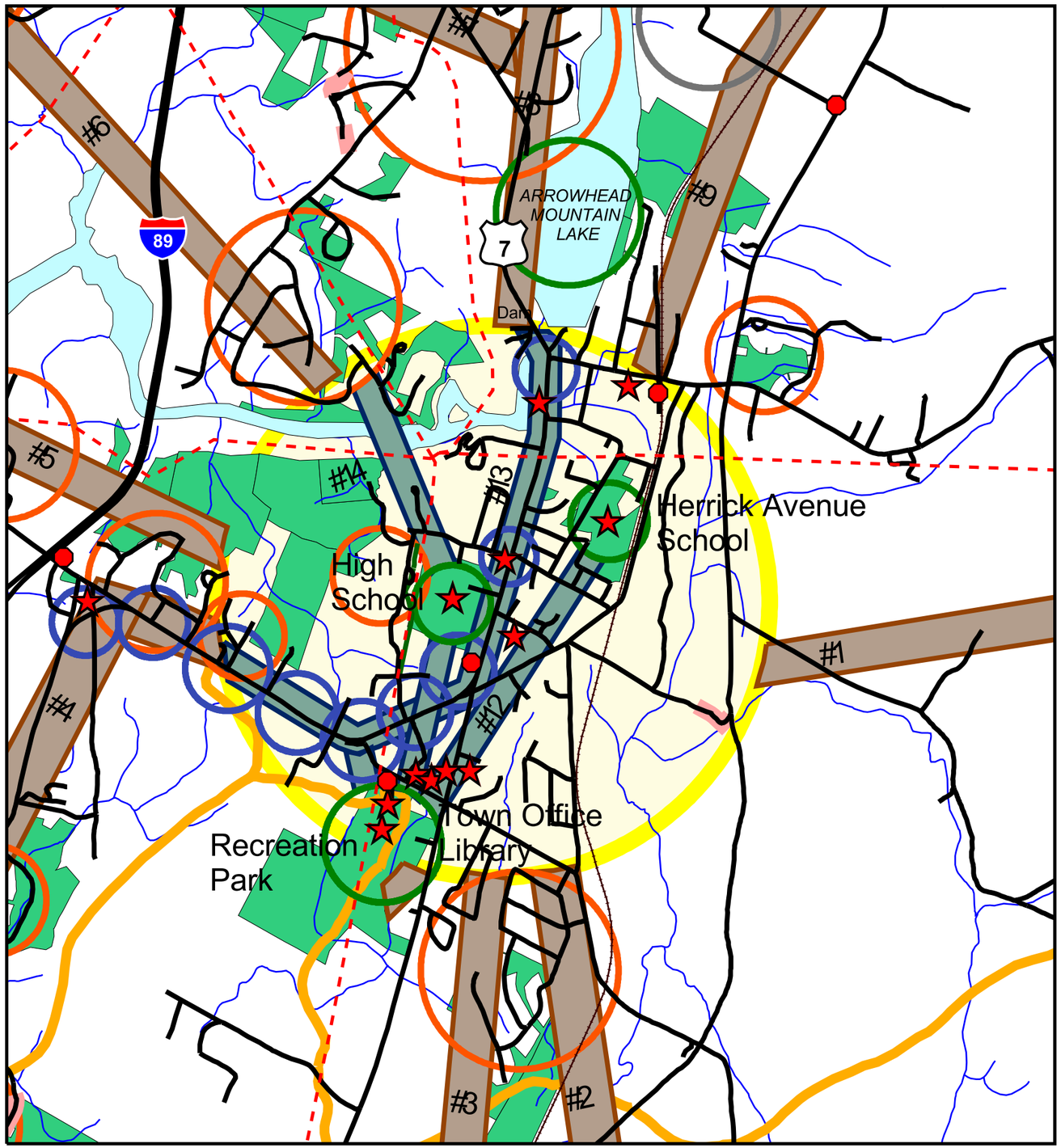
AlternativeTransportation Master Plan Milton, Vermont

Proposed Corridors and Linkages



Alternative Transportation Master Plan Milton, Vermont

Proposed Corridors and Linkages (Town Core Area)



Legend

- Transit stop
- Activity Center
- #14 Corridor Numbers
- Utility Corridor
- Roads
- Village Bike Path
- Class 4 roads.shp
- Railroads
- Recreation Center
- Commercial Activity Center
- Industrial Center
- Residential Neighborhoods
- Town Core Area Priority Corridors
- Town-wide Corridors
- VAST trails
- Streams
- Open Spaces (from Town GIS)
- Town Core Area

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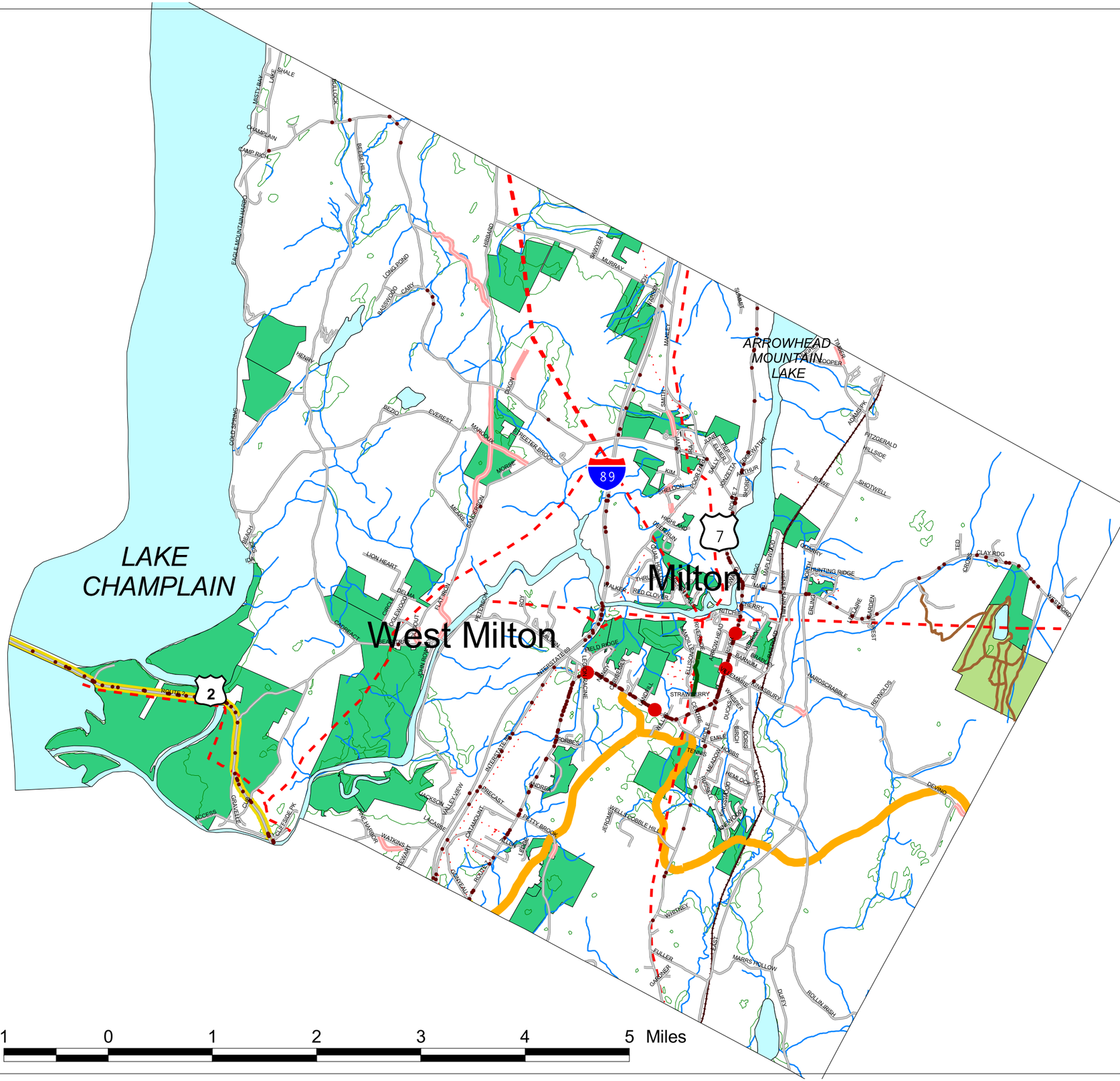
Figure 6

AlternativeTransportation Master Plan Milton, Vermont

Existing Facilities and Conditions



Legend

- Bike/Ped Accident Location (1989-1993)
- Accident Location, All Types (1989-1997)
- Class 4 roads
- Village Bike Path
- Utility Corridor
- Bike Lanes
- VAST Trails
- Town Forest Trails
- Gasline
- Railroads
- Streams
- Wetlands
- Town Forest
- Open Spaces

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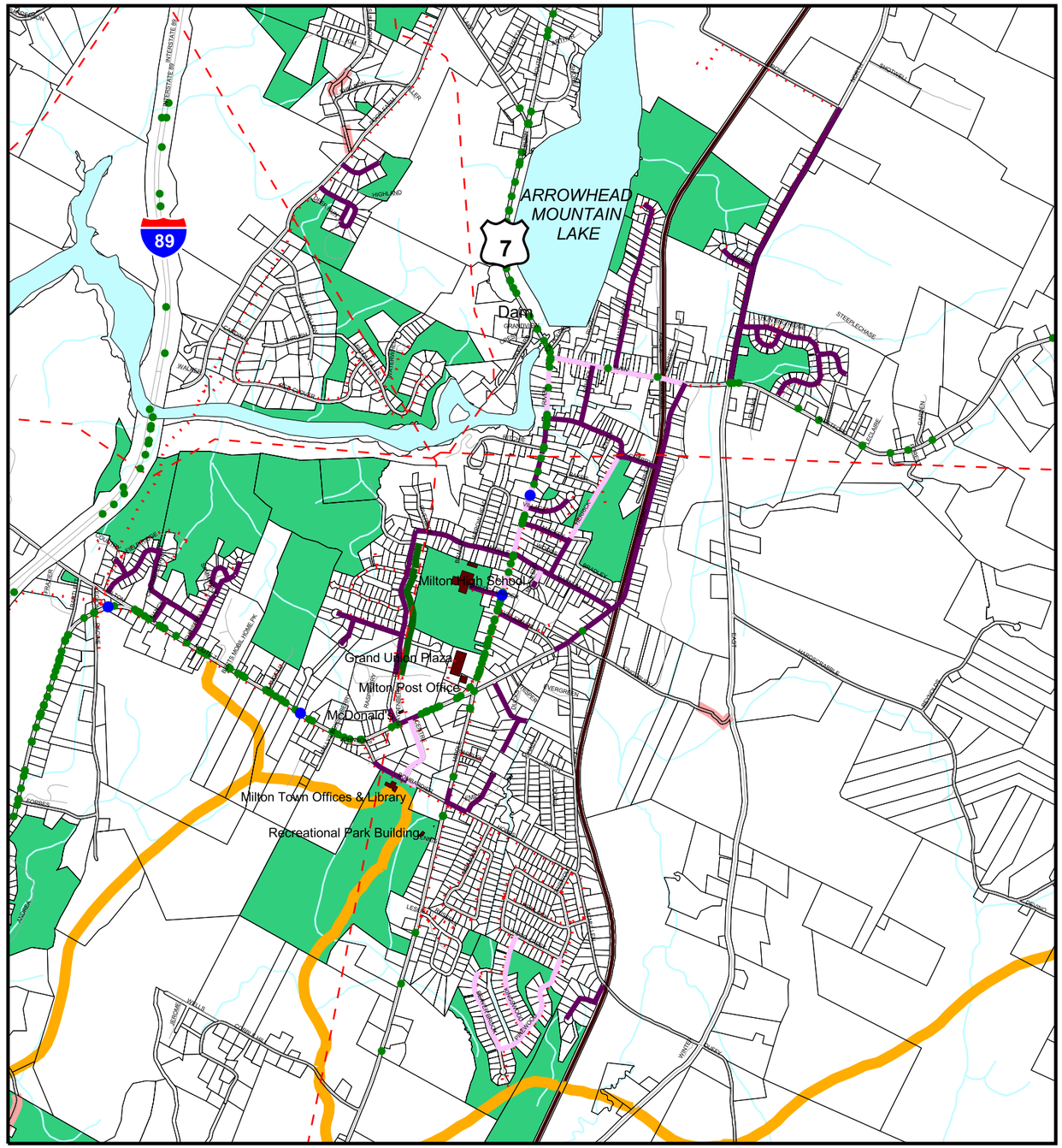
Figure 7

Alternative Transportation Master Plan Milton, Vermont

Existing Facilities/ Existing Conditions (Town Core Area)



Legend

- Bike/Ped Accident Locations (1989-1993)
- Accident Location, All Types (1989-1997)
- Electric Utility Corridor

Sidewalks
- 1 Side
- 2 Sides
- Village Bike Path
- Gasline
- Buildings (Partial Information)
- Parcel (1997 Information)
- Class 4 Roads
- VAST trails
- Railroads
- Streams
- Open spaces

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Figure 8

AlternativeTransportation Master Plan Milton, Vermont

Planning Areas (Neighborhoods)

Miltonboro

Arrowhead Mountain

North Road

LAKE CHAMPLAIN

Miltonboro

West Milton

Town Core

Checkerberry

Georgia Mountain

Beaver Brook

Catamount

Legend

- Railroads
- Streams
- Wetlands
- Parcel (1997 Information)
- Town Forest
- Open Spaces

1 0 1 2 3 4 5 Miles

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March 2002

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Figure 9