



Town of Penfield Bicycle Facilities Master Plan

Penfield, New York

Prepared for:

The Town of Penfield, NY
Genesee Transportation Council, Rochester, NY

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December 2008



www.penfield.org

Executive Summary

This report summarizes the objectives, procedures and products derived from the analysis and planning studies for the Bicycle Facilities Master Plan for the Town of Penfield.

Through funding by the Genesee Transportation Council, the Town of Penfield contracted with Environmental Design and Research and SRF & Associates to design the Bicycle Facilities Master Plan for the Town. In addition, the Town of Penfield provided in-kind services that included GIS data analysis and map production. The project timeline was from April to December 2008.

Detailed information and specialized knowledge of local cyclists was heavily utilized. Based on input from the Penfield bicycling community, a list of **Community Destinations** was derived and mapped. Community Destinations include schools (both public and private), parks, community centers, and commercial areas. The best roadways accessing and connecting the Community Destinations were identified and mapped as **Priority Bicycle Routes**. The Priority Routes include roughly 61 miles of roadway, and fall under Town, County and State jurisdiction.

An inventory and analysis process was then applied to the Priority Bicycle Routes. Data reviewed included all criteria utilized in Federal Highway Administration (FHWA) guidelines. Additional information was gathered on road slopes and car/bike accident history. A field inventory process was designed and applied at selected locations by Bicycle Committee volunteers. The field inventories verified and supplemented data collection and image analysis.

To help focus and prioritize implementation of improvements, input from the cycling community was solicited to identify a number of **Hot Spots**. Hot Spots are areas along the Priority Routes that have problems in need of immediate attention or repair.

Diversity of bicyclists' needs and abilities in Penfield was considered. Both AASHTO and FHWA recognize (3) categories of cyclists; A "advanced", B "basic" and C "children". The Penfield Bicycle Facilities Plan emphasizes the requirements of the Basic cyclist, while recognizing the needs of advanced cyclists and children.

Recommendations for Improvements were made in (4) categories: On-Road Improvements, Off-road Improvements, Bike Facilities at Destinations, and Policies & Programs. On-Road and Off-Road Improvements comply with The American Association of State Highway & Transportation Officials' (AASHTO) 1999 *Guide for the Development of Bicycle Facilities*.

A **Phasing Plan** and cost estimates are included to facilitate implementation of the Recommendations.

An **Education Plan** provides tools and strategies to increase public awareness, enhance safety, and encourage bicycling among a diversity of user groups. The Education Plan recognizes that transportation networks are shared resources utilized by motor vehicles, bicycles, and pedestrians alike.

Maintenance is addressed as being of critical importance to bicycle comfort and safety.

The Bicycle Facilities Master Plan is a positive step towards making the Town of Penfield a bicycle-friendly community.

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I. Introduction

Communities across the world are responding to the growing need and responsibility to provide community members the opportunity to bike safely more often and to more destinations. According to the *2001 National Household Travel Survey, New York Add-on- Rochester MPO*¹, 59 percent of average daily trips made by private vehicle are five miles or less. The ability to ride a bicycle for daily trips could assist in reducing private vehicle usage. Also, the benefits of riding a bicycle, either for utilitarian or recreational purposes, can be shown as improvements in the following:

- **Environmental and individual health;**
- **Traffic congestion reductions;**
- **Personal time and stress;**
- **Economic gains; and**
- **Enhancements in the quality of life and community.**

In Fall 2007, the Town of Penfield began the process of developing a Bicycle Facilities Master Plan. A Bicycle Facilities Master Plan is a strategy for providing safe, convenient and well-designed bicycle routes and facilities within a community. A bicycle facility is a structure that enhances accessibility, use, and convenience of bicycle transportation. Through funding by the Genesee Transportation Council, the Town of Penfield contracted with Environmental Design and Research and SRF & Associates to design the Bicycle Facilities Master Plan for the Town. In addition, the Town of Penfield provided in-kind services that included GIS data analysis and map production. The project timeline was from April to December 2008.

The Town of Penfield's commitment to bicycling demonstrates a commitment to sustainable transportation, congestion reduction, safer streets, healthful and enjoyable recreation, and an increased quality of life. The Town of Penfield's commitment is aligned with the Rochester and Monroe County's focus on alternative transportation. In September 2008, Rochester and Monroe County received an *Honorable Mention* designation as a *Bicycle Friendly Community* by the *League of American Bicyclists*. The designation was based on the following categories: education; engineering; enforcement; encouragement; and evaluation.²

This Bicycle Facilities Master Plan uses a multiple-solutions approach that addresses the following critical issues:

- **Community** consensus building that includes involvement with Town staff, steering committee, residents, civic and business groups, visitors, and the relevant agencies
- **Connectivity** to community resources, adjacent neighborhoods, existing parks and trails systems, public transportation, and regional designations
- **Safety** for bicyclists, pedestrians, and motorists
- **Recreational** opportunities for residents and visitors
- **Sustainability** that rests upon appropriate planning/design, quality construction, consistent maintenance, educational programming, and policy change. Each step of the planning, design, and implementation process must remain conscious of all these factors.

In addition, this plan builds upon alternative transportation and bicycle recreation goals from previous Town and Regional plans. Section II reviews the relationship of this plan to previous plans and the engagement of the Stakeholder Steering Committee and public in this process.

Half of the average person's greenhouse gas emissions are from transportation.

(Appendix D)

In 2000, national health care costs associated with physical inactivity topped \$76 billion.

(Appendix D)

A research study found that children who are physically active perform better academically and miss few days of school.

(Appendix D)

Riding a bicycle allows a commuter to choose a less busy route and by-pass traffic lights.

(Appendix D)

Group B:

Basic Bicyclists are the focus of the design of the bicycle facility guidelines.

Consideration for different types of bicycle users was incorporated into the plan. The Federal Highway Administration (FHWA) identifies three different types of bicycle users:

- Group A: Advanced Bicyclists
- Group B: Basic Bicyclists
- Group C: Children

Section III: Bicycle Facility Users provides detailed descriptions of each bicycle user type. For this Bicycle Facilities Master Plan, the Stakeholder Steering Committee chose to design the bicycle facility guidelines for Group B: basic bicyclists, while being aware of the needs for Groups A and C.

The Bicycle Facilities Master Plan includes the following information and guidelines:

- Identification of community destinations (Section IV)
- Delineation of Priority Bicycle Routes (Section V)
- Assessment of existing conditions (Section VI)
- Improvements alternatives (Section VII)
- Recommendation for improvements (Section VIII)
- Maintenance (Section IX)
- Implementation schedule with phasing plan (Section X)
- Education Plan (Section XI)
- Cost estimates (Appendix A)

In addition, the proposed design guidelines for the bicycle route system and bicycle facilities use a multiple-solutions approach in order to address the Town of Penfield's varied road layouts. The different design guidelines developed create a varied bicycle experience for users on the existing and varied road conditions.

This Bicycle Facilities Master Plan is a positive start towards making the Town of Penfield a bicycle-friendly community.

Financial assistance for the preparation of this report was provided by the Federal Highway Administration. The Town of Penfield is solely responsible for its content and the views and opinions expressed herein do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

II. Planning Process

The planning process for the Town of Penfield Bicycle Facilities Master Plan was based on the foundation laid by other planning studies and initiatives, and also utilized the knowledge of local residents, who attended public meetings and provided input to the Stakeholder Steering Committee.

A. Public & Stakeholder Input

The Town of Penfield Bicycle Facilities Master Plan planning process was informed by local residents who served on the Stakeholder Steering Committee, as well as by the general public, who attended public outreach sessions. Input, ideas and concerns from the Penfield Community were incorporated into this plan.

1. Stakeholder Steering Committee Meetings

The Steering Committee convened on the following dates:

- March 13, 2008
- May 1, 2008
- September 30, 2008

2. Public Outreach Sessions

The public meetings were held on the following dates:

- July 17, 2008
- October 29, 2008

Project material, updates and input forms were posted continuously on the Town web site.

Printed copy was available at the Penfield Library. Both public meetings were shown live on Penfield Cable Access TV, re-broadcast multiple times, and made available for streaming download on the Town web site.

B. Relationship to Other Plans and Studies

The Town of Penfield Bicycle Facilities Master Plan builds on the following previously completed planning initiatives:

- *Town of Penfield Comprehensive Plan 2000*
- *Town of Penfield Parks and Recreation Master Plan 2007*
- *Regional Trails Initiative: Phase 1 – Rochester TMA August 2002*
- *Long Range Transportation Plan (LRTP) for the Genesee – Finger Lakes Region: 2005-2025 and 2007-2027 LRTP Update*
- *Genesee Transportation Council Technical Memorandum: On-Street Bicycle Facilities Opportunities Assessment*

In addition, information and guidance was incorporated from the following guidelines and organizations:

- The American Association of State Highway & Transportation Officials' (AASHTO) 1999 *Guide for the Development of Bicycle Facilities*
- Federal Highway Administration Publication FHWA-RD-92-073: *Selecting Roadway Design Treatments to Accommodate Bicycles*.
- National Center for Safe Routes to School
- Genesee Transportation Council (GTC)
- Pedestrian and Bicycle Information Center (PBIC)
- National Highway Traffic Safety Administration (NHTA)
- Institute of Transportation Engineers (ITE)
- Centers for Disease Control and Prevention (CDC)

Penfield community members' ideas, concerns and input were incorporated into this plan.

This plan builds on previous Penfield and regional plans.

Specifically, the Town of Penfield Bicycle Facilities Master Plan supports the following goal and recommendations from the *Town of Penfield Comprehensive Plan 2000*.

Goal: Provide a safe and efficient network of bicycle access routes throughout the Town.

Recommendations:

1. The Town of Penfield should provide for strategically located bicycle routes to accommodate the growing needs for bicyclists.
2. The Town of Penfield should periodically review the recommendations of the *GTC Long Range Transportation Plan* to determine what implementation strategies are most appropriate for Penfield.
3. The Town should continue to work with Monroe County and New York State to develop new bicycle routes and improve conditions for bicycling along county and state highways as Capital Improvement Programs are implemented.
4. The Town should develop a priority list of Town roads that warrant the improvements of wider shoulders where appropriate.
5. The Town should encourage the installation of bicycle racks in all new or renovated commercial and high-density residential development and should require that the provision of bicycle parking be considered during the site plan review for these projects.

Also, this plan builds upon the mission statement, goals and priorities from the Appendix A: Penfield Bike Advisory Committee Goals for the *Town of Penfield Parks and Recreation Master Plan 2007*.

Penfield Bike Advisory Committee Mission Statement: To make Penfield roads and multi-use trail systems bike friendly by developing guidelines and processes for building, managing and promoting biking in all forms in and around our roads and trails systems.

Penfield Bike Advisory Committee Overview of Goals:

1. Bike Route Assessment Review
2. Town of Penfield should investigate the feasibility of a multi-use trail linking Harris Whalen Park to Veterans Memorial Park. Including partnership with the YMCA for this. Ultimately linking the Rte. 250 Corridor.
3. The Town of Penfield should form a Penfield Bike Committee as a sub-committee of the Penfield Trails Committee.
4. Create Town Bike Plan.

Relating on a regional level, this plan aligns with the following goals and recommendations from the *Regional Trails Initiative: Phase 1 – Rochester TMA*, which was published in August 2002:

Goals:

1. Support the development of a high-quality trails system that is consistent with the goals and objectives of the overall regional transportation system.
2. Meet or exceed minimum standards and guidance for accessibility as defined by the Americans with Disabilities Act and the US Department of Transportation.
3. Maintain and improve the quality, operation, and integrity of existing trail facilities, including the provision of adequate amenities and support facilities.
4. Be “context sensitive,” reflecting the setting in which they are or will

be located and the desired trail uses.

5. Facilitate partnerships among communities, agencies, and organizations to effectively market and promote the regional trails system inside and outside of the region.

Recommendations:

1. Support local communities' efforts to preserve, and/or create corridors for trail development through local land use, planning, and zoning strategies.
2. Encourage the use of Trail Design, Maintenance, and Operations "Best Practices" Guidance developed as part of this Initiative for all trail projects and improvements in the region.
3. Prioritize the development of off-street and on-street linkages to/from trails and between trails to close gaps in the regional system.
4. Accommodate bicyclists, pedestrians, and other trail uses on roadways and bridges in the region as appropriate.
5. Develop partnerships among trail groups, local communities, GTC, other government agencies, tourism promotion agencies, and related businesses and business organizations to effectively market trails as a major attraction in this region.
6. Support the development and maintenance of an interactive regional trail information web site that would provide detailed information on trails in this region, including maps, user groups allowed, and other regulations, trail events, links to trail groups, and other relevant information.
7. Support the placement of functional trail amenities for trail users (e.g. bathroom facilities, drinking water, bicycle parking, benches, picnic tables, lighting, etc.).
8. Develop and disseminate trail amenity and signage guidance that addresses a variety of settings and budgets.

Also, on a regional level, this plan aligns with the following policies from the *Long Range Transportation Plan for the Genesee – Finger Lakes Region: 2005-2025*:

Policies

1. Preserve and maintain existing bicycle and pedestrian facilities, particularly trails, sidewalks, and crosswalks, in a manner that promotes safety, increases efficiency, and minimizes lifetime costs.
2. Identify and address key bicycle and pedestrian safety, efficiency, and connectivity deficiencies.
3. Increase the efficiency and safety of the region's bicycle and pedestrian network.
4. Ensure the accessibility of the bicycle and pedestrian network to all residents of the region.
5. Ensure that regional attractions are easy to find by residents and visitors alike using the regional bicycle and pedestrian system.
6. Increase the size and scope of the region's bicycle and pedestrian network through the development of new or expanded facilities.

III. Bicycle Facility Users

On average, bicyclists require a minimum of 40 inches of operating space, even though bicyclists vary in size. A minimum width of four feet is necessary for any bicycle facility with exclusive or preferential use by bicyclists. When bicyclists are traveling along side motor vehicles, a width of five feet or more is suggested for bicyclists.³

While the minimum operating space and bicycle facility width remains relatively the same between users, the skills, confidence and preferences of bicyclists vary largely. The challenge for every bicycle facilities plan is designing the bicycle facilities for the diversity of user skills. According to the FHWA, the Federal policy goal for bicycling is “to accommodate current use and encourage increased use, while enhancing safety.”⁴

The Federal Highway Administration (FHWA) identifies the following three different types of bicycle users:⁵

- **Group A: Advanced Bicyclists**
- **Group B: Basic Bicyclists**
- **Group C: Children**

Defining the bicyclist skill level through three groups and designing for the specific groups helps to refine roadway and path treatments. A description of the three different types of bicycle users by The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*⁶ is shared below. Also, details of characteristics specific to the Town of Penfield Group A, B, C riders is described in each section below.

The Stakeholder Steering Committee chose to design the bicycle facility guidelines for Group B: basic bicyclists, while being aware of the needs for Groups A and C.

A. Group A: Advanced Bicyclists

Group A, advanced or experienced riders, are generally using their bicycles as they would a motor vehicle. They are riding for convenience and speed and want direct access to destinations with a minimum of detour or delay. Advanced riders are typically comfortable riding with motor vehicles in traffic. They comprise the majority of the current users of collector and arterial streets and are best served by the following:

1. Direct and convenient access to destinations usually via the existing street and highway system.
2. The opportunity to operate at maximum speed with minimum delays.
3. Sufficient operating space on the roadway or shoulder to reduce or preferably eliminate the need for either the bicyclist or the motor vehicle operator to change position when passing.

Ideally for Group A riders, all roads would be “bicycle friendly.”

B. Group B: Basic Bicyclists

Group B, basic adult and teenage riders, may also be using their bicycles for transportation purposes, e.g. to get to the store or to visit friends. Group B bicyclists are less confident of their ability to operate in traffic without special provisions for bicycles. Basic riders prefer to avoid roads with fast and busy motor vehicle

Challenge: Design Bicycle Facilities for diversity of user groups:

Group A:
Advance Bicyclists

Group B:
Basic Bicyclists

Group C:
Children

Focus of Plan Design:
Group B



Group A:
Experienced bicyclists that use their bicycles as they would a motor vehicle.



Group B:
Bicyclists that are comfortable riding on neighborhood streets, shared use paths, bike lanes or wide shoulder lanes on busier streets.



Group C:
Children bicyclists that would benefit from designated bicycle facilities on key routes through main corridors.

traffic unless there is ample roadway width to allow easy overtaking by faster motor vehicles. Thus, basic riders are comfortable riding on neighborhood streets and shared use paths and prefer designated facilities such as bike lanes or wide shoulder lanes on busier streets. Some will develop greater skills and progress to the advanced level, but there will always be many millions of basic bicyclists. Group B bicyclists prefer:

1. Comfortable access to destinations, preferably by a direct route, using either low-speed, low traffic-volume streets or designated bicycle facilities, avoiding routes with high-volume or high traffic speeds.
2. Well-defined separation of bicycles and motor vehicles on arterial and collector streets (bike lanes or shoulders) or separate bike paths.

Group B bicyclists would be best served by designated bicycle facilities on key routes through main travel corridors.

C. Group C: Children

Group C bicyclists are children riding on their own or with their parents. This group may not travel as fast as their adult counterparts, but still require access to key destinations in their community, such as schools, convenience stores and recreational facilities. Group C bicyclists prefer the following:

1. Access to key destinations surrounding residential areas, including schools, recreation facilities, shopping, or other residential areas.
2. Residential streets with low motor vehicle speed limits and volumes linked with shared use paths and busier streets with well-defined pavement markings between bicycle and motor vehicles.
3. Well-defined separation of bicycles and motor vehicles on arterial and collector streets linked with shared use paths and other bicycle facilities.

Similar to Group B bicyclists, Group C bicyclists would be best served by designated bicycle facilities on key routes through main travel corridors.

D. Town of Penfield Users

Bicycling is a growing mode of transportation and venue for recreating and commuting in the Town of Penfield. The 2000 U.S. Census recorded 34,645 residents living in the Town of Penfield. See table below showing the breakdown in 2000 of the population by age group.

Population by Age Group in 2000		
Town of Penfield		
	#	%
Under 5 years	2,003	5.8%
5 to 9 years	2,566	7.4%
10 to 14 years	2,786	8.0%
15 to 19 years	2,105	6.1%
20 to 24 years	1,161	3.4%
25 to 34 years	3,430	9.9%
35 to 49 years	9,114	26.3%
50 to 64 years	6,298	18.2%
65 years and older	5,182	14.9%
Total	34,645	100.0%

Source: U.S. Census Bureau, Census 2000

In 2000, less than one percent of workers over 16 in Penfield biked to work. However almost half of the workers over 16 (8,429 residents) worked within 20 minutes from home, which provides an opportunity to increase bicycle ridership to work with the proper bicycle facilities (See tables below).

Means of Transportation to Work for Workers 16 Years and Over		
Town of Penfield		
	#	%
Car, truck or van	16,541	94.9%
Drove alone	15,587	89.4%
Carpooled	954	5.5%
Public Transportation	55	0.3%
Bus or trolley bus	49	0.3%
Streetcar or trolley car	0	0.0%
Subway or elevated	6	0.0%
Railroad	0	0.0%
Ferryboat	0	0.0%
Taxicab	0	0.0%
Motorcycle	5	0.0%
Bicycle	14	0.1%
Walked	184	1.1%
Other Means	52	0.3%
Worked at home	578	3.3%
Total	17,429	100.0%

Source: U.S. Census Bureau, Census 2000

In 2000, over half of workers over 16 in Penfield worked within 20 minutes from home.

Middle school and high school students are potential bicycle users.

Travel Time to Work for Workers 16 Years and Over		
Town of Penfield		
	#	%
Did not work at home:	16,851	96.7%
Less than 5 minutes	312	1.8%
5 to 9 minutes	1,451	8.3%
10 to 14 minutes	2,699	15.5%
15 to 19 minutes	3,962	22.7%
20 to 24 minutes	4,079	23.4%
25 to 29 minutes	1,666	9.6%
30 to 34 minutes	1,661	9.5%
35 to 39 minutes	176	1.0%
40 to 44 minutes	238	1.4%
45 to 59 minutes	257	1.5%
60 to 89 minutes	182	1.0%
90 or more minutes	168	1.0%
Worked at home	578	3.3%
Total	17,429	100.0%

Source: U.S. Census Bureau, Census 2000

In addition, middle and high school students are potential bicycle users. According to the 2005-06 New York State School Reports, the Penfield Central School District had 2,795 students attending public middle and high schools (See table below).

Penfield Central School District Schools' Enrollments 2005-06		
	Grades	#
Cobbles Hill Elementary	K-5	513
Indian Landing Elementary	K-5	485
Harris Hill Elementary	K-5	521
Scribner Road Elementary	K-5	528
Bay Trail Middle	6-8	1,200
Penfield Senior High	9-12	1,595
School District Total	K-12	4,842

IV. Community Destinations

Bicycle facilities should be located in areas where use can be maximized. Identifying community resources that would benefit from bicycle traffic is an important step towards developing Priority Routes.

Community resources in the Town of Penfield, such as schools, park and trail systems, community spaces or recreational facilities and commercial areas are abundant. A goal of this plan is to provide safe bicycle routes to these community destinations for recreational, social and economic impacts, such as improving air quality by reducing automobile usage; enhancing economic development through increased patronage to commercial venues; providing residents with affordable alternatives for travel; and encouraging residents and visitors to enjoy the recreational and social attributes of the community. The community destinations are described below and mapped on Town of Penfield Bicycle Destinations Map.

A. Schools

Providing the young people of Penfield with safe, alternative routes to school is important component to this plan. The schools located within the bicycle destinations routes are shown in the table below and Figure 1: Bicycle Destinations Map.

School	District/Private	Location
Cobbles Elementary	Penfield Central	140 Gebhardt Rd, Penfield
Harris Hill Elementary	Penfield Central	2126 Penfield Rd., Penfield
Indian Landing Elementary	Penfield Central	702 N. Landing Rd., Rochester
Plank Road School North Elementary	Webster Central	705 Plank Rd., Webster
Plank Road School South Elementary	Webster Central	715 Plank Rd., Webster
Scribner Elementary	Penfield Central	1750 Scribner Rd., Penfield
Bay Trail Middle	Penfield Central	1760 Scribner Road, Penfield
Penfield High	Penfield Central	25 High School Drive, Penfield
The Charles Finney School	Private	2070 Five Mile Line Rd., Penfield
Rochester Christian School	Private	260 Embury Rd., Penfield
St. Joseph School	Private	39 Gebhardt Rd., Penfield

Transportation to and from school is provided by the Penfield Central School District for the following students:

- Grades K-8: Students who live more than ½ mile from school, and
- Grades 9-12: Students who live more than 1 ½ miles from school.⁷

The school district's transportation policy can be seen as a good indicator of the leadership and community's desire to encourage students to walk or ride their bike to school. The policy reinforces the need to provide safe bikable and walkable routes to school to accommodate the students who live under a ½ mile for grades K-8 and under 1 ½ miles for grades 9-12 and do not have bus transportation.

In addition, the school district has begun offering alternative, individual sports, such as bicycling, as part of the physical education curriculum, which reinforces the community's commitment to cycling. In addition to learning skills such as off-road cycling, students have the opportunity to learn how to repair their bicycles and put on back tires.⁸ The courses focus mainly on off-road cycling, however some of the basic skills learned will apply to on-road cycling as well.

Goal:
Provide safe, alternative transportation routes to community destinations.

Community Destinations
include schools, parks, cultural, social and recreational centers, and commercial venues.

Penfield School District transportation policy reinforces the need to provide safe bikable and walkable routes to school for students without bus transportation.

Children biking or walking to school have decreased over the past three decades.

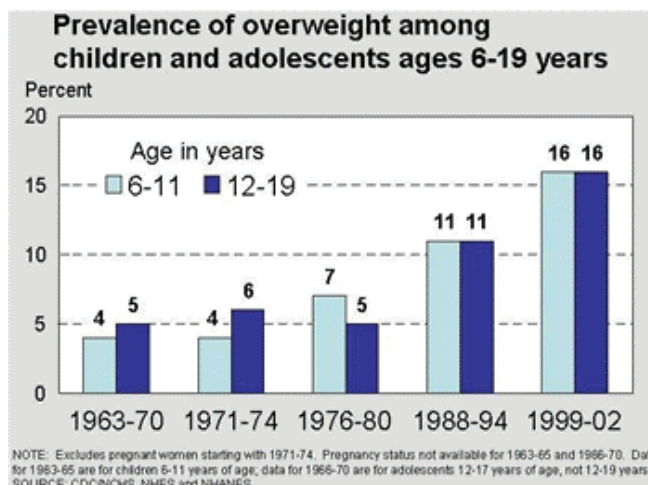
Also, creating safe routes to school is important for increasing physical activity for young people and reducing school traffic. Fewer children today than a generation ago bike or walk to school. The following statistics show the significant decline:

- In 1969, 42 percent of children 5 to 18 years of age walked or bicycled to school.
- In 2001, 16 percent of children 5 to 18 years of age walked or bicycled to school.
- In 1969, 87 percent of children 5 to 18 years of age who lived within one mile of school walked or bicycled to school.
- In 2001, 63 percent of children 5 to 18 years of age who lived within one mile of school walked or bicycled to school.⁹

Multiple factors have contributed to the decline in children bicycling and walking to school. In a 2004 nationwide survey, parents identified six barriers to walking to school for children aged 5 to 18 years:

1. Distance to school: 61.5%
2. Traffic-related danger: 30.4%
3. Weather: 18.6%
4. Crime danger: 11.7%
5. Opposing school policy: 6.0%
6. Other reasons (not identified): 15.0%¹⁰

During the same period, an increase in overweight children and adolescents, ages 6 to 19 years, has occurred as shown in the figure below.



Source: CDC/National Center for Health Statistics, *National Health Examination Survey and NHANES*.
<http://www.saferoutesinfo.org/> (Accessed 10/2008)

In addition, parents driving their children to school create more congestion on the roads. Twenty percent to 25 percent of morning rush hour traffic is attributable to parents driving their children to school.¹¹

In response to the reduction of children walking or bicycling to school and an increase in children obesity and traffic congestion, the *United States Congress* funded two pilot programs of a Safe Routes to School (SRTS) program through the *United States Department of Transportation* in 1998. The program helps communities promote alternative modes of school transportation. In July 2005, *Congress* passed federal legislation that established a National Safe Routes to School program.¹² The Safe Routes to School incorporates the following approaches:

20-25 percent of morning rush hour traffic is attributable to parents driving children to school.

- **Education Approach** teaches students important safety skills and launches driver safety campaigns.
- **Encouragement Approach** uses events and contests to entice students to try walking and biking.
- **Enforcement Approach** uses local law enforcement to ensure drivers obey traffic laws.
- **Engineering Approach** focuses on creating physical improvements to the infrastructure surrounding the school, reducing speeds and establishing safer crosswalks and pathways.¹³

Including the schools in the Penfield area as community destinations will help encourage the development of more safe routes to school for the young people in the community.

B. Parks and Recreation

The Town of Penfield's parks and recreation areas are included in the community destinations. Parks provide multiple ways for residents to be active and socialize. The table below lists the parks included in the community destinations.

Town of Penfield, Monroe County & Genesee Land Trust Parks	Location
Channing Philbrick Park	1 Linear Park Drive, off Rt. 441, west of Five Mile Line Rd. & Rt. 441 intersection
Ellison Park	West of Landing Rd. south of Browncroft Blvd.
Greenwood Park	Northwest corner of Embury & Scribner Rds. intersection
Harris Whalen Park	2126 Penfield Rd., west of Rte. 250 & 441 intersection
Irondequoit Bay Park East	Off Empire Blvd. on Irondequoit Bay
The Park at LaSalle's Landing	Off Empire Blvd. on Irondequoit Bay
Rothfuss Park	1648 Five Mile Line Rd., north of Atlantic Ave.
Schaufelberger Park	Four Corners, Five Mile Rd. & Rt. 441 intersection
Sherwood Park	Off Rt. 441 between Harris Rd. and Salt Rd.
Veteran's Memorial Park	3100 Atlantic Ave. behind Penfield Town Hall
Wild Iris Path/Hipp Brook Preserve	Between Atlantic Ave. and Whalen Rd., and Baird Rd. and Jackson Rd.

C. Community Resources

The Town of Penfield and other community recreation centers provide many recreational, social, cultural and educational activities for residents and visitors throughout the year such as library programs; summer concerts and movies; and seasonal parades and food events. The community resources are listed in the table below.

National Safe Routes to School Program provides guidelines for encouraging biking or walking to school.

Community resources provide year-long social, cultural, recreational and educational activities for residents and visitors.

Town of Penfield Community Resource	Location
Penfield Community Center	1985 Baird Rd.
Public Library	1985 Baird Rd.
Penfield Amphitheatre Concerts & Movies	3100 Atlantic Ave. behind Penfield Town Hall
Heritage Park Gazebo Music Series	Behind Penfield Fire Hall at Four Corners
Harris Whalen Park Cruise Night, Music and Food	2126 Penfield Rd., west of Rte. 250 & 441 intersection
YMCA- Eastside Family	1835 Fairport Nine Mile Point Rd.
YMCA- Bay View Family	1209 Bay Road, Webster

D. Commercial Areas

Commercial areas in the Town of Penfield provide the community with a rich resource of retail and restaurant services. The following table lists main commercial areas in Penfield.

Town of Penfield Commercial Areas	Location
Browncroft Blvd. and Panorama Trail Area	Browncroft Blvd. and Panorama Trail intersection
Empire Blvd. and Creek St. Area	Empire Blvd. and Creek St. intersection
Four Corners	Rt. 441 and Five Mile Line Rd. Intersection
Panorama Plaza	Penfield Rd. and Panorama Trail intersection
Rt. 441 and Rt. 250	Rt. 441 and Rt. 250 intersection

Providing safe bicycle routes to these commercial areas will help to reduce automobile traffic and improve air quality, provide access to jobs for residents without automobiles; and enhance community safety. Business owners supplying bicycle parking facilities will be a key component to accessing commercial areas by bicycle.

Bicycle parking facilities are key components for bicycle accessibility in commercial areas.

V. Priority Bicycle Routes

Ideally, all roadways in Penfield will eventually offer the highest possible level of service for bicyclists. In order to establish a set of practical and achievable objectives, The Bicycle Facility Plan's recommendation focus on a preliminary set of Priority Routes identified during the planning process.

The selection of Priority Routes does not indicate a lack of need for improvements on other roadways. Addressing the needs on the Priority Routes should be viewed as only the first steps in making Penfield a bicycle-friendly community. The Town of Penfield recognizes that providing bicycle routes on all roads would be ideal. A long-term goal will be to provide bicycle facilities for all roads in the Town of Penfield, so that bicyclists can safely travel to any destination in Town.

In addition, it is critical to recognize that bicycle travel does not stop at the Town line. While the limits of this study dictate addressing bicycle facilities within the Town of Penfield, many of the Priority Routes extend into adjacent municipalities. The Context Map (Figure 2: Context Map) illustrates the integration of Penfield bicycle routes into a larger regional framework.

The Priority Routes maximize accessibility to community destinations and linkages to regional transportation routes; and target roads identified as "hot spots" by the Stakeholder Steering Committee (See Sections IV and VI). Improvements for bicycle facilities in the Town of Penfield will start with these Priority Routes.

A. Priority Route Selection

The Priority Routes were selected through the following process:

1. First, community destinations were identified by the committee and mapped. (See Section IV and Figure 1: Bicycle Destinations Map)
2. Second, the roads linking the community destinations were identified as potential priority routes. (See Figure 1: Bicycle Destinations Map) The existing routes that created the most practical access to the Community Destinations were selected as Priority Bicycle Routes.

- **North-South Roads:**

- Creek Street
- Scribner Rd
- 5-Mile line Rd
- Jackson Rd
- Salt/Harris/Gloria (E. Penfield Roads)
- Rt 250
- Baird Rd

- **East-West Roads:**

- Atlantic/Blossom/Browncroft
- Empire
- Penfield Rd/441
- Plank
- Embury
- Whalen Rd

B. Priority Route Ownership

In total, the Priority Routes consist of approximately 61 miles of roadway. The

North/South routes include roughly 32.5 miles, and the East/West routes include roughly 28.5 miles. The Priority Routes fall under different jurisdictions. New York State roads account for about 25 miles, Monroe County roads account for about 25 miles, and Penfield Town roads account for about 11 miles.

C. Priority Route Character

For bicyclists in Penfield, contiguous East/West routes tend to be more challenging than the North/South roads. Two of the most direct and continuous East/West routes are Atlantic Ave. (NYS Route 286) and Penfield Road (NYS Route 441). Both are State roads with relatively high traffic volumes and speed limits. Plank Road, an East/West County Road, is more bicycle-friendly, but provides less connectivity to the community destinations. For the North/South rider, there are more opportunities to stay on the lower volume County and Town roads.

Population densities tend to be highest in the western quadrants of the Town. The western side of Penfield has a more developed suburban character, and the eastern side of Town has a less developed rural character. Many of the Community Destinations fall on the west side of town, and a proportionate number of bicycle trips will be associated with reaching those destinations. The open rural roads east of Route 250 are popular with fitness riders. The roads on the east side see a higher degree of purely recreational of fitness riding.

VI. Existing Conditions Assessment

In order to develop a plan for community-wide improvements for bicycling, an inventory of existing conditions is necessary to provide the baseline of information and unique conditions for the Town of Penfield.

A. Site Context

Bicyclists traverse outside of the Town boundary, thus awareness of the larger regional context in developing this plan is important. The Context Map (Figure 2) shows the biking distance relationship to the Town of Penfield's surrounding communities. This plan focuses the priority bicycle routes within the Town of Penfield; however, connections to regional bike routes and destinations were incorporated into the design recommendations.

B. Mapping & Data

Federal Highway Administration developed the following inventories for determining recommended bicycle facility routes¹⁴:

1. **Traffic Volume (AADT)** (Figure 3)
2. **Average Motor Vehicle Operating Speed** (Figure 4)
3. **Number of traffic lanes and width of outside lane**
4. **Traffic Mix of Automobiles, Trucks, Buses, and/or Recreational Vehicles** (Figure 3)
5. **On-Street Parking**
6. **Sight Distance**

An assessment of current roadway system includes mapping the annual average daily traffic counts (AADT) provided by the New York Department of Transportation; documenting the posted speed limit or actual average operating condition; recording the types of vehicles traveling on the road, number of traffic lanes, width of outside lane, and presence of on-street parking; and noting sight distance at intersections and other crossings.

This plan utilizes the above inventories as a baseline for the Priority Routes, which are mapped on Figure 1: Bicycle Destinations Map. Additional information specific to Penfield was used to further inform the recommendations:

7. **Bicycle/Motor Vehicle Related Accidents** (Figure 5)
8. **Slope Analysis** (Figure 6)
9. **Town of Penfield Sidewalk Map** (Figure 7)
10. **Off-Road & On-Road Bike System** (Figure 8)
11. **Bike Route Suitability** (Figure 9)
12. **Pavement Quality** (Figure 10)

Mapping bicycle and motor vehicle accident information aides in identifying potential opportunities to improve safety. Reviewing slope conditions on the Priority Routes identifies potential challenges for bicyclists (see Figure 6). Roadways with slopes greater than 5 percent for more than a quarter mile provide a challenge for experienced riders and potential difficulty for other cyclists. In general, Penfield is relatively flat, with some steeper slopes around the Irondequoit Creek valley. Figure 6 maps areas with steep slopes along the Priority Routes. The Town of Penfield mapped sidewalk current conditions and proposed upgrades (see Figure 7). This plan uses the sidewalk information to determine recommendations along the Priority Routes. The existing trail, parks and other open space parcels in Penfield provide opportunities for off-road bicycling. Potential connections for on-road and off-road

bicycling were inventoried on the Priority Routes (see Figure 8).

C. Field Inventories

A process of on-site field investigations by Bicycle Committee members supplemented data mining and GIS mapping. The field investigation methodology was as follows:

1. Analysis of aerial photographs was utilized to identify (45) points on the Priority Bicycle Routes where road conditions indicate potential opportunities to improve safety for bicyclists (including abrupt termination of shoulders, changes in lane number and width, etc.)
2. Additional survey points were identified by committee members and added to the baseline of 45 points.
3. A Field Inventory Sheet was designed that recorded and quantified site-specific road information related to the needs of bicycle riders. Information items on the inventory sheets field-verified assessments made from GIS maps, and added additional layers of detail regarding road edge conditions.
4. Digital photographs of each survey location were taken and inserted onto the survey sheet.
5. Information from the field inventory sheets was compiled into a data base format by Town of Penfield staff.

See Figure 11 for the field survey locations and Figure 12 for a sample field inventory sheet.

D. Town of Penfield's Unique Conditions and Opportunities

1. On-Road and Off-Road Connections

The Town of Penfield has an extensive and rapidly evolving trail system. For example, a multi-use trail connects Panorama Plaza to Philbrick Park. Secondary trails connect that Park to the Four Corners commercial area and Penfield High School. The Bicycle Facilities Master Plan aims to optimize any functional alternative transportation links from on-road to off-road facilities.

2. Winter Cycling

In the winter, some experienced bicyclists, especially commuters, choose to ride, despite winter extreme temperatures or conditions. The Town of Penfield has the following winter conditions¹⁵: an average annual snowfall of 92.6 inches; snowfall from November to April, with peak snow from mid-December to mid-February; an average of 200 cloudy days; a mean of 133 days with temperatures of 32 degrees or less; and an average of 10 MPH winds from the west southwest direction. Winter cycling issues that are considered for the Town of Penfield include: low temperatures; low light and visibility; snow, ice, debris, de-icers and frost heaves on the road or shoulders; and motorist awareness of bicyclists due to less bicyclists typically on the road during the winter.

When it is expected that a facility will be used during winter months, snow removal must be planned for both on the roads and shared use paths for bicyclists, walkers and joggers. Snow and ice buildup will inhibit wintertime use of shared use paths. Walkways and curb ramps should not be used as snow storage areas for snow removed from streets. Local policies should treat the clearance of snow from

walkways as being of equal importance as clearance of snow from streets. In areas where abutting landowners and residents are responsible for clearing walkways, local regulations should be enforced. In addition special attention should be given to snow removal from shoulders.

3. Town of Penfield Sidewalk Plan

Bicycle use of sidewalks is normally not recommended for a variety of reasons including potential conflicts with pedestrians and numerous intersections with driveways. However, it is important to acknowledge that bicycle riding on sidewalks does occur on a frequent basis. Penfield has a significant and growing sidewalk program that is likely to be utilized to some extent by local bicyclists. Children on bicycles (Group “C”) are the most frequent sidewalk riders, but basic adult riders (Group “B”) are not uncommon. This plan does not support riding on sidewalks, but does encourage some sidewalk locations transitioning to multi-use paths designed for both safe pedestrian and bicycle usage. No Town ordinance prohibits bicycles on sidewalks.

The Town of Penfield’s Sidewalk Plan provides an inventory of all existing and proposed sidewalks within the Town (see Figure 7). The Town of Penfield is proud of its aggressive position in constructing sidewalks throughout the Town. On any given day, you can see residents using these safe and convenient paths.

The Town of Penfield has a sidewalk policy that dictates the process used by new development for sidewalk installation. The policy also specifies a Sidewalk Master Plan to identify primary roads in need of sidewalks. The Town Board guides this policy.

The sidewalk priorities are based upon proximity to schools, parks, community facilities, and locations along busy (high volume) roadways. These priorities are reviewed annually by the Town staff and the Town Board. The primary focus of the Town at this time is to install sidewalks within the high density residential areas which are typically located west of Fairport, Nine Mile Point Road (Route 250.)

The Town currently has over 264,000 linear feet of sidewalks within its borders. Each year the Town reviews the needs for additional sidewalks and develops a plan for the coming construction season.

All new sidewalks are constructed of concrete with a minimum width of 5 feet. Wider sections are required next to the curb or roadway. The Town uses three snowplows to keep the sidewalks along major roadways clear in the winter wherever the sidewalks are continuous. Each route takes approximately 3-1/2 hours to complete. Subdivision sidewalks are currently not cleared by the Town.

Concepts for integrating the Penfield sidewalk program with the Bicycle Facilities Master plan are outlined in Section VIII “Recommendations”.


E. Hot Spots

Members of the Penfield bicycle community were asked to identify specific locations along the Priority Routes that might most benefit from immediate attention (“Hot Spots”). The following is a list of the “Hot Spots” identified:

1. Baird Rd / Whitney Rd

The Town of Penfield increases the number of sidewalks every year. Upgrading some sidewalks to multi-use paths would provide safe, off-road bicycle and pedestrian paths.

Penfield Community Members identified “Hot Spots”- locations along Priority Routes that need immediate attention.

- 
2. Blossom Rd. at Atlantic Ave
 3. Browncroft Blvd – no shoulder, high speeds, recessed grates
 4. Five Mile Line Rd at Whalen Rd (2) – No Shoulder
 5. Five Mile Line Rd. at Atlantic (2) – sight distance and traffic in shoulder
 6. Five Mile Line Rd. at Plank – road hazards
 7. Four Corners – high traffic density, narrow shoulders
 8. Jackson Rd at Atlantic Ave (3) – high traffic speeds, limited visibility Eastbound
 9. Rt. 250 at Rt. 441 (4) – Traffic in shoulders
 10. Rt. 250 at Whalen Rd. (2)
 11. Rt. 250 at Atlantic Rd.
 12. Rt. 441 at Baird Rd. (2) – poor visibility, no shoulder
 13. Rt. 441 at Blossom Rd.
 14. Rt. 441 at Five Mile Line Rd (3)
 15. Rt. 441 at Old Penfield Rd. (2) – poor visibility, high traffic density, high speeds

The Hot Spots were mapped (See Figure 13: Bicycle Facility 'Hot Spots') and then prioritized according to their proximity to the Community Destinations. A Hot Spot that was in close proximity to the greatest number of Community Destinations received the highest priority for improvements.

VII. Improvements Alternatives

In order to accommodate varying bicycle user needs and road conditions, a variety of bicycle facility improvement alternatives, both on-road and off-road, are provided by AASHTO (American Association of State Highway and Transportation Officials) and FHWA (Federal Highway Administration)¹⁶ as design guidelines. Both the AASHTO and FHWA are adhered to by most community's bicycle facility designs. Although the bicycle classifications are structured differently, the FHWA guidelines reference the AASHTO standards heavily.

The AASHTO guidelines are used solely for this plan's on-road and off-road bicycle facilities recommendations. AASHTO recommends four bicycle classifications as bicycle facility improvements:

- **Shared Roadways**
- **Signed Shared Roadways**
- **Bike Lanes**
- **Shared Use Paths**

A description of each bicycle classification from AASHTO's 1999 *Guide for the Development of Bicycle Facilities* is provided in Appendix B. These bicycle classifications supply the choices of improvement alternatives for the Town of Penfield's bicycle facility recommendations found in this plan.

Below sections provide diagrams of each bicycle facility improvement.

A. Shared Roadways

Shared roadways allow bicyclists to ride along side motor vehicles.

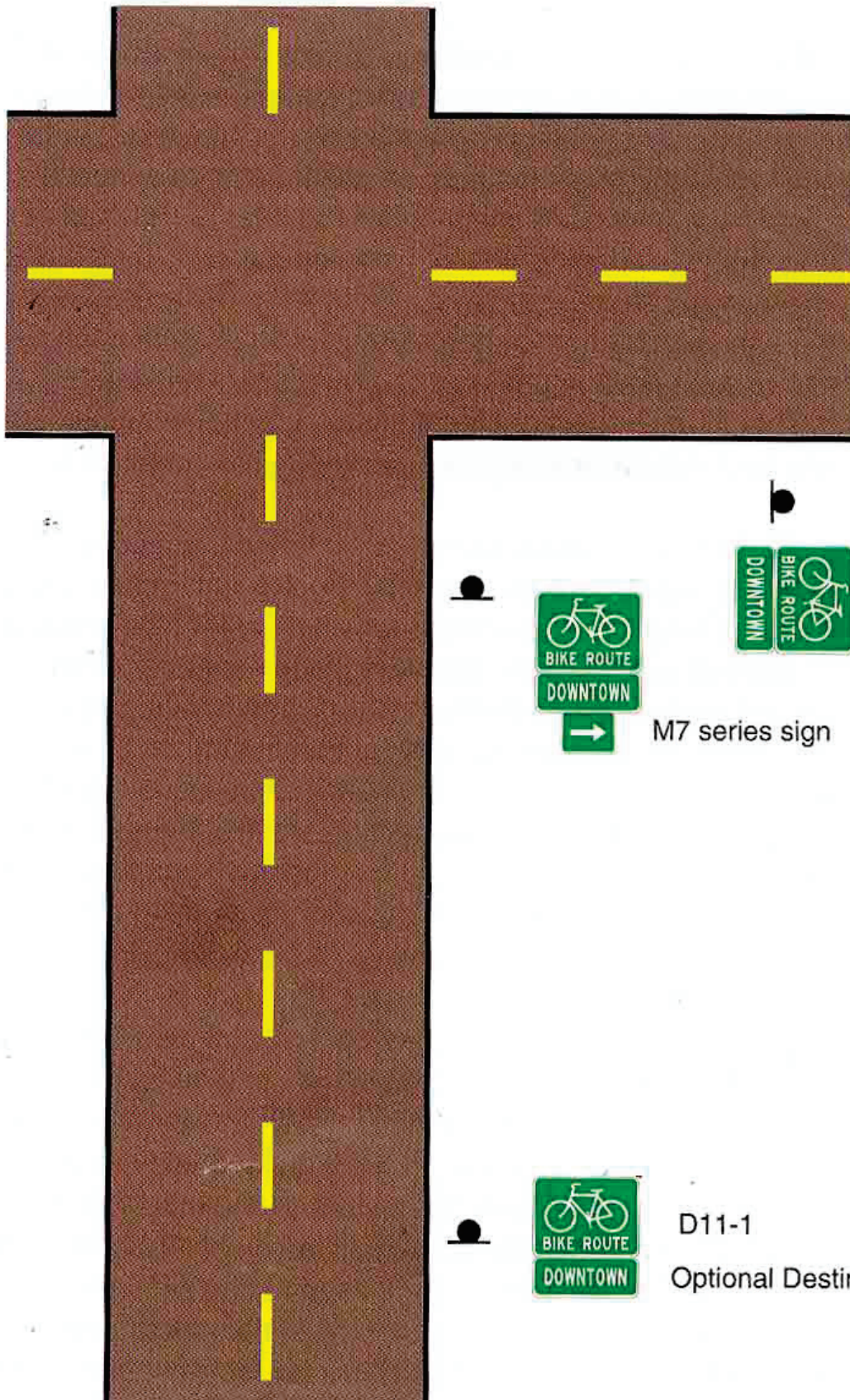
B. Signed Shared Roadways

Signed shared roadways provide signage to inform both motorists and bicyclists that bicycles will be sharing the road with motor vehicles.

The following AASHTO figure provide guidelines for signage locations.

AASHTO and FHWA provide comprehensive design guidelines for bicycle facilities.

Appendix B describes AASHTO design guidelines in detail.



M7 series sign

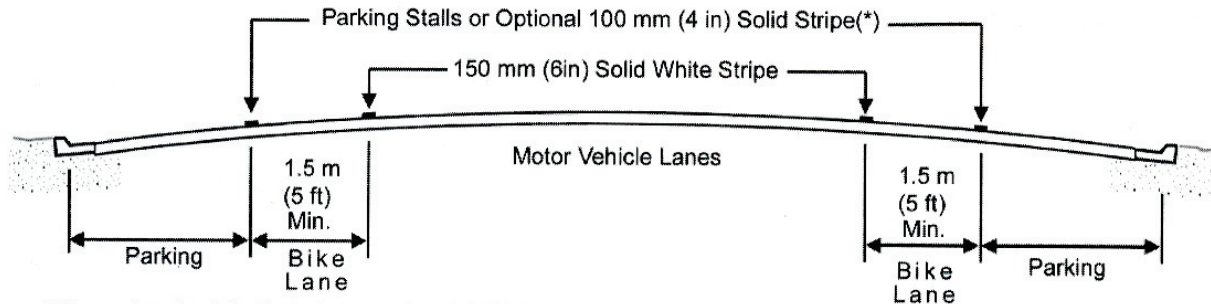
D11-1

Optional Destination Signing

C. Bike Lanes

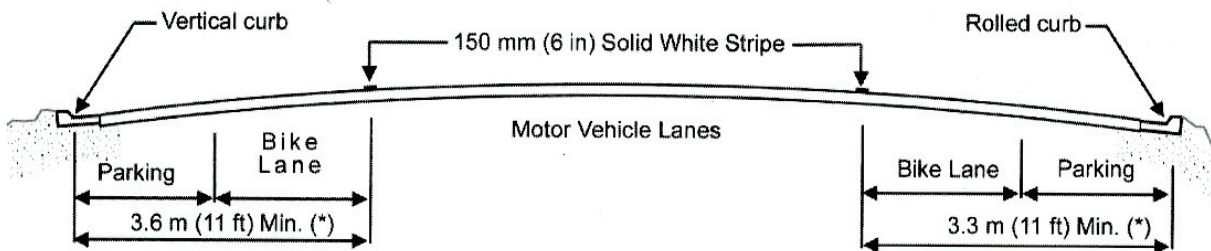
Bike lanes provide designated lanes on roadways for bicyclists.

The following AASHTO figures demonstrate bike lane design, symbols and pavement markings for bike lanes.



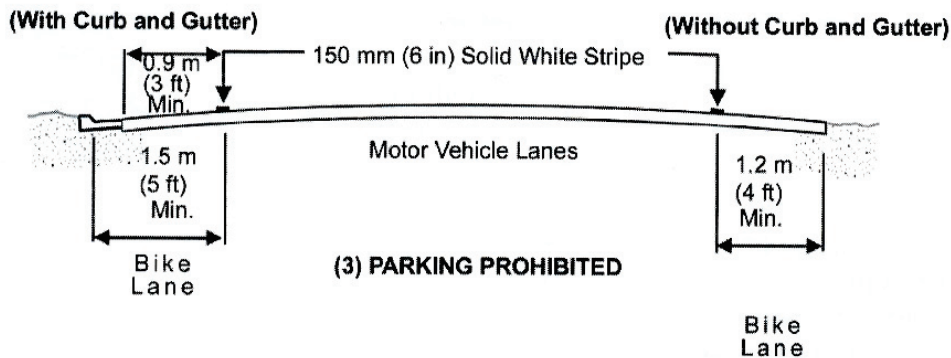
* The optional solid white stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorists may misconstrue the bike lane to be a traffic lane.

(1) ON-STREET PARKING

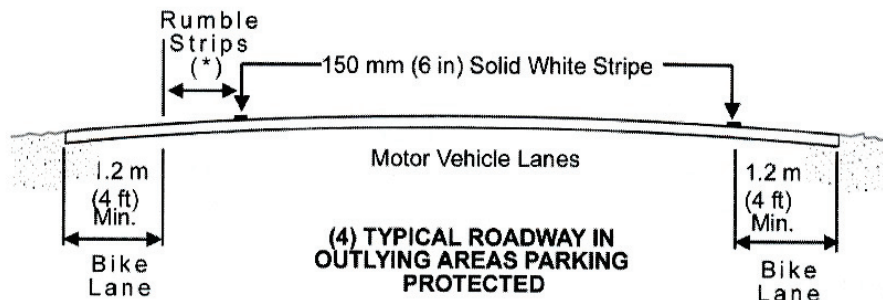


*3.9 m (13 ft) is recommended where there is substantial parking or turnover of parked cars is high (e.g. commercial areas).

(2) PARKING PERMITTED WITHOUT PARKING STRIPE OR STALL

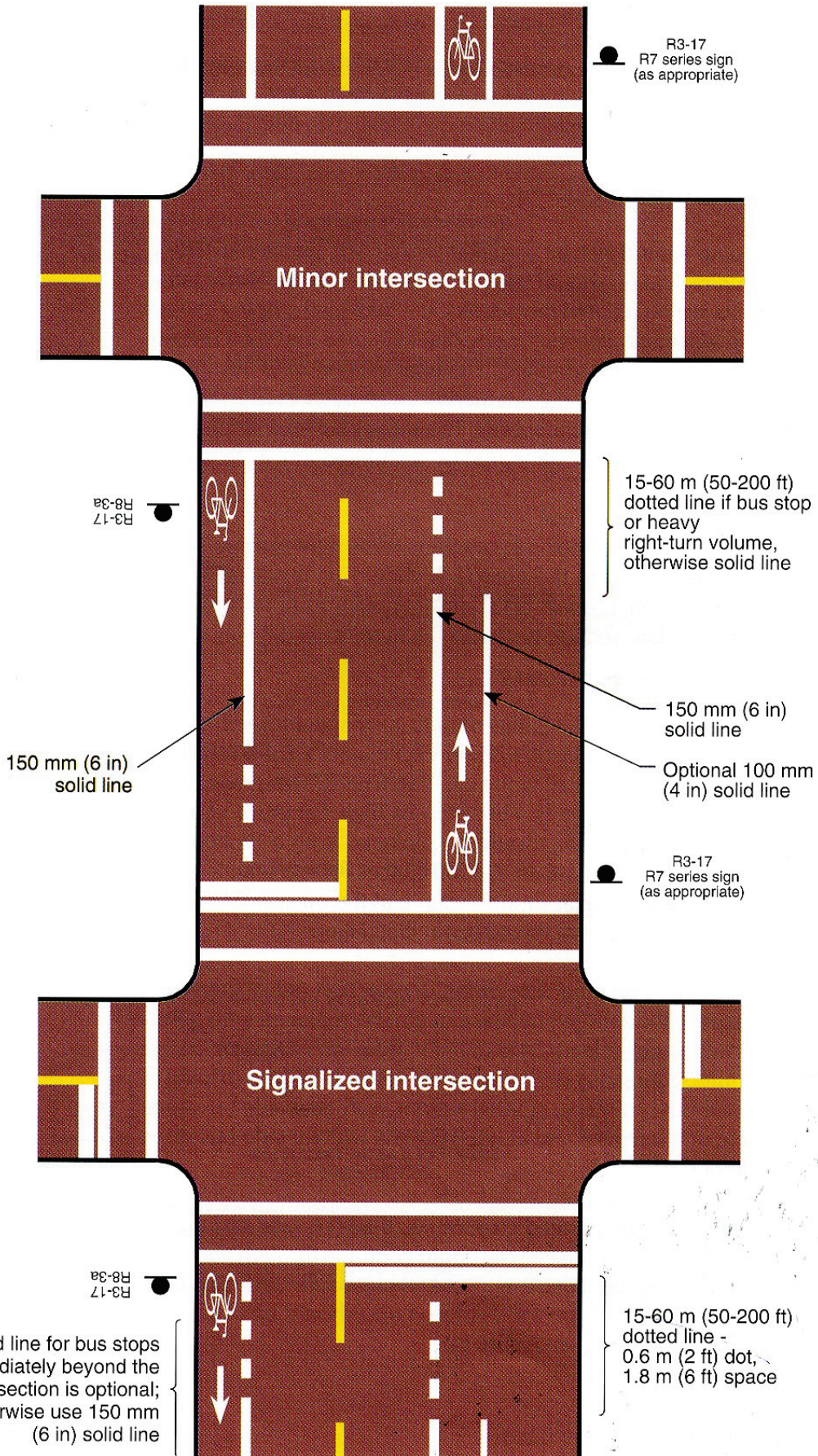


(3) PARKING PROHIBITED

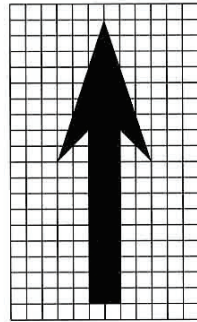


*If rumble strips exist there should be 1.2 m (4ft) minimum from the rumble strips to the outside edge of the shoulder.

Typical application where parking prohibited

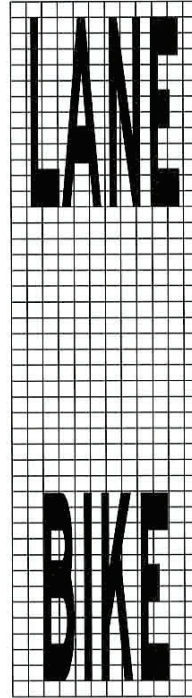


Typical application where parking permitted

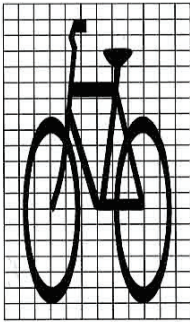


Directional arrow

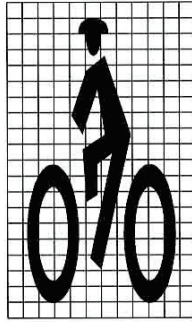
□ = 0.1 m x 0.1 m
(4 in x 4 in)



**Word legend
(optional)**



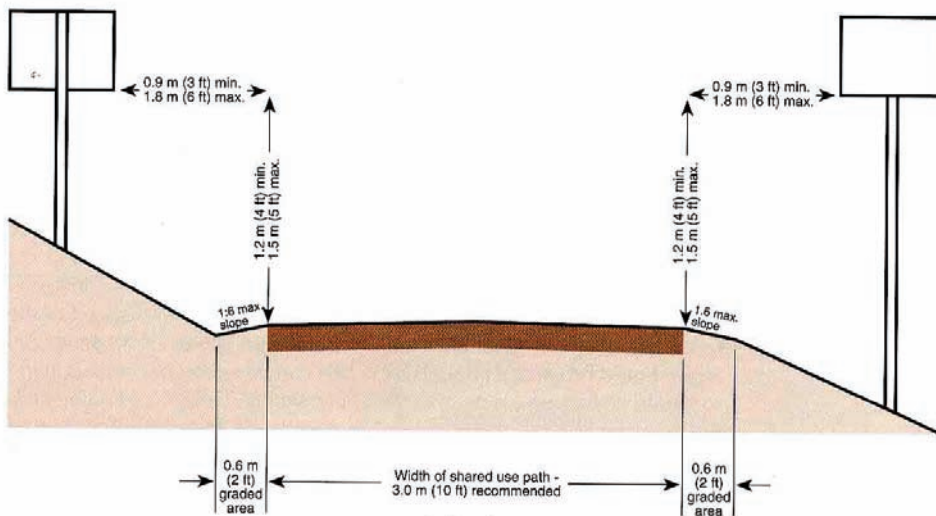
Preferred symbols



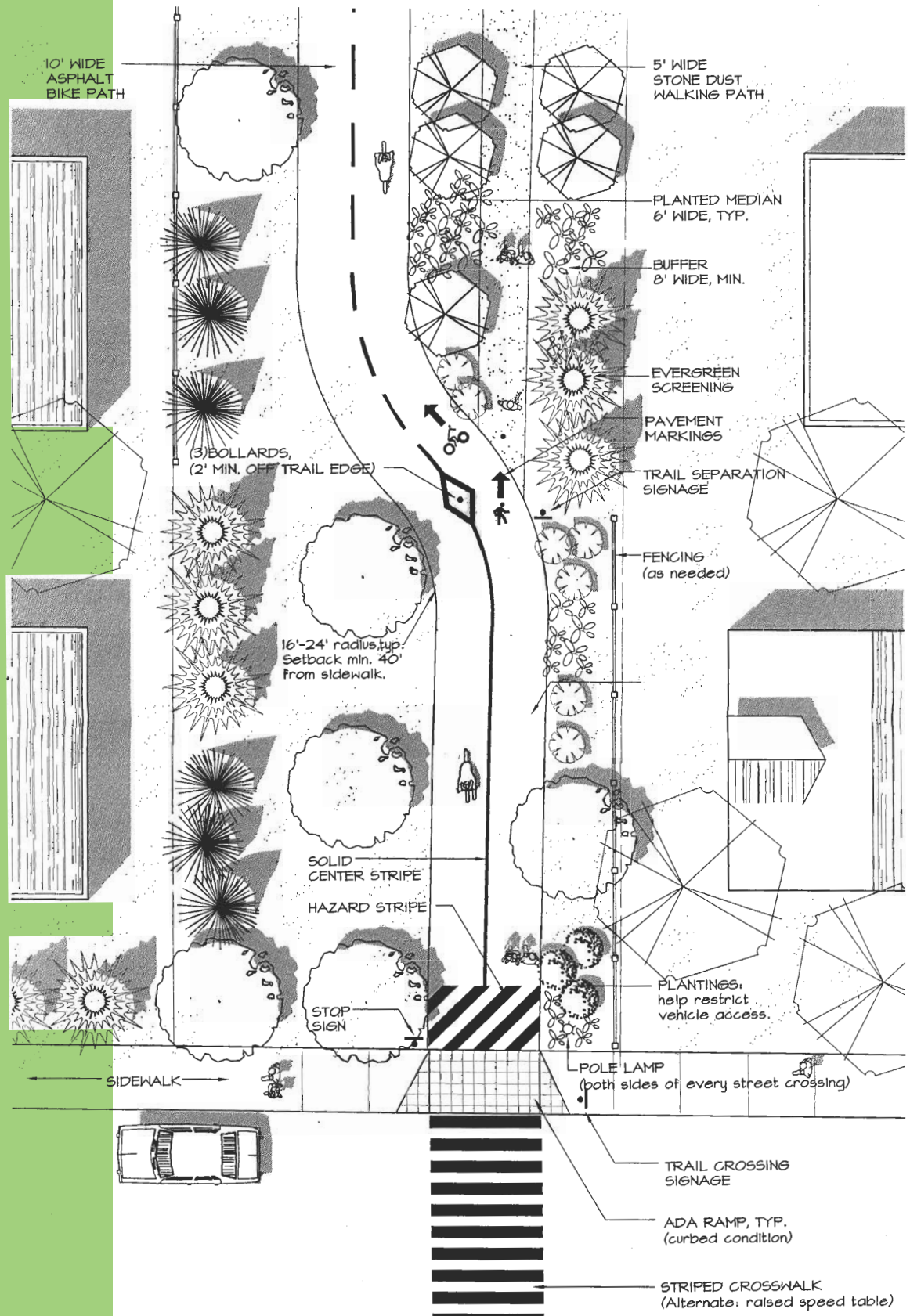
D. Shared Use Paths (Off-Road)

Shared use paths provide bicycle facilities off-road. The Town of Penfield uses the term, “multi-use trail,” as an equivalent terminology to “shared use path.”

The following AASHTO figure shows recommended dimensions for a shared use path.



The figure below provides design considerations for shared use paths intersecting roads.



VIII. Recommendations

The bicycle facility plan recommendations include four areas of improvements:

- On-Road Improvements
- Off-Road Improvements
- Bicycle Facilities at Destinations
- Policies and Programs

General recommendations are made in the form of a “Bicycle Facilities Toolbox,” (See Figure 14). The toolbox provides design and usage recommendations for specific treatments for on-road and off-road improvements, policies and programs. Treatments within the toolbox include:

- Signed Shared Roadway
- “Sharrow” Markings
- Bicycle Detectors
- Wide Curb Lanes
- Paved Shoulders
- Bike Lanes
- Bike Paths
- Signal Modifications
- Bike Route Signs
- Shared Lane Yield to Bicyclists
- Intersection Guidance Signage
- Bike Racks
- Bike Lockers
- Bike Shelters
- Public Transit Accessibility
- Bicycle Rental Program
- Road Maintenance Program
- Education Programs

The sections below review both general design guidelines and improvements for specific locations and situations.

A. On-Road Improvements

1. Specific Improvements

Figure 15: On-Road Bicycle Facilities Recommendations and Figure 16: On-Road Improvements Map detail specific improvements for the identified “Hot Spots,” identified along the Priority Routes. AASHTO design guidelines reviewed in Section VII and detailed in Appendix B for specific applications. The end goal is to have all of the Priority Routes meet the AASHTO standards for bicycle facilities.

Critical to the success of on-road improvements is ongoing communication between the Penfield Bicycle Committee, the Town of Penfield and the County and State Department of Transportation.

2. Signage

MUTCD W11-1 Bicycle Warning Sign and W16-1 Share the Road signage are recommended, aligned with typical practices in the Rochester region, for use sparingly. The conditions that permit these signs are locations where substantial volume of bicyclists exist or are expected and where there are not adequate bicycle accommodations, such as narrow shoulders. Placement of W11-1 and W16-1

signage should be prioritized for the following roads in Penfield:

- Route 441 (West of Harris Road)
- Route 250
- Route 286

3. Speed Limit Modifications

Travel speeds of motor vehicles are a critical element for the perceived and actual safety of bicyclists. Reduction of posted speed limits is one way to increase safety and comfort of bicyclists. Where adequate shoulder conditions do not exist and cannot be provided, and there is no possibility of an off-road bike path, speed limit reductions might be pursued as an alternative strategy. Formal traffic analysis would be required for candidate road segments to insure that required vehicular levels of service are maintained. The approvals required would depend upon the jurisdiction of the roadway.

B. Off-Road Improvements

1. Multi-use Trails

Multi-use trails should be designed and built compliant with AASHTO standards and assist in linking to priority destinations. Consideration should be made to provide safe routes for B and C level bicyclists between destinations where traffic volumes and speeds are intimidating.

Identify connections and linkages between Priority Routes, existing trails in Penfield, and surrounding region, and future trails, such as the Genesee Transportation Council's Irondequoit Creek Multi-Use Trail.

Figure 17: Off-Road Bicycle Facilities Recommendations suggests a multi-use path from Scribner Elementary and Bay Trail Middle Schools through Rothfuss Park and connecting to Veteran's Memorial Park. Certain details for the multi-use path route will need to be determined.

2. Sidewalk Enhancements

Coordination with Town of Penfield Sidewalk program to investigate upgrading some existing 5' wide sidewalks to 10' wide multi-use (shared use) pathways is recommended. While bicycling on sidewalks is not recommended, some roads will not be able to accommodate on-road bicycle facilities. Thus, multi-use paths are suggested to provide off-road facilities for both bicyclists and pedestrians. Upgrading to multi-use paths in specific locations may be of particular benefit in areas close to schools, and along roadways with high speeds and traffic volumes. The Town Engineering Department is open to pursuing select upgrading of sidewalks to multi-use paths where applicable.

The following details are advised for a proposed sidewalk conversion to a multi-use path:

- 5' wide concrete sidewalk expanded to a 10' wide multi-use path
- Center striping added for two-way for bicycle and pedestrian usage
- A minimum of 5' distance from roadway
- MUTCD signage R9-6 and R9-7 added

Figure17: Off-Road Bicycle Facilities Recommendations suggests a sidewalk to multi-use path conversion on Atlantic Ave. between Clark Rd./Qualtrough Rd.

to Five Mile Line Rd. and from Atlantic Ave. on Scribner Rd. to Bay Trail Middle School and Scribner Elementary School. This location would benefit parents and younger children in the surrounding residential area both for recreational enjoyment and bicycling or walking to school.

C. Bicycle Facilities at Destinations

Over 1.5 million bicycles are stolen annually in the United States. Providing safe and convenient bicycle parking at the community destinations is critical to increasing bicycle usage. Bicycle parking needs to be accessible, visible, convenient, and abundant.

Penfield's Zoning Ordinance, Article IV, requires for subject premises provision for parking of bicycles and motorbikes. The following subsections share guidelines provided by the Pedestrian and Bicycle Information Center.¹⁷ In addition, Figure 18: Pedestrian and Bicycle Oriented Parking Lot provides a diagram of good parking lot practices for safe bicycle parking.

1. Bicycle racks

Bicycle racks should:

- Support the frame of the bicycle and not just one wheel;
- Allow the frame and one wheel to be locked to the rack when both wheels are left on the bike;
- Allow the frame and both wheels to be locked to the rack if the front wheel is removed;
- Allow the use of either a cable or U-shaped lock;
- Be securely anchored;
- Be usable by bikes with no kickstand;
- Be usable by bikes with water bottle cages; and
- Be usable by a wide variety of sizes and types of bicycle.

The following are suggested criteria for bicycle rack locations:

- Parking should be covered whenever possible to protect the bicycle from the rain, snow and other elements. Covered parking areas should have at a minimum six or seven feet of clearance, but be low enough to avoid rain or snow blowing in under the roof.
- Racks should be in a well-lit area and in open view.
- Parking should not be in the way of pedestrians and motorists. Racks can be used on sidewalks when the width of sidewalk is ten feet or more. Near the curb and away from building entrances and crosswalks is recommended.
- Racks should have enough room between them and not be too close to walls.
- Racks can be installed in bus stops or loading zones if they do not interfere with boarding or loading passengers and no other options are available.
- Install racks only on concrete. Racks installed in asphalt are not secure.
- Racks must be four feet from fire hydrants, curb ramps and building entrances.
- MUTCD parking guide sign (D4-3) should be used to inform bicyclists of parking areas.

2. Short-term bicycle parking

Appendix E
provides additional sustainable design information from the USGBC's LEED rating system.

Short-term bicycle parking provides parking for two hours or less, such as outside of stores, office building visitors or park users. The following format is recommended:

- Well-distributed racks are preferable over grouping several racks together.
- Visible to cyclist.
- In high pedestrian activity areas.
- Placed within 50 feet of a main entrance to a building frequently used by cyclists.

3. Long-term parking

Long-term parking accommodates bicyclist who leave their bike all day, or overnight, or a longer duration. Long-term parking requires more levels of security and protection from the elements than short-term parking. Long-term parking preferences include:

- Lockers, individual lockers for one or two bicycles.
- Racks in an enclosed, lockable room.
- Racks in an area that is monitored by security cameras or guards (within 100 feet).
- Racks or lockers in an area visible to employees.

4. Amount of Bicycle Parking

The United States Green Building Council (USGBC) provides the following suggestions for the amount of bicycle parking to provide for users:

- For bicyclists using commercial or industrial buildings:
 - Provide bicycle racks or storage for 5 percent or more of building users.
 - Provide showers and changing facilities for 0.5% of full-time equivalent staff.
- For bicyclists using residential buildings:
 - Provide covered bicycle storage for 15 percent or more of building occupants.¹⁸
- For bicyclists using school buildings:
 - Provide bicycle racks or storage for 5 percent or more of school staff or students above 3rd grade level.
 - Provide showers and changing facilities for 0.5% of full-time equivalent staff.¹⁹

D. Policies and Programs

3. Policies

The first step in implementing this Bicycle Facilities Master Plan starts when the Town Board accepts or adopts the document. Acceptance or legal adoption would mean that the board accepts this plan as the guide to the Town's future development of bicycle facilities. Once accepted or adopted, this plan should be referenced or incorporated into updates for the Town's comprehensive plan. Public agencies and citizens should use this document to help make decisions concerning future bicycle facilities in Penfield. This plan should be placed on the Town's website so that the information can be accessed by developers and residents.



Nashbar High Visibility Safety Vest
<http://www.nashbar.com>

The zoning ordinance could be revised to encourage existing or future commercial properties to provide bicycle facilities for their employees and customers. In addition to the Town of Penfield Zoning Ordinance, Article IV, Penfield would benefit from adopting more specific bicycle parking design, location, minimum number per building type and land use, and installation requirements. Site plan review standards could be developed for commercial properties for bicycle accommodation between the street and the storefront. Figure 18: Pedestrian and Bicycle Oriented Parking Lot provides a diagram of good parking lot practices for safe bicycle parking. The Town Board has the legal authority to pass or amend a zoning law. However, the Planning Board can research zoning tools and draft a zoning law to be considered by the Town Board. Most amendments and/or new local laws will require an environmental review (SEQRA) along with appropriate public notice and hearings.

4. Programs

Although the Town Board has direct responsibility to implement this plan's actions and programs, active involvement of citizens and other organizations is vital for successful implementation. Public-Private partnerships should be encouraged wherever possible. The Town of Penfield will need to delegate some responsibility in implementing the recommendations. In addition, various citizen committees, such as the Penfield Bicycle Committee, can help with programs and making action recommendations to the Town Board. In all cases, these committees should have both clear direction from the Town and an efficient process in which to accomplish their work.

The development of programs to inform residents and visitors about safely utilizing the bicycle facilities is highly recommended. Section XI Education Plan details objectives, ideas and resources for developing various bicycle facility programs.

Two programs are suggested for immediate execution. First, the Town should develop a brochure with safety lessons and rules for both bicycle and motor vehicle audiences. A hard copy of this brochure could be distributed at the Town Hall, schools, grocery stores and parks. An electronic version could be available through the Town website. Second, a "Share the Road" Campaign could be launched to increase safe bicyclist, motorist and pedestrians' behavior and respect. High visibility vests could be sold as a possible fundraiser for the campaign.

IX. Maintenance

Guidelines for maintenance of the Town of Penfield Bicycle Facilities Routes will help establish Penfield as an alternative transportation community and a destination for bike enthusiasts that can be managed and maintained safely and efficiently over the long term. Sustaining a maintenance program for the bicycle facilities will depend on efforts from the Town of Penfield, Monroe County Department of Transportation, New York State Department of Transportation and volunteers. Maintenance responsibility for specific roads will be dependent on road ownership. Figure 19: Bike Routes maps Town, County and State-owned roads.

A. Town of Penfield's Maintenance Issues and Current Conditions

The Stakeholder Steering Committee identified the following specific maintenance issues affecting bicyclists in Penfield:

- Debris or loose gravel on roadways
- Uneven pavement
- Snow and ice conditions

The following sections review the current maintenance practices in Penfield. (Source: Town of Penfield Highway Dept. September, 2008.)

1. Sweeping

The Town of Penfield owns two street sweepers: one vacuum unit; and one mechanical unit.

The Town Highway Department is under contract with Monroe County and NYSDOT to sweep County and State roads within Town borders. The Town will prioritize additional sweeping of roads that were chip sealed the previous year.

The NYSDOT Highway Maintenance Residencies share a combination of State owned and rented equipment. All roads in Penfield get swept in the spring. County roads are typically swept twice a year. State roads are typically swept just once a year.

2. Chip Sealing

The objective of chip sealing is to prolong the service life of the road pavement. The Town goal is to chip seal 10 to 12 percent of the roads in Town every year. High volume roadways, such as Route 441, do not receive chip seal.

Chip sealed roads are swept within two to three weeks of the sealing and will be swept multiple times as needed to better accommodate bicycles. Equipment and technology is reducing the amount of loose stone that needs to be applied; and polymer oils are now the norm.

3. Winter De-icing

For winter de-icing, Penfield uses mostly salt. Sand is applied when temperatures fall below ten degrees Fahrenheit.

4. Road Striping

The Town's goal is to re-stripe road centerlines every year, and re-stripe road edge lines every 2 years.

5. Drain Inlets

Town repairs drain inlets on Town roads; and drain inlets on County roads under work orders from the County. Repairs on State roads are handled by NYSDOT. Reports of needed repairs on State roads are forwarded to NYSDOT.

B. Maintenance Overview

The following maintenance sections are provided verbatim from the *Vermont Pedestrian and Bicycle Facility Planning and Design Manual* prepared for the Vermont Agency of Transportation by the National Center for Bicycling and Walking in December 2002.

Like all transportation infrastructure, pedestrian and bicycle facilities are subject to debris accumulation, surface deterioration, and other maintenance issues that can limit their functionality if not addressed. Maintenance protects the investment of public funds in pedestrian and bicycle facilities, so they can continue to be used safely. Poorly maintained facilities become unusable and a potential legal liability, as bicyclists and pedestrians who continue to use them may risk personal injury and equipment damage. Others will choose not to use the facilities at all.

Every agency, municipality or organization that is responsible for maintaining a facility should establish maintenance standards, identify how users should report maintenance needs, and prioritize special activities such as snow clearing and debris removal. Maintenance inspections should be routinely performed in combination with a spot improvement program (discussed in more detail below).

Consider costs and responsibility for maintenance when projects are planned and budgets are developed. **A good rule of thumb is that 3-5 percent of infrastructure replacement costs should be spent on annual maintenance.** For example, if a facility costs \$100,000 to construct, \$5,000 should be budgeted for its maintenance each year. Preventive maintenance reduces hazards and future repair costs. Life cycle cost analysis can be used to evaluate expenditures, such as the net value of using a higher quality, longer-lasting material initially.

It is essential that maintenance considerations be considered during the planning and design stages of a project to ensure that a capable maintenance entity is identified and the full cost of maintenance activities are considered before embarking on the types of improvements described in this manual.

The primary goal of a maintenance program should be to ensure that a facility serves its original purpose. **The following actions will help ensure that adequate maintenance takes place:**

- *Develop written maintenance procedures and follow them.*
- *Develop an inspection and maintenance checklist.* Periodic inspections that identify problem areas are an essential feature of any maintenance program. The frequency of inspections will vary from region to region and with the nature of the maintenance activity. The adoption of an inspection and maintenance checklist outlining possible problems and appropriate solutions will help ensure adequate maintenance and repair of facilities.
- *Regularly monitor/inspect facilities.* Inspect facilities regularly using trained and experienced maintenance personnel. Investigate reports of hazards.
- *Keep a report of maintenance activities and inspections.* Such records may become significant in liability actions that may take

place at a later date.

C. Responsibility

Although the state may assist with funding and development of sidewalks and shared use paths, maintenance of these facilities often remains a municipal responsibility. The VTrans' Sidewalk Policy requires that there be an agreement between the Agency and the municipality where a sidewalk will be built identifying the municipality responsible for all maintenance, including (but not limited to) winter snow and ice removal when deemed appropriate.

Because on-road bicycle facilities (bicycle lanes, wide curb lanes and paved shoulders) are an extension of the road surface, they should receive the same level of maintenance as the rest of the road and will require less specialized maintenance.

In communities where the Department of Corrections has work crews available, it may be possible to have some maintenance done by this agency.

Management of some rail-trails in Vermont is a joint effort between the Vermont Department of Forests, Parks and Recreation (FP&R) and the Vermont Agency of Transportation. Because the trails are on state lands, FP&R, as the state's natural resource management agency, is a logical management entity. However, FP&R and VTrans have limited resources for land management and maintenance. A plan for maintenance and funding sources should be included in the planning process for rail-trail development. In most cases, funding may be derived from a consortium of trail users, host communities, and the state.

D. Design with an Eye Toward Maintenance

Designers should take into account what effects their design will have on long-term maintenance and management of the project. Designers should also consider the perspectives of all potential facility users, visit other projects, seek innovative solutions to address specific design issues, strive for simplicity, and monitor the successes and failures of similar projects as they develop.

General principles to consider when designing with an eye toward maintenance include:

- Working with adjacent property owners in advance will result in fewer problems and better solutions.
- Expect vandalism.
- Consider the range of potential uses and user groups.
- Optimize use of existing infrastructure including park-and-ride lots, trail friendly businesses and neighbors.
- Use common sense. Keep the design simple.

6. Materials and Techniques

Consider the characteristics of all facility users, their equipment and the potential impact of the equipment upon the facility. In choosing materials:

- Use locally available materials where possible to ease and speed repair and replacement.
- Avoid mechanical parts that may rust, corrode, loosen or break.
- Use durable materials.
- Provide adequate base materials to increase the longevity of paved

surfaces.

- Plant landscaping a sufficient distance from facilities to minimize encroachment problems.

7. Consider Maintenance Equipment

Off-road facilities should be designed and built to a standard that allows appropriate maintenance equipment to access and service the facility without damaging it. The dimensions of shared use paths should consider the width, turning radii and weight of the equipment expected to maintain the facility.

8. Wildlife Impacts

Anticipate unexpected problems with wildlife access (i.e., nesting turtles in gravel path surfaces, snakes on stone surfaces, and animal waste from wild and domestic animals). Leave frequent openings in fencing (at natural crossing locations) to ensure that wildlife may safely cross a facility.

E. Management Plans

Especially for shared use paths and rail trails, a management plan is a useful tool to identify maintenance needs and responsible parties. It is recommended that development of a management plan with a maintenance component occur before the trail is constructed. Path managers should recognize that adjustments to the plan might be needed when the facility becomes operational. While maintenance issues are a key component of a management plan, other items, such as resolving user conflicts, can be addressed. Items to address in a management plan include:

- Basic operational and staffing questions such as: Who opens and closes gates? Fills potholes? Removes downed or dangerous trees? Responds to vandalism and trespass? Removes litter? Replaces stolen or damaged signs? Waters and weeds landscaping? Acts as the main contact? Does the work? Pays the bills?
- What services will and will not be available on the trail? What happens to trail users when they leave the trail to access local services?
- Addressing how funding generated from leases and easements can be used for trail maintenance.
- For maintenance items, include:
 - The frequency of maintenance tasks.
 - The types of materials to be used.
 - The standards for successful accomplishment of tasks.
 - The total resources needed including man-hours.
 - An estimate of cost for each activity.

Additionally, some communities have initiated adopt-a-path or trail programs where civic groups or other organizations can “adopt” a segment of path, trail or bicycle route and take responsibility for routine maintenance. If instituting an adopt-a-path program, the responsibilities of the organization adopting the facility should be clearly spelled out.

1. Spot Improvement Programs

Responsible entities may wish to create an ongoing spot improvement program. Soliciting comments from users can help an agency find specific problem locations.

Institutionalizing this process, in the form of a user-requested “spot improvement program,” can provide ongoing input and, in many cases, help identify problems early. In addition, such a program can dramatically improve the relationship between an agency and the public.

Spot improvement request forms can be created as mail-in post cards and be made available at municipal buildings, bike shops, libraries, etc., and can be filled out and submitted to local authorities. Simple requests like filling potholes or sweeping, are usually handled on a routine basis. On paths or rail trails, they can be located at path and trailside facilities and at information kiosks. An important element of a spot improvement program is to identify the funding and personnel who will be responsible for responding to requests prior to soliciting these from the public.

F. General Maintenance Considerations

There are a number of maintenance activities that are common to all pedestrian and bicycle facilities.

1. Snow Removal

When it is expected that a facility will be used during winter months, snow removal must be planned for. It should be expected that pedestrian facilities would be used year-round. Shared use paths may be used for winter activities like cross-country skiing or snowmobiling. In those cases, snow removal is not a consideration. However, some shared use paths are kept clear of snow so that walking, jogging and bicycling can occur year-round. Even in winter, some experienced bicyclists, usually in urban areas, use a bicycle for commuting. Snow should be placed well out of the portion of the travel lane that bicyclists use.

Snow and ice buildup will inhibit wintertime use of walkways. Walkways and curb ramps should not be used as snow storage areas for snow removed from streets. Local policies should treat the clearance of snow from walkways as being of equal importance as clearance of snow from streets. In areas where abutting landowners and residents are responsible for clearing walkways, local regulations should be enforced.

Give special attention to snow removal from shoulders. Frequently, and for a variety of reasons, more people tend to walk when there are snow conditions. In areas with no sidewalks (or where sidewalks are not cleared in a timely manner), pedestrians will walk on the shoulder or on the roadway. Snow removal programs should call for providing a clear shoulder just as they do for travel lanes on the roadway. Further, care must be taken not to reduce sight distance at intersections and corners by piling snow too close to the walkway.

2. Sweeping

Loose sand and debris on the surface of sidewalks, paved shoulders, bicycle lanes and paved sections of shared use paths should be removed at least once a year, normally in the spring. Bicyclists ride close to the right-hand edge of the roadway, where tires and air movement of moving traffic are most likely to “sweep” the roadway surface free of sand and debris. Even so, pay close attention to this area, especially along designated bicycle routes or on bicycle lanes.

Winter sanding usually leaves a coating of material on sidewalks at the end of the winter season. Sidewalks should be swept and the debris removed. Where the abutting landowners and residents bear this responsibility, enforce local

regulations to clean walkways.

Where bicycle lanes are provided, passing motor vehicles may not be as likely to sweep these lanes free of debris and may actually increase the amount of debris on the bicycle lanes. This can be especially true for bicycle lanes that are located directly adjacent to a curb, where debris tends to collect against the curb. Keeping bicycle lanes well maintained becomes especially important. Otherwise, bicyclists may choose to ride in the vehicle travel lanes, defeating the purpose of providing extra space for bicyclists.

3. Surface Repairs

Bicyclists and pedestrians are more sensitive to problems in the roadway surface than motor vehicles. Small bumps and cracks that are barely noticeable to motor vehicles can cause a bicycle to crash or swerve or make walking difficult, especially for pedestrians with disabilities. Over time sidewalks can develop uneven surfaces and cracks. Sections of walkway with a vertical differential of greater than 13 mm (0.5 in.) should be replaced or repaired temporarily with asphalt. In locations with a high volume of pedestrian traffic, especially wheelchair users, any differential larger than 7 mm (0.25 in.) should be repaired. Separated expansion joints between adjoining sections of sidewalk should be no greater than 13 mm (0.5 in.). The gap can be filled with hardening expansion compound.

Sidewalks and shared use paths can also be cracked and heaved by tree roots. Failed sections of concrete sidewalk should be removed, the roots cut and new sections of sidewalk installed. Where the roots have heaved an asphalt sidewalk or path, the surface repair should extend over the full width of the facility to minimize future problems due to possible differential settling. If the roots to be removed are large, contact an arborist to determine how to lessen the possibility of injuring the tree. Transition problems can result from previous repairs. Where the pavement surface from a prior repair has deteriorated, become cracked, or is missing altogether, remove the transition section and have all defective sections of pavement replaced.

4. Resurfacing

Pavement overlays are an excellent opportunity to improve conditions for bicyclists.

Care should be taken to avoid leaving a ridge in a shoulder or bicycle lane. The overlay should be extended over the entire roadway surface, if possible. If not, the overlay should end at the shoulder or bicycle lane stripe, provided an abrupt transition is not created.

Utility covers and drainage grates should be raised to within 6 mm (1/4 in.) of the pavement surface, and grates should be bicycle-safe grates (refer to Section 4.7.1, Drainage and Drainage Grates). Gravel driveways and alleys should be paved back 3.0 m (10 ft) from the edge of the roadway, path or sidewalk to help prevent gravel from spilling onto the facility.

Care should also be taken to raise the level of adjacent unpaved compacted shoulders so they are flush with the new roadway surface, as a vertical drop onto a low shoulder can cause a bicyclist trying to ride back onto the roadway to fall into the path of overtaking vehicles.

One potential problem with resurfacing occurs when a road has been constructed over an old concrete roadbed that remains in place beneath the existing paved surface. In most cases, the old roadbed is much narrower than the current paved

roadway and because of differential settling between it and adjacent material, surface cracking occurs on the paved surface. These longitudinal cracks typically appear from 0.3 - 0.6 m (1 - 2 ft) in from the edge line of the road, which is where bicyclists normally ride. Bicyclists are therefore forced to cross over the crack to use a shoulder, if one is available, or to ride in the travel lane.

There are several methods for addressing old concrete roadbeds. The most expensive and labor intensive is to excavate and completely remove the concrete, which essentially requires full-depth reconstruction of the entire road. Most of the other methods attempt to make the area adjacent to the old roadbed act similarly to the roadbed. This results in a more consistent overall cross section and lessens the amount and extent of surface cracking. The various alternatives are listed below in increasing order of expense and effectiveness. The different alternatives for achieving this include:

1. Crack and seat the slabs, which breaks them into smaller pieces that move more like adjacent material.
2. Rubblize the slabs, which breaks them into aggregate size pieces that mimic adjacent material.
3. Excavate the material adjacent to the slabs and replacing it with aggregate and pavement that replicates the stiffness of the concrete
4. Extend the existing concrete slabs to the full roadway width
5. Place a stiff fabric, such as asphalt impregnated fiberglass, on the outside portion of the roadway, overlapping the area that overlays the old roadbed. This provides the lowest level of relief and often only delays the cracking.

5. Signs and Pavement Markings

Signs and pavement markings are important features of roadways and shared use paths and need to be maintained and inspected regularly. A regular inspection of bicycle facilities should include an inventory of signs to account for missing signs or damaged signs. Similarly, striping should be inspected and reapplied as needed. In some cases, striping may be visible, but has lost its slip resistance, which can be a hazard to bicyclists. A regular inspection of the condition of paint on crosswalks and stop bars should be conducted and re-application should occur if necessary.

Inspect pedestrian signals periodically for proper operation; clean lenses and replace bulbs as necessary.

One method of sign management is to place a numbered tag on each sign so routine patrols can identify which ones are missing. This technique can be expanded to produce a facility map that shows the tag number and location of each sign, kiosk, mile marker, culvert, picnic table, sign-in box, bench, etc. along a facility.

6. Utility Cuts

Utility cuts can leave uneven surfaces for bicyclists and pedestrians if they are not backfilled and replaced correctly. Cuts should be backfilled and compacted so that the cut will be flush with the existing surface when completed. For bicycle facilities, care should be taken to avoid cuts that are parallel to the direction of bicycle traffic, if possible. Such cuts can result in uneven edges or grooves that can be a problem for bicyclists.

7. Vegetation

Vegetation may encroach onto bicycle or pedestrian facilities by either growing into the travel path of bicyclists or pedestrians or growing in cracks and causing deterioration of the surface. Regular inspection and maintenance can address this issue. Local regulations that require abutting land users to perform timely clearance of vegetation that becomes an obstruction or limits sight distance should be enacted and enforced. As an alternative, private contractors can be hired to clear vegetation and the costs assessed to abutting landowners.

8. Drainage

Standing water problems can hinder the use of bicycle and pedestrian facilities. Some of these problems are created by either the design or construction of a facility, but some are related to maintenance. Common maintenance problems are clogged drainpipes or inlets. On sidewalks, ponds at curb ramps can be especially problematic for persons with disabilities. Where ponding occurs in bicycle lanes or on shoulders, bicyclists may be forced to swerve into adjacent travel lanes. Maintenance should occur on drainage grates and swales around curb inlets to ensure that they are functional, free of debris, and level with the pavement.

9. Amenities and Miscellaneous Items

There are a number of ancillary items associated with bicycle and pedestrian facilities that also will require an ongoing maintenance program. The following maintenance activities should be considered:

- Keep lights clean and replace fixtures as required.
- Maintain support facilities such as benches and drinking fountains.
- Pick up litter and empty trashcans.
- Repair sections of broken or missing fencing, especially on bridges or other locations where it serves as a barrier to protect pedestrians and bicyclists from adjacent hazards.

F. Special Considerations for Sidewalks

In addition to the maintenance activities expected for all bicycle and pedestrian facilities, sidewalks may include the following needs:

- *Newspaper stands, portable signs, and other devices creating barriers on a sidewalk.* The responsible parties should be required to remove any obstructions from the pedestrian through zone (refer to Chapter 3, Pedestrian Facilities).
- *Worn or slippery steps or ramp surfaces.* Steps and ramp surfaces that are worn and slippery should be overlaid, textured, or replaced to create a slip-free and unbroken surface.
- *Snow and slush removal from curb ramps.* Extra effort may be required to remove accumulated snow and slush from the base of curb ramps. If this material is not removed, it can freeze and render the ramps unusable by persons with disabilities and other users.
- *Pavement overlays adjacent to curbed sidewalks.* Repeated pavement overlays adjacent to curbed sidewalks eventually result in the loss of the original curb reveal.

This can result in standing water on sidewalks, vehicles parking on sidewalks and loss of vertical separation between sidewalks and adjacent roadways. Normally one overlay can be performed while maintaining adequate curb reveal. The

preferred technique is to mill off existing surfaces and replace with the same depth of material, thus maintaining curb reveal.

G. Special Considerations for Shared Use Paths

In addition to the maintenance activities expected for all bicycle and pedestrian facilities, plan for the following on shared use paths:

- Remove debris along the path and animal waste at agricultural crossings
- Plan for the installation and removal of seasonal signing and other items if different user groups are expected in the winter.
- Place and remove plank runners on bridge decks to accommodate seasonal snowmobile use.
- Where paths are plowed, completely clear snow from the path edge. Where snow is not cleared from path edges, additional moisture and frost problems can occur.
- Locate fences and barriers away from paths to facilitate snow removal.

X. Implementation Phasing Strategy

A successful strategy should start with the most important recommendations, address recommendations that pave the way for other recommendations, work to maximize the number of different parties addressing at least one recommendation, and simultaneously address at least one issue addressed in this plan.

An annual agenda of recommendations to be implemented that year should be prepared by the Town Board, the Planning Board, or the Transportation Committee. Each year's work should be manageable and involve the necessary volunteers or agencies. An annual status report of what's been done should be presented to the public. This will help keep everyone informed about what is being implemented, what has already been done, and what has not.

As an ongoing practice, the Transportation Committee should include one member from the Penfield Bicycle Committee. Including a Penfield Bicycle Committee member on the Transportation Committee will help to promote coordination between the Town and the community.

Figure 15: On-Road Bicycle Facilities Recommendations and Figure 16: On-Road Improvements Map provides a recommended sequence of short-term, mid-term, and long-term actions for On-Road Bicycle Facilities.

XI. Education Plan

The Bicycle Facility Plan will help the Town of Penfield provide safe, convenient routes for bicyclists to commute and recreate throughout the Town and connect to other regional bike systems. The bicycle network's success depends on users safely, appropriately and frequently utilizing the network. To assist in creating an effective and safe bicycle network, this education plan provides resources to help the Town of Penfield's Bicycle Program achieve the following objectives:

1. Improve Safety for Bicyclists, Pedestrians and Motorists
2. Promote Awareness and Usage of the Bicycle Network System
3. Increase Community Partnerships in Providing Resources for Bicyclists
4. Measure and Communicate User Benefits & Community Impact

The recommendations in this chapter aim to assist in increasing the number of Penfield bicyclists while improving safe and appropriate behavior by bicyclists, motorists and pedestrians.

The bicycle network will attract bicyclists with different skill levels and varying ages, as well as interface with motorists and pedestrians. Thus, the education programs and information must cater to the different user and interface groups. The AASHTO 1999 Bike Book recommends that an education plan address these four groups:

- Young bicyclists
- Parents of young bicyclists
- Adult bicyclists
- Motorists

This plan recommends that the following groups be addressed as well:

- Pedestrians
- Senior bicyclists

When developing the different programs, campaigns or information elements, make sure each group is addressed in multiple and suitable ways. For example, programs for young bicyclists should use age-appropriate curriculum and language to explain concepts and issues.

A. Objective #1: Improve Safety for Bicyclists, Pedestrians and Motorists

Bicycle facilities are designed with the assumption that bicyclists follow traffic laws by stopping at red traffic lights and riding in the same direction on streets as motorists. Also, the designs assume that motorists will yield to bicyclists when turning or will not drive or park in designated bicycle lanes. Realistically to maintain safe streets, these assumptions must not be made. As the Town of Penfield implements and improves the bicycle network, new information and programs will need to be developed to educate bicyclists, motorists and pedestrians about how to co-exist safely in the roadway and shared path network. Safe driving, biking and walking techniques need to be promoted to ensure that bicyclists, motorists and pedestrians obey traffic rules and behave appropriately.

The main components of bicycle safety education programs are included in Appendix G: Key Components of Bicycle Education Information and Programs. Suggestions for implementation of these key components are the following:

- Brochure with safety lessons and rules (hard copies and on website).



<http://www.marinbike.org/Campaigns/ShareTheRoad/Index.shtml>

Bicyclists must obey and are protected under the same NY laws that apply to drivers, with some obvious exceptions and rules. Likewise, motorists must obey the rules of the road with respect to bicyclists.

(From: Sharing the Road Safely In New York State)

Children under the age of nine do not have fully developed peripheral vision and cannot judge the speed of an approaching vehicle.

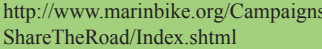
(From: Seattle Bicycle Master Plan, September 2007)



<http://www.hamax.com/admin/common/GetImg2.asp?FileID=1217&FxBPB=False>

Head injuries cause about three-fourths of the 800 to 900 deaths resulting from bicycling-related accidents in the U.S. each year. According to a study conducted by the Harborview Injury and Prevention and Research Center, helmets that meet federal CPSC standards can cut the risk of riders' head injuries by 85%.

(From: Seattle Bicycle Master Plan, September 2007)



*(From: National Highway
Traffic Safety Administration)*

- Hands-on bicycle and pedestrian safety training for different age groups and bicycling skill level.
- Bicycle commuter classes.
- Enforcement by police officers of traffic rules.
- Media outreach in the Town and regionally to promote bicycling and increase awareness of bicycle safety, including messages on buses, newspaper articles and posters in public venues.
- A “Share the Road” campaign to increase safe bicyclist, motorist and pedestrian behavior and respect.
- Saturday rides throughout the Town, which are geared towards less-experienced cyclists.
- “Drive with Care” campaign targeted to impact motorists’ behavior.
- “Safe Routes to School” program
- Sunday Parkways- allow certain roads to be motorists free for a period of time on Sunday for bicyclists.
- Bicycle theft reduction program that includes a bike registration program, lock give-away and bicycle storage facilities.

B. Objective #2: Promote Awareness and Usage of the Bicycle Network System

The success and growth of the bicycle network system depends on people using the routes. Promoting awareness about the network and providing information about how and where to use and connect to the system is important to develop. Below are suggestions for implementing awareness and usage information, programs and campaigns:

- Create a Town of Penfield Bicycling Guide Map (hard copy and online)
- Develop an online bicycle route wayfinding program. The online program could include park amenities, transit connections, school locations, shopping plazas, public amenities, such as the post office, bike storage and parking facilities, and other useful information for bicyclists.
- Develop wayfinding signage along the route system and at trail connections, shopping plazas, schools and other public locations.
- Provide a downloadable copy of the Bicycle Facilities Plan on the Town website.
- Develop a “Bicycle Public Awareness Campaign.”
- Create a “Going Green Campaign” commuter challenge.
- Do Saturday Bike Tour days showing the routes.
- Promote at a summer Fair Day.
- Create a “Bike to School or Work Day.”
- Work with businesses to develop programs that encourage their employees and customers to bicycle.
- Provide bicycle parking facilities.

Add blurb about community businesses, schools, and non-profit organization involvement.

Suggestions for increasing community partnerships include the following:

- Promote secure and convenient bicycle parking (short or long-term storage) at all cycling destinations to encourage and support cycling.
- Encourage short-term storage facilities for stores, schools, parks, trailheads, and long-term storage facilities at apartment complexes.
- Work with public bus system to provide bike storage on front of buses.
- Create a Bicycle Benefits program with discounts for bicyclists.
- Create incentives to benefit business for participating
- Help start a Community Bicycle Network

D. Objective #4: Measure and Communicate User Benefits & Community Impact

Last, programs and information will need to promote bicycling as a fun and healthy alternative transportation in the Town. As described in Appendix D, cycling provides environmental, health, financial, time and stress benefits. Educational programs need to communicate these benefits to potential bicycle users.

Create a baseline of ridership and other benefits today that can be measured after program implementation. This information can be used to promote the program and gain future funding for improvements.

The following components can be included to measure and communicate user benefits and community impact:

- Create a baseline, create goals with community organizations (like schools) and measure.
- Create a Healthy Benefits campaign
- Share findings on website and through media venues.

Sample venues for publicizing information include:

- Parks & Rec magazine
- Town of Penfield website
- Penfield Post
- Democrat & Chronicle
- Schools
- YMCA
- Town Hall
- Post Office
- Other Town facilities (ex. The Lodge)



Post and Ring Bicycle Stands in Toronto

Biking 10 miles to work or school once a week can reduce 500 lbs of carbon dioxide from an average car (19.8 mpg).

(From: www.terrapass.com)

XII. Potential Funding Sources

A. Federal Sources

SAFETEA-LU (*Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, formerly TEA-21 and ISTEA*) – This program is a multi-year, federal transportation legislation with many different funding programs for bicycle improvements. The following chart shows a brief summary of the areas funded within the various programs. Additional information may be found at: <http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4>.

	NHS	STP	HSIP	SRTS	TEA	CMAQ	RTP	FTA	TE	BRI	402	PLA	TCSP	JOBS	FLH	BYW
Bicycle and pedestrian plan		*				*						*	*			
Bicycle lanes on roadway	*	*	*	*	*	*		*	*	*					*	*
Paved Shoulders	*	*	*	*	*	*				*					*	*
Signed bike route	*	*		*	*	*									*	*
Shared use path/trail	*	*		*	*	*	*			*					*	*
Single track hike/bike trail							*									
Spot improvement program		*	*	*	*	*										
Maps		*		*		*					*					
Bike racks on buses		*			*	*		*	*							
Bicycle parking facilities		*		*	*	*		*	*							*
Trail/highway intersection	*	*	*	*	*	*	*								*	*
Bicycle storage/service center		*		*	*	*		*	*				*	*		
Sidewalks, new or retrofit	*	*	*	*	*	*		*	*	*					*	*
Crosswalks, new or retrofit	*	*	*	*	*	*		*	*						*	*
Signal improvements	*	*	*	*	*	*										
Curb cuts and ramps	*	*	*	*	*	*										
Traffic calming		*	*	*									*			
Coordinator position		*		*		*							*			
Safety/education position		*		*		*					*					
Police Patrol		*		*							*					
Helmet Promotion		*		*	*						*					
Safety brochure/book		*		*	*	*	*				*					
Training		*		*	*	*	*				*					

KEY

NHS	National Highway System	BRI	Bridge
STP	Surface Transportation Program	402	State and Community Traffic Safety Program
HSIP	Highway Safety Improvement Program	PLA	State/Metropolitan Planning Funds

SRTS	<u>Safe Routes to School Program</u>	TCSP	<u>Transportation and Community and System Preservation Pilot Program</u>
TEA	<u>Transportation Enhancement Activities</u>	JOBS	<u>Access to Jobs/Reverse Commute Program</u>
CMAQ	<u>Congestion Mitigation/Air Quality Program</u>	RTP	<u>Recreational Trails Program</u>
FLH	<u>Federal Lands Highway Program</u>	FTA	<u>Federal Transit Capital, Urban & Rural Funds</u>
BYW	<u>Scenic Byways</u>	TE	Transit Enhancements

B. State Sources

Recreational Trails Program – The Recreational Trails Program is a State-administered, Federal assistance program to provide and maintain recreational trails for both motorized and non-motorized recreational trail use. This program is administered by the New York State Office of Parks, Recreation and Historic Preservation, but funds for the Recreational Trails Program are provided by SAFETEA-LU. The RTP legislation requires that States use 40% of their funds apportioned in a fiscal year for diverse recreational trail use, 30% for motorized recreation, and 30% for non-motorized recreation. This grant requires a 20% matching fund commitment from the applicant at the time of application. <http://nysparks.state.ny.us/grants/programs/recreation.asp>.

C. Local & Private Sources

Bonding – Bonds generate immediate financing and are appropriate for large-scale, permanent types of capital projects. General obligation bonds involve the taxing power of a municipality as it is pledged to pay the interest and principal to retire the debt.

Donations – Local clubs, interest groups, private developers and individuals should all be viewed as potential sources of money, services and labor for the development of new facilities and/or programs. The donor(s) determine what the funds would be used for. Property owners may also wish to donate land for public use/access for recreational purposes.

Real Estate Taxes – The acquisition, development, operation and maintenance of the bicycle facilities may be partially supported by real estate tax revenue. Local tax revenues are the primary sources of maintenance and operating funds.

Sales Tax Increase – Municipalities may consider establishing a sales tax increase to generate general revenue for the acquisition and development of the bicycle facilities. In most areas, a tax increase for this purpose would require a public referendum and voter approval. This increase could be short-term or permanent.

The Foundation Center – The Foundation Center is the primary source of information on private funding sources, with information on over 40,000 foundations offering private monies. Grant information is delineated by geography, types of support, affiliations to facilitate research. Corporate giving and government funding sources can also be researched through the Foundation Center. For more information, please go to <http://foundationcenter.org>.

D. Funding Resource Provider

Connie D. Miner & Co. Grant Consultants
4818 Kraus Road
Clarence, New York 14031
(716) 759-3336

APPENDIX A: Schematic Cost Estimates

ITEM	DESCRIPTION	UNIT	UNIT COST
1	ON-ROAD BICYCLE FACILITIES		
1.1	Paved Shoulder		
	Paving Shoulder (as per NYSDOT full depth shoulder)	SY	\$38.00
	Lane Line	FT	\$1.00
1.2	Bicycle Lane		
	Lane Line	FT	\$1.00
	Marking for One On Ground Bicycle Symbol		
	Thermoplastic	EACH	\$60.00
	Tape Markings	EACH	\$150.00
1.3	Road Widening (If necessary to accommodate bicycle lane)	SY	\$38.00
	Paving Shoulder (as per NYSDOT full depth shoulder)	SY	\$38.00
	Lane Line	FT	\$1.00
1.4	Existing Paved Shoulder		
	Lane Line	FT	\$1.00
2	OFF-ROAD BICYCLE FACILITIES		
2.1	10' Wide Stone Dust Trail with 2' Wide Graded Shoulders	LF	\$20.00
2.2	10' Wide Stone Dust Trail with 2' Wide Graded Shoulders and Built to AASHTO Standards	LF	\$40.00
2.3	Concrete Sidewalk Conversion: 5' Wide Concrete Addition to Existing Concrete Sidewalk	LF	\$28.00
3	SIGNAGE		
3.1	MUTCD Sign*	EACH	\$250.00
4	BICYCLE FACILITIES AT DESTINATIONS**		
4.1	Bicycle Locker	EACH	\$1,000.00
4.2	Bicycle Racks		
	Ribbon Rack (holds 10-12 bicycles at \$65 per bicycle)	RACK	\$650-780
	Inverted U Rack (holds 2 bicycles)	RACK	\$190.00

* Installation Cost Not Included

** Car parking spaces cost \$2,200 each for surface lot parking. 10-12 bicycles can be parked in one parking space.

APPENDIX B: AASHTO's Bicycle Facilities Guidelines

The information below is provided verbatim from *AASHTO's 1999 Guide for the Development of Bicycle Facilities*.²⁰

A. Shared Roadways

To varying extent, bicycles will be used on all highways where they are permitted. Bicycle-safe design practices should be followed during initial roadway design to avoid costly subsequent improvements. Because most existing highways have not been designed with bicycle travel in mind, roadways can often be improved to more safely accommodate bicycle traffic. Design features that can make roadways more compatible to bicycle travel include bicycle-safe drainage grates and bridge expansion joints, improved railroad crossings, smooth pavements, adequate sight distances, and signal timing and detector systems that respond to bicycles. In addition, more costly shoulder improvements and wide curb lanes can be considered.

Width is the most critical variable affecting the ability of a roadway to accommodate bicycle traffic. In order for bicycles and motor vehicles to share the use of a roadway without compromising the level of service and safety for either, the facility should provide sufficient paved width to accommodate both modes. This width can be achieved by providing wide outside lanes or paved shoulders.

1. Paved Shoulders

Adding or improving paved shoulders often can be the best way to accommodate bicyclists in rural areas and benefit motor vehicle traffic. Paved shoulders can extend the service life of the road surface since edge deterioration will be significantly reduced. Paved shoulders also provide a break down area for motor vehicles. Where funding is limited, adding or improving shoulders on uphill sections will give slow-moving bicyclists needed maneuvering space and will decrease conflicts with faster moving motor vehicle traffic.

Paved shoulders should be at least 1.2 m (4 feet) wide to accommodate bicycle travel. However, where 1.2-m (4-foot) widths cannot be achieved, any additional shoulder width is better than none at all. The measurement of usable shoulder width should not include the width of a gutter pan, unless the pan width is 1.2 m (4 feet) or greater. Shoulder width of 1.5 m (5 feet) is recommended from the face of guardrail, curb or other roadside barriers. It is desirable to increase the width of shoulders where higher bicycle usage is expected. Additional shoulder width is also desirable if motor vehicle speeds exceed 80 km/h (50 mph), or the percentage of trucks, buses and recreational vehicles is high, or if static obstructions exist at the right side of the roadway.

In general, AASHTO's recommendations for shoulder width are the best guide for bicycles as well, since wider shoulders are recommended on heavily traveled and high-speed roads and those carrying large numbers of trucks. However, in order to be usable by bicyclists the shoulder must be paved.

Rumble strips or raised pavement markers, where installed to discourage or warn motorists they are driving on the shoulder, are not recommended where shoulders are used by bicyclists unless there is a minimum clear path of 0.3 m (1 foot) from the rumble strip to the traveled way, 1.2 m (4 feet) from the rumble strip to the outside edge of paved shoulder, or 1.5 m (5 feet) to adjacent guardrail, curb or other obstacle. If existing conditions preclude achieving the minimum desirable clearance, the width of the rumble strip may be decreased or other appropriate alternative solutions should be considered.

2. Increased Lane Width

Wide curb lanes for bicycle use are usually preferred where shoulders are not provided, such as in restrictive urban areas. On highway sections without designated bikeways, an outside or curb lane wider than 3.6 m (12 feet) can better accommodate both bicycles and motor vehicles in the same lane and thus is beneficial to both bicyclists and motorists. In many cases where there is a wide curb lane, motorists will not need to change lanes to pass a bicyclist. Also, a wide curb lane provides more maneuvering room when drivers are exiting from driveways or in areas with limited sight distance.

In general, 4.2 m (14 feet) of usable lane width is the recommended width for shared use in a wide curb lane. Usable width normally would be from edge stripe to lane stripe or from the longitudinal joint of the gutter pan to

lane stripe (the gutter pan should not be included as usable width). On stretches of roadway with steep grades where bicyclists need more maneuvering space, the wide curb lane should be slightly wider where practicable [4.5 m (15 feet) is preferred]. The 4.5-m (15-foot) width may also be necessary in areas where drainage grates, raised reflectors on the right-hand side of the road, or on-street parking effectively reduce the usable width. With these exceptions in mind, widths greater than 4.2 m (14 feet) that extend continuously along a stretch of roadway may encourage the undesirable operation of two motor vehicles in one lane, especially in urban areas, and therefore are not recommended. In situations where more than 4.5 m (15 feet) of pavement width exists, consideration should be given to striping bike lanes or shoulders.

Restriping to provide wide curb lanes may also be considered on some existing multi-lane facilities by making the remaining travel lanes and left-turn lanes narrower. This should only be considered after careful review of traffic characteristics along the corridor and supported by a documented engineering analysis based on applicable design criteria.

3. On-Street Parking

On-street parking increases the potential for conflicts between motor vehicles and bicyclists. The most common bicycle riding location on urban roadways is in the area between parked cars and moving motor vehicles. Here, bicyclists are subjected to opening car doors, vehicles exiting parking spaces, extended mirrors that narrow the travel space, and obscured views of intersecting traffic. Therefore, 3.6 m (12 feet) of combined bicycle travel and parking width should be the minimum considered for this type of shared use.

4. Pavement Surface Quality

The smoothness of the riding surface affects the comfort, safety and speed of bicyclists. Pavement surface irregularities can do more than cause an unpleasant ride. Pavement surfaces should be smooth, and the pavement should be uniform in width. Wide cracks, joints or drop-offs at the edge of traveled way parallel to the direction of travel can trap a bicycle wheel and cause loss of control; holes and bumps can cause bicyclists to swerve into the path of motor vehicle traffic. In addition, a reduction in the operating speed of the bicyclist below a comfortable level results in less stability of the bicycle. As pavements age it may be necessary to fill joints or cracks, adjust utility covers or even overlay the pavement in some cases to make it suitable for bicycling.

5. Drainage Inlet Grates

Drainage inlet grates and utility covers are potential obstructions to bicyclists. Therefore, bicycle-safe grates should be used, and grates and covers should be located in a manner, which will minimize severe and/or frequent maneuvering by the bicyclist. When new highway facilities are constructed, curb opening inlets should be considered to minimize the number of potential obstructions. Drainage inlet grates and utility covers should be placed or adjusted to be flush with the adjacent pavement surface.

Drainage inlet grates with slots parallel to the roadway, or a gap between the frame and the grate, can trap the front wheel of a bicycle, causing loss of steering control. If the slot spacing is wide enough, narrow bicycle wheels can drop into the grates. Conflicts with grates may result in serious damage to the bicycle wheel and frame and/or injury to the bicyclist. These grates should be replaced with bicycle-safe, hydraulically efficient versions. When this is not immediately possible, a temporary correction is to weld steel cross straps or bars perpendicular to the parallel bars at 100-mm (4-inch) center-to-center maximum spacing to provide a maximum safe opening between straps.

While identifying a grate with pavement markings would be acceptable in some situations, as indicated in the MUTCD2, bar grates with bars parallel to the direction of travel deserve special attention. Because of the serious consequences of a bicyclist missing the pavement marking in the dark or being forced over such a grate inlet by other traffic, these grates should be physically corrected, as described above, as soon as practicable after they are identified.

B. Signed Shared Roadways

Signed shared roadways are those that have been identified by signing as preferred bike routes. There are several

reasons for designating signed bike routes:

- a. The route provides continuity to other bicycle facilities such as bike lanes and shared use paths.
- b. The road is a common route for bicyclists through a high demand corridor.
- c. In rural areas, the route is preferred for bicycling due to low motor vehicle traffic volume or paved shoulder availability.
- d. The route extends along local neighborhood streets and collectors that lead to an internal neighborhood destination such as a park, school or commercial district.

Bike route signs may also be used on streets with bike lanes, as well as on shared use paths. Regardless of the type of facility or roadway where they are used, it is recommended that bike route signs include destination information.

Signing of shared roadways indicates to cyclists that there are particular advantages to using these routes compared to alternate routes. This means the responsible agencies have taken action to ensure these routes are suitable as shared routes and will be maintained.

The following criteria should be considered prior to signing a route:

- a. The route provides through and direct travel in bicycle-demand corridors.
- b. The route connects discontinuous segments of shared use paths, bike lanes and/or other bike routes.
- c. An effort has been made to adjust traffic control devices (e.g., stop signs, signals) to give greater priority to bicyclists on the route, as opposed to alternative streets. This could include placement of bicycle-sensitive detectors where bicyclists are expected to stop.
- d. Street parking has been removed or restricted in areas of critical width to provide improved safety.
- e. A smooth surface has been provided (e.g., adjust utility covers to grade, install bicycle-safe drainage grates, fill potholes, etc.)
- f. Maintenance of the route will be sufficient to prevent accumulation of debris (e.g., regular street sweeping).
- g. Wider curb lanes are provided compared to parallel roads.
- h. Shoulder or curb lane widths generally meet or exceed width requirements included with Shared Roadways.

C. Bike Lanes

Bike lanes can be incorporated into a roadway when it is desirable to delineate available road space for preferential use by bicyclists and motorists, and to provide for more predictable movements by each. Bike lane markings can increase a bicyclist's confidence in motorists not straying into their path of travel. Likewise, passing motorists are less likely to swerve to the left out of their lane to avoid bicyclists on their right. Drainage grates, railroad crossings, traffic control devices, etc., need to be evaluated and upgraded if necessary for bicycle use.

Bike lanes should be one-way facilities and carry bike traffic in the same direction as adjacent motor vehicle traffic. Two-way bike lanes on one side of the roadway are not recommended when they result in bicycles riding against the flow of motor vehicle traffic. Wrong-way riding is a major cause of bicycle crashes and violates the rules of the road as stated in the Uniform Vehicle Code²¹. Bicycle-specific wrong-way signing may be used to discourage wrong-way travel. However, there may be special situations where a two-way bike lane for a short distance can eliminate the need for a bicyclist to make a double crossing of a busy street or travel on a sidewalk. This should only be considered after careful evaluation of the relative risks and should be well documented in the project file.

On one-way streets, bike lanes should generally be placed on the right side of the street. Bike lanes on the left side are unfamiliar and unexpected for most motorists. This should only be considered when a bike lane on the left will substantially decrease the number of conflicts, such as those caused by heavy bus traffic or unusually heavy turning movements to the right, or if there are a significant number of left-turning bicyclists. Thus, left-side bike lanes should only be considered after careful evaluation. Similarly, two-way bike lanes on the left side of a one-way street could be considered with a suitable separation from the motor vehicle traffic after a complete engineering study of other alternatives and relative risks.

1. Bike Lane Widths

For roadways with no curb and gutter, the minimum width of a bike lane should be 1.2 m (4 feet). If parking is permitted, the bike lane should be placed between the parking area and the travel lane and have a minimum width of 1.5 m (5 feet). Where parking is permitted but a parking stripe or stalls are not utilized, the shared area should be a minimum of 3.3 m (11 feet) without a curb face and 3.6 m (12 feet) adjacent to a curb. If the parking volume is substantial or turnover is high, an additional 0.3 to 0.6 m (1 to 2 feet) of width is desirable.

Bike lanes should never be placed between the parking lane and curb lane. Bike lanes between the curb and parking lane can create obstacles for bicyclists from opening car doors and poor visibility at intersections and driveways and they prohibit bicyclists from making left turns.

The recommended width of a bike lane is 1.5m(5 feet) from the face of a curb or guardrail to the bike lane stripe. This 1.5-m (5-foot) width should be sufficient in cases where a 0.3-0.6 m (1-2 foot) wide concrete gutter pan exists, given that a minimum of 0.9 m (3 feet) of rideable surface is provided, and the longitudinal joint between the gutter pan and pavement surface is smooth. The width of the gutter pan should not be included in the measurement of the rideable or usable surface, with the possible exception of those communities that use an extra wide, smoothly paved gutter pan that is 1.2 m (4 feet) wide as a bike lane. If the joint is not smooth, 1.2m(4 feet) of rideable surface should be provided.

Since bicyclists usually tend to ride a distance of 0.8-1.0 m (32-40 inches) from a curb face, it is very important that the pavement surface in this zone be smooth and free of structures. Drain inlets and utility covers that extend into this area may cause bicyclists to swerve, and have the effect of reducing the usable width of the lane. Where these structures exist, the bike lane width may need to be adjusted accordingly. Bike lanes should be located within the limits of the paved shoulder at the outside edge. Bike lanes may have a minimum width of 1.2 m (4 feet), where the area beyond the paved shoulder can provide additional maneuvering width. A width of 1.5 m (5 feet) or greater is preferable and additional widths are desirable where substantial truck traffic is present, or where motor vehicle speeds exceed 80 km/h (50 mph).

A bike lane should be delineated from the motor vehicle travel lanes with a 150-mm (6-inch) solid white line. Some jurisdictions have used a 200-mm (8-inch) line for added distinction. An additional 100-mm (4-inch) solid white line can be placed between the parking lane and the bike lane. This second line will encourage parking closer to the curb, providing added separation from motor vehicles, and where parking is light it can discourage motorists from using the bike lane as a through travel lane.

Bike lanes should be provided with adequate drainage to prevent ponding, washouts, debris accumulation and other potentially hazardous situations for bicyclists. The drainage grates should be bicycle-safe. When an immediate replacement of an incompatible grate is not possible, a temporary correction of welding thin metal straps across the grates perpendicular to the drainage slots at 100-mm (4-inch) center-to-center spacing should be considered.

A smooth riding surface should be provided and utility covers should be adjusted flush with the surface.

Raised pavement markings and raised barriers can cause steering difficulties for bicyclists and should not be used to delineate bicycle lanes.

2. Bike Lanes at Intersections

Bike lane striping should not be installed across any pedestrian crosswalks, and, in most cases, should not continue through any street intersections. If there are no painted crosswalks, the bike lane striping should stop at the near side cross street property line extended and then resume at the far side property line extended. The only exception to this caveat might be the extension of dotted guidelines through particularly complex intersections or multi-lane roundabouts. The same bike lane striping criteria apply whether parking is permitted or prohibited in the vicinity of the intersection.

At signalized or stop-controlled intersections with right-turning motor vehicles, the solid striping to the approach should be replaced with a broken line with 0.6-m (2-foot) dots and 1.8-m (6-foot) spaces. The length of the broken

line section is usually 15 m to 60 m (50 feet to 200 feet).

Since there are usually small volumes of right-turning motor vehicles at non-signalized minor intersections with no stop controls, solid bike lane striping can continue all the way to the crosswalk on the near side of the intersection. However, if there is a bus stop or high right-turn volume, the 150-mm (6-inch) solid line should be replaced with a broken line with 0.6-m (2-foot) dots and 1.8-m (6-foot) spaces for the length of the bus stop. The bike lane striping should resume at the outside line of the crosswalk on the far side of the intersection.

If a bus stop is located on a far side of the intersection rather than on a near side approach, the solid white line can also be replaced with a broken line for a distance of at least 24 m (80 feet) from the crosswalk on the far side of the intersection.

At T-intersections with no painted crosswalks, the bike lane striping on the side across from the T-intersection should continue through the intersection area with no break. If there are painted crosswalks, the bike lane striping on the side across from the T-intersection should be discontinued only at the crosswalks.

3. Bike Lanes and Turning Lanes

Bike lanes sometimes complicate bicycle and motor vehicle turning movements at intersections. Because they encourage bicyclists to keep to the right and motorists to keep to the left, both operators are somewhat discouraged from merging in advance of turns. Thus, some bicyclists may begin left turns from the right-side bike lane and some motorists may begin right turns from the left of the bike lane. Both maneuvers are contrary to established rules of the road and may result in conflicts; however, these can be lessened by signing and striping.

At intersections, bicyclists proceeding straight through and motorists turning right must cross paths. Striping and signing configurations which encourage crossings in advance of the intersection, in a merging fashion, are preferable to those that force the crossing in the immediate vicinity of the intersection. To a lesser extent, the same is true for left-turning bicyclists; however, in this maneuver, most vehicle codes allow the bicyclist the option of making either a “vehicular style” left turn (where the bicyclist merges leftward to the same lane used for motor vehicle left turns) or a “pedestrian style” left turn (where the bicyclist proceeds straight through the intersection, turns left at the far side, then proceeds across the intersection again on the cross street).

Where there are numerous left-turning bicyclists, a separate turning lane can also be considered. The design of bike lanes should also include appropriate signing at intersections to warn of conflicts. General guidance for pavement marking of bike lanes is contained in the MUTCD2. The approach shoulder width should be provided through the intersection, where feasible, to accommodate right-turning bicyclists or bicyclists who prefer to use crosswalks to negotiate the intersection.

Intersections with throat widening at approaches that provide an exclusive left-turn bay can also provide an exclusive right-turn lane for motor vehicles. In those cases where throat widening has reduced the available pavement width below the minimum requirements for bike lane operation and it is not possible to widen the pavement, the bike lane striping should be discontinued following a regulatory sign.

Bicyclists proceeding straight through the intersection should be directed to merge with motor vehicle traffic to cross the intersection. Where sufficient width exists, a separate through bike lane should be placed to the right of the through lane

4. Bike Lane Symbol Guidelines

A bike lane should be painted with standard pavement symbols to inform bicyclists and motorists of the presence of the bike lane. The standard pavement symbols are one of two bicycle symbols (or the words “BIKE LANE”) and a directional arrow. These symbols should be painted on the far side of each intersection. Additional stencils may be placed on long, uninterrupted sections of roadway. All pavement markings are to be white and reflectorized.

The Preferential Lane Symbol (“diamond”) previously used as a pavement marking and on signs to show preferential use by different classes of vehicles should no longer be used for bikeways, due to the confusion with the use of the diamond for High Occupant Vehicle (HOV) lanes, and the misinterpretation of the diamond as a two-way arrow. These symbols should be eliminated through normal maintenance practices.

D. Shared Use Paths (Off-Road)

The Town of Penfield uses the term, “multi-use trail,” as an equivalent terminology to “shared use path.”

Shared use paths are facilities on exclusive right-of-way and with minimal cross flow by motor vehicles. Shared use paths are sometimes referred to as trails; however, in many states the term *trail* means an unimproved recreational facility. Care should be taken in using these terms interchangeably. Where shared use paths are called trails, they should meet all design criteria for shared use paths to be designated as bicycle facilities. Users are non-motorized and may include but are not limited to: bicyclists, in-line skaters, roller skaters, wheelchair users (both non-motorized and motorized) and pedestrians, including walkers, runners, people with baby strollers, people walking dogs, etc. These facilities are most commonly designed for two-way travel, and the guidance herein assumes a two-way facility is planned unless otherwise stated.

Shared use paths can serve a variety of purposes. They can provide users with a shortcut through a residential neighborhood (e.g., a connection between two cul-de-sac streets). Located in a park, they can provide an enjoyable recreational opportunity. Shared use paths can be located along rivers, ocean fronts, canals, abandoned or active railroad and utility rights-of-way, limited access freeways, within college campuses or within and between parks. Shared use paths can also provide bicycle access to areas that are otherwise served only by limited access highways closed to bicycles. Appropriate locations can be identified during the planning process.

Shared use paths should be thought of as a complementary system of off-road transportation routes for bicyclists and others that serves as a necessary extension to the roadway network. Shared use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a system of on-road bike lanes, wide outside lanes, paved shoulders and bike routes. There are some similarities between the design criteria for shared use paths and highways (e.g., horizontal alignment, sight distance requirements, signing and markings). On the other hand, some criteria (e.g., horizontal and vertical clearance requirements, grades and pavement structure) are dictated by operating characteristics of bicycles that are substantially different from those of motor vehicles. The designer should always be aware of the similarities and differences between bicycles and motor vehicles and of how these similarities and differences influence the design of shared use paths.

The AASHTO guidelines²² provide further design considerations for the following criteria:

1. Separation Between Shared Use Paths and Roadways
2. Width and Clearance
3. Design Speed
4. Horizontal Alignment
5. Grade
6. Sight Distance
7. Path-Roadway Intersections
8. Other Intersection Design Issues
9. Signing and Marking
10. Pavement Structure
11. Structures
12. Drainage
13. Lighting
14. Restriction of Motor Vehicle Traffic

APPENDIX C: Public Input

Public Comments, July 22, 2008

Results from 10 Public Input Forms and 4 Emails Received:

1. Destinations

Baumans Farm Market
Canal Path (4)
Community Center
Corbetts Glen
East Rochester
Eastside YMCA
Ellison Park (3)
Fairport
First Unitarian Church –Winton Rd
Ganada High School
Irondequoit Bay
Linear Park
Panorama Plaza (3)
Panorama Trail
Penfield Bike Trail to Penfield Historic Sites
Penfield East Area / Walworth Area
Penfield Highschool
Pittsford (2)
Pittsford Dairy
Post Office at 250/441
Rothfuss Park
Target
Thousand Acre Swamp
Walmart
Webster (2)
Wegmans 250/441 (4)

2. Biking Routes

GOOD

441 (Sidewalk)
Baird (Sidewalk) (5)
Browncroft
Dublin Rd (2)
Embury
Five Mile
Gloria Dr
Jackson (4)
Plank (3)
Rt. 250
Rt. 31 through Egypt
Scribner (2)
Sweets Corner Rd (4)
Victor-Egypt Rd

Whalen (3)
Harris
Kennedy
Whitney
Penfield Center Rd.
BAD

Atlantic (10)
Baird
Blossom Rd (2)
Browncroft Blvd
Creek (3)
Empire Blvd (3)
Fairport Rd
Five Mile Line (3)
Harris
Jackson (5)
Panorama Trail (2)
Plank (3)
Rt. 250 (6)
Rt. 441 / Penfield Rd (9)
Salt (5)
Whalen Rd. (2)
State Rd
Bay Rd

3. 4. Hot Spots (Locations where bike access or visibility is problematic)

Baird Rd / Whitney Rd
Blossom Rd. at Atlantic Ave
Browncroft Blvd – no shoulder, high speeds, recessed grates
Five Mile Line Rd at Whalen Rd (2) – No Shoulder
Five Mile Line Rd. at Atlantic (2) – sight distance and traffic in shoulder
Five Mile Line Rd. at Plank – road hazards
Four Corners – high traffic density, narrow shoulders
Jackson Rd at Atlantic Ave (3) – high traffic speeds, limited visibility Eastbound
Rt. 250 at Rt. 441 (4) – Traffic in shoulders
Rt. 250 at Whalen Rd. (2)
Rt. 250 at Atlantic Rd.
Rt. 441 at Baird Rd. (2) – poor visibility, no shoulder
Rt. 441 at Blossom Rd.
Rt. 441 at Five Mile Line Rd (3)
Rt. 441 at Old Penfield Rd. (2) – poor visibility, high traffic density, high speeds

5. Bicycle Facilities (Bike Racks Needed)

Wegmans (4)
Starbucks (2)
Linear Park (2)
Ellison Park
Town Hall (2)
Panorama Plaza (3)
All Churches
All Grocery Stores
Panera Bread
Target / JoAnn Fabrics
C-2

Harris Hill Park
Veterans Memorial Park (2)
Dolomite Lodge
Rothfuss Park (2)
Times Square Pizza
Four Corners Area
Subway

6. Other Comments

- Rt. 441 is unusable and unsafe for bicyclists
- Atlantic Ave needs wider shoulders
- Panorama Trail needs wider shoulders
- Blossom Rd. needs wider shoulders
- Shoulders need to be cleaned/swept more often

- Town needs to construct more off-road trails
- Town needs to develop a good connection to canal path
- Better delineation of bike lanes needed
- Increase education of motorist awareness of bicyclists
- Instruct bicyclists of how to properly travel in pedestrian areas (ie. Sidewalks)
- Create a bike path on Five Mile Line Rd from Whalen to Canal Path
- "I'd love to see a bike lane on Rt. 441 from Four Corners to Rt. 250"
- Penfield Community Center should offer bicyclist safety courses
- Wider shoulders would allow use in winter
- "We bike with our small children and always use sidewalks"
- "We taught our children to use sidewalks for safety"
- Bicyclists are way to vulnerable
- Continue to allow bicyclists to use sidewalks in Penfield
- Bikers don't want to be on roads with limits higher than 35 MPH
- "Group rides would be a great way to get large groups of cyclists on the roads"
- Safety clinics would be a great way to get teens, kids, and parents up to date on the rules of the road, cycling etiquette and strategies to avoid collisions with motorists and pedestrians.
- Make shopping venues accessible by bike and convenient for cyclists
- Link Penfield trails and bike routes to routes in adjacent Towns, the Canal Path in particular.
- Tryon Park should become an official mountain bike park and multi-use location similar to Dryer Rd. Park in Victor
- Group rides for teenagers would be a great idea
- Please consider placing a shoulder on Salt Rd. between Plank Rd. and Atlantic to improve safety for those of us that ride bicycles, walk, or walk our dogs. The traffic does not obey a 40 MPH limit and it is very dangerous. The cars come very close as they speed by. Is it possible to reduce the speed limit to 35 mph or encourage enforcement of the 40 mph limit?
- 441/ Penfield road – Bar none, the worst bicycling road in Penfield.

From the western edge of Town, 441 is a four lane highway with wide 12 foot shoulders. Unfortunately a combination of poor shoulder maintenance and very noisy pavement make this section of road very uncomfortable to ride on. The shoulders are a veritable debris mine field that requires constant attention and will certainly cause flat tires on many road bikes. The concrete road surface, and its regular cracks and potholes, creates a deafening noise as cars pass. Even though you can be 12 feet away the sound makes the cars feel right next to you. The high speed exit ramps also make for some interesting interaction if you are pedaling past them if someone decides to exit. Cars desiring to exit have to decide between cutting you off or slamming on the brakes to go behind you. It's really quite sporty. The unfortunate point is that this is the easiest grade to pedal of any road that crosses Irondequoit Creek, but the connections on either end and the comfort level for riding is the worst.

At the end of the expressway section of 441 and the beginning of Penfield Road entering the Town, the shoulder suddenly disappears at the Channing Philbrick park entrance and the terror begins. Cars are still traveling well above the 35 mile per hour limit and you are suddenly up against a new curb with no curb lane and depressed storm grates. You can't go right and you can't go left. The situation is further complicated by numerous turning lanes, driveway cuts, and side streets that all present their own spur-of-the-moment

situations. This continues until the crest of the hill at Sanders Farm Road where the shoulder suddenly widens and you gain a little distance from the speeding cars. This section has good pavement except for the spitting seams where the road has frequently been widened and turning lanes have been added. The good pavement continues along with the high volumes of traffic, high speed, and numerous turning movements up to Watson Road where the curbing disappears and so does the good pavement. At this point, and continuing to the east, the pavement is collection of very poor maintenance attempts and a total lack of maintenance. The shoulder has partial overlays, large holes, and alligatored pavement that continues to break up. The road becomes quite curvy and hilly also, which makes the stretch difficult for anyone less than a serious cyclist.

State Road – The best example of why Webster is a better Town to bicycle in.

If you approach Penfield from the east on State Road you will be enjoying a ride on a wide shoulder paved with solid smooth macadam. There is little traffic and the bicycling is fast and quiet. But then you enter Penfield and remember why you rode east in the first place. This road is the perfect example of the failure of the county's and Town's antiquated road maintenance standard practices. The oil and stone treatment covers multiple longitudinal cracks and alligatored pavement. The shoulders have dropped and the road is edged with stone that is sometimes the best riding surface. Adding to that, a developer who seems to lack understanding of SWPPP measures regularly tracked mud up and down the road adding to the mess that the Town didn't bother to clean up. There isn't one good thing to say about this road other than it is a good way to get out of Town onto better roads for bicycles in Webster. It should be an integral road for a fitness loop and connection to Webster, but not in its present condition.

Plank Road between Hatch and Jackson – catching or giving the same virus as State Road?

Thanks to the repairs to Plank on both the east and west ends, this section is now the worst and equaled only by State Road for the worst pavement award. Again, failed oil and stone maintenance over broken pavement = Penfield's low maintenance standards that the county is happy to comply with. The eastern end of Plank is now in danger of falling under these same low standards after finally being rebuilt into an excellent riding road. Oil and stone will be applied in July ruining the road for bicycling for quite some time. The intersection at Five Mile line is particularly noteworthy as a point of neglect. Valve caps and manhole covers present a particular high hazard to bicyclists. This intersection is busy and quite often above the speed limit so bicycles trying to dodge the hazards are at risk of being run over by the vehicles. This is an area that should be addressed immediately for the safety of everyone.

With county-promised rebuilding in the near future, and 12 more inches of shoulder width, this will be the best option for an east-west route - If you can just stop it from being ruined with oil and stone over the next few years.

Atlantic from the west to 250 – at the moment, the best of the worst for east-west major roads.

The expressway section of Atlantic (286) is wide and in reasonably good condition. There is frequently debris along the shoulders and it would benefit from more cleaning. The shoulders are wide and there is enough distance between cars and bicycles except on the bridges. The hill is steep however, and this makes crossing the Irondequoit Creek valley a challenge.

The expressway ends in typical Penfield fashion as the shoulder disappears and a curb appears. Bicycles are crammed onto the driving lane with cars still traveling at 55 mph. Add a difficult intersection and multiple driveways and it's a wonder why more bicyclists aren't hit in this area.

Continuing east there is no shoulder, a curb, and depressed storm drains are added to force bicycles into the left track of the traffic lane. The storm drains range from 1 –

3 inches below the pavement and provide an amazingly jarring ride if you are forced onto them. Traffic is busy and drivers are usually too lazy to move over to the other lane and still brush by you even on quiet Sunday mornings.

Beyond Clark Road the road changes to two lanes and the shoulder shows some big holes but, generally improves as you progress. At Scribner, you reach the only improved intersection in Penfield that provided shoulders for bicycles. I presume the engineer was fired for doing that because it hasn't happened since. Beyond Scribner the shoulder is narrow for a road of this speed and traffic level. The shoulder condition is generally good except for the damage that was done during the sewer project through the s-curve section. In this area is also narrow on the inside curves due to foliage on the west bound shoulder. The S-curves themselves also need some shoulder work. The westbound lane shoulder from Jackson to the S-curve is also rough and breaking up in many places. This section of road from Five Mile Line to 250 would benefit greatly from the same wider shoulders that were installed in front of the Town Hall. I have been brushed by vehicles twice in this section and ended up in the weedy ditch both times.

The improvements in front of the Town hall should be a model for all Penfield roads. They are a great

improvement for bicycles and keep reminding me of Webster where this standard width is more the norm. In spite of the off-road experiences, I continue to use Atlantic as my primary route. Since this is a state road, there is little danger they will apply oil and stone. The surface is smooth and fast, and is holding up well, counter to the Town's and county's argument for oil and stone. Beyond 250 the road quiets down and becomes rural and a great place to ride and connect to better riding in Wayne County.

Jackson Road – the definition of disappointment.

Formerly my vote for the worst road in Penfield, two years ago the county promised to rebuild Jackson Road which we thought would create the best north-south corridor road. Unfortunately, all that occurred was an overlay to reduce the crown and a slight widening of the shoulder with an un-even coat of macadam. They finished the mess with oil and stone to cover it up and now the road is only slightly better to ride on before they started. There are fewer holes and cracks, but they are quickly reappearing and this road should be back to where it started in no time. Just another lost opportunity. Needs much more frequent sweeping.

Empire Boulevard – planned but no progress.

Potholes, traffic, no shoulder and dirty shoulders. It would be nice to ride safely along this popular destination but good luck. The state isn't going to spend money on it, and the Town appears to be having only slight success in finding money for the plan. When money did become available, the Town spent it on a dead-end. Penfield progress at work.

Panorama Trail – It would be a nice connection to the business.

I don't ride this road because I think it is too narrow and rough. I really would like to see it improved and visit the businesses district but this is a bigger neighborhood issue and it seems like a long shot that it will ever be widened enough to add bike lanes. Probably another overlay with oil and stone in the future so we should recommend another way to access the businesses. Old Penfield road is a nice road, but I have to go down into Ellison Park and back up just to get to Old Penfield. A nice ride, but twice as long and twice as many hills.

Blossom Road – Scary corner is always dirty.

While not a terrible road, the hill is steep and the corners are covered in grit and dirt. The road shoulders need to be swept every other week. Visibility is poor heading south west so it is scary, but rideable. A necessary choice for many bike commuters, and the beginning of many RBC rides.

Bay Road – the little road to better ones needs some TLC.

Another of Penfield's improved roads and intersections that neglects bicycles greets you as you return from Webster. I used this road in a presentation to the Town Board to show how the shoulders disappear as you enter the Town. The only items that can be addressed in the short term are the numerous valve caps and drain grates that are low. The traffic is what it is and there is no escape for bicycles.

Creek Street – a little more shoulder would make this a great road.

This is a heavily bicycled road. It would be even better for bicycles if a few issues were addressed. The shoulder width would be great if it were at least 12 inches wider. Foliage, water hazards, and rough areas of shoulder pavement cause riders to veer into the traffic lane frequently. In the northbound direction foliage encroaches on the road in several places thanks to low hanging tree branches south of the S-curves. The S-curves are breaking up on the inside of the corners, and filthy dirty on the outside corners. On the southbound side north of the S-curve there are numerous depressions in the shoulder from previous water main leaks. Some of those are pretty nasty. They are invisible until you ride over them because the pavement didn't break. North of Plank there are all kinds of valve cap issues. Oh – and did I forget to mention the "improved" intersections at Plank, Browncroft, and Empire that suddenly cause the shoulder to disappear and a curb pops up in its place? Look for more of the same when they "improve" the Creek/Browncroft intersection again this summer.

250 at 441 and ½ mile north and south.

This is just a congestion problem. There is no shoulder on the northbound side, so all you can do is be cautious. The pavement is excellent.

New road to add to the watch List –

Scribner road north of Plank was just resurfaced and it was done more as an overlay than a complete paving project. I have to think that this was done deliberately since the quality isn't that great so this is probably another road that is going to get the oil and stone treatment later this year or next year at the latest. That'll make a mess of this north-south route so we might not want to include it on the list of good roads if this is confirmed.

-“I often observe riders behavior that is dangerous, unlawfull and just plain rude. I often drive on Sweets Corners

Rd. it has a large hill that attracts riders. I have come over the top of that hill(at or below legal speed) only to find a biker stopped in the middle of road talking on his cell phone. Or I encounter groups of 4+ riders taking the entire lane. I have had riders ride through a crosswalk during a don't walk sign. I really do not want to hit them, I want to share the roads, but I expect riders to also share the road and ride in a legal and safe manner. At the public meeting someone (it may have been you?) stated that drivers need to be educated. While we can all use a refresh on the legalities of right of way, I was not pleased to hear the comments that seemed to conclude that all problems are the fault of the motorists. May you could consider using this group and educate riders of all ages of the legal and safe ways to use our roads and educate motorists as well?

-“if I were to choose the street in Penfield on which I think there is the greatest likelihood of a bike-car fatality or bike-pedestrian accident I would name Creek St. because bike traffic has minimally tripled this good weather season, so the bike-car ratio is high. Many young riders are using the sidewalks in groups of 2-3 to chagrin of pedestrians, elderly, etc. Shoulders are much too narrow with at best irregular surface. Lawn service rigs often force riders into the main lanes. Creek needs a shoulder wide enough so that kids aren't afraid to ride it and their parents stop telling them to stay on the sidewalk. 9Bike safety education issue). It is a major utility-rider street given the shopping at Empire/Creek/Bay as well as N-S corridor for all living west of Scribner Road between Empire and Atlantic. Bike-pedestrian issues are also important for roads (and unfortunately sidewalks) on approaches to schools, where the density of young cyclists and young pedestrians is high.

APPENDIX D: Alternative Transportation Benefits

Transportation accounts for more than 30 percent of U.S. carbon dioxide emissions (West, 2007). However, there are a number of alternative transportation possibilities, such as walking, bicycling, and taking public transportation. According to the American Public Transportation Association (APTA), public transportation in the United States saves approximately 1.4 billion gallons of gasoline and about 1.5 million tons of carbon dioxide annually.²³ Bicycling as a means of transportation reduces those figures even further. Bicycling offers benefits to the global environment as well as to personal health, finances, time, and stress.

A. Environmental Benefits

Only 14 million Americans use public transportation daily while 88 percent of all trips in the United States are made by car—and many of those cars carry only one person.²⁴ Switching to alternative transportation reduces emissions of greenhouse gases and other pollutants that contribute to global warming, smog, and acid rain. Greenhouse gases are atmospheric gases, primarily carbon dioxide, methane and nitrous oxide, which trap the sun's heat, making the Earth a greenhouse. Emissions of greenhouse gases enhance the Earth's greenhouse effect contributing to climate change. Air pollution includes ground level ozone and fine airborne particles, as well as carbon monoxide, nitrogen oxides and sulphur oxides. This mix of substances is often called smog.²⁵

Half of the average person's greenhouse gas emissions are from transportation. Choosing alternative transportation is an easy way to reduce greenhouse gas emissions. Shorter trips, which are most suited to alternative transportation, are the least fuel-efficient and generate the most pollution per mile when a motor vehicle is used.²⁶

B. Health Benefits

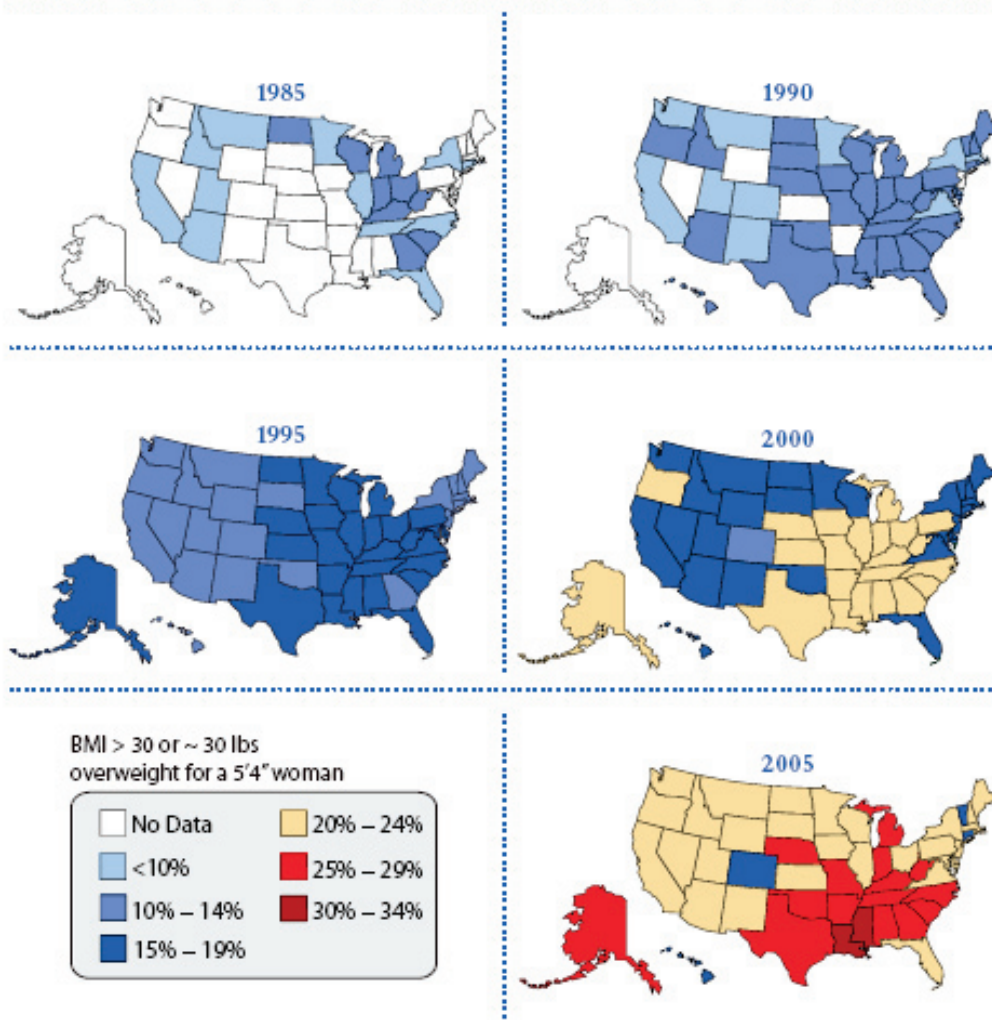
The most valuable natural resource of any community is the health of the residents. In 2005, the *Centers for Disease Control and Prevention* (CDC) reported the following statistics:

- Obesity has risen significantly among adults in the last 20 years
- 30% of U.S. adults age 20 and older – over 60 million people – are obese
- The percentage of young people who are overweight has more than tripled since 1980
- 16% of young people age 6-19 years – over 9 million people – are considered overweight

In Upstate New York, children obesity trends exceed or match national trends. For example in 2004, twenty-one percent of Upstate New York 3rd graders are obese, which exceeds the national rate of 16%²⁷. Childhood overweight and obesity is a precursor for adult obesity. The *Strategic Plan for The Prevention of Childhood Overweight and Obesity in Monroe County, NY 2007-2017*, contributes “the physical environment and the lack of affordable and safe recreational venues for many children,” as a factor in childhood overweight and obesity. The *Greater Rochester Health Foundation* and its Task Force has set the following goal to decrease childhood obesity:

- Reduce the prevalence of overweight and obesity, as measured by Body Mass Index (BMI), from 12,244 (15%) to 4,081 (5%) of Monroe County children ages 2-10 by 2017.

Obesity Trends Among U.S. Adults



Source: Behavioral Risk Factor Surveillance System, CDC

Increased physical activity and creating safe environments are strategies that will be employed to meet the goal.

Health care costs and insurance rates are escalating, causing serious impacts to the local economy. In 2000, national health care costs associated with physical inactivity topped \$76 billion.²⁸ The national cost of direct health care costs per year for childhood overweight and obesity is approximately \$14 billion. For Monroe County, annual costs of obesity is estimated at \$292 million for medical costs and lost worker productivity and \$35 million of that amount spent specifically for children²⁹. Lack of physical activity is a contributing factor to a growing number of serious illnesses and health problems among all age groups. Land use and building patterns exacerbate the problem by providing new neighborhoods that have few opportunities for physical activities, such as biking. Lifestyles have become increasingly sedentary in a post-industrial society.

Despite the proven benefits, more than 50% of American adults do not get enough physical activity to provide health benefits.³⁰ With this in mind, opportunities for exercise and healthful outdoor activity are more than expendable extras. Bicycle facilities take on new meaning and value. Opportunities for recreation and active transportation support the health and wellness of local residents, and have significant and quantifiable economic impacts. Active transportation, such as bicycling, provides an opportunity to incorporate regular physical activity into the daily routine.

Regular physical activity has the benefit of looking and feeling better, but also reducing the risk of disease. Unhealthy diet and physical inactivity can cause or aggravate many chronic diseases and conditions, including type 2 diabetes, hypertension, heart disease, stroke, and some cancers.³¹ Regular physical activity, such as bicycling, is an important component of a healthy lifestyle, and aids in the prevention of many chronic diseases, disabling conditions and chronic

disease risk factors.³²

In addition, research studies have found that overweight and obese children have lowered academic achievement in standard test scores.³³ Also, findings in other studies show that children who are physically active perform better academically and miss fewer days of school.³⁴ Bicycling provides an opportunity to simultaneously obtain the benefits of transportation and physical exercise.

A. Financial Benefits

In addition to health-related costs, operating a personal automobile is very expensive. Of every dollar earned, the average household spends 18 cents on transportation, 94% of which is for buying, maintaining and operating cars, the largest source of household debt after mortgages. The average vehicular commuter spends over \$7,500 per year on commuting expenses, which include the cost of gas, vehicle wear and tear, vehicle maintenance, and insurance. In contrast, the average transit rider spends between \$200 and \$2600 annually on public transportation, depending on mileage traveled and other factors, such as transfers, distance, and parking charges.³⁵

For some households, alternative transportation can even reduce the need for additional cars, which can be a yearly expense between \$5,000 and \$11,800.³⁶ With the money saved on a vehicle, or even just the additional parking, fuel and maintenance required to commute in a vehicle, an active commuter can pay for a good quality bicycle with money left over.

C. Time and Stress Benefits

Alternative transportation can save time and reduce stress. Riding a bicycle allows a commuter to choose a less busy route and by-pass traffic lights. Cyclists see more of their community than stoplights, white lines and car bumpers, and benefit from the stress relief that accompanies physical exercise.

Studies have shown that the longer the regular commute, the greater amount of stress that a commuter feels. Stress often leads to fatigue, headaches, and irritable moods, which can subsequently affect work performance and household dynamics. Active transportation increases social interaction with the community. It is easier and less expensive to park a bike than a car, which further reduces the stress of commuting.

APPENDIX E: Sustainability and LEED

Environmental stewardship, as defined by the Environmental Protection Agency, is the responsibility for environmental quality shared by all those whose actions affect the environment. The actions set forward from this Bicycle Facilities Master Plan should reflect the latest sustainable development practices available.

As a Bicycle Facility Master Plan for Penfield, this plan does not specifically fall under the jurisdiction of the U.S. Green Building Council (USGBC) and their standards for Leadership in Energy and Environmental Design (LEED). However, LEED has become the accepted standard for incorporating the principles of sustainability into new development and major renovation projects and thus provides a guide for the Town of Penfield, developers and existing property managers or owners when adding bicycle facilities for new development or renovations.

Through LEED, the USGBC has provided voluntary rating systems that are based on accepted energy and environmental principles, and strike a balance between established practices and emerging concepts. As of July 2008, there were nine different LEED rating systems. The three rating systems that are applicable to this project are LEED-NC for New Construction and Major Renovations, LEED for Existing Buildings: Operations and Maintenance and LEED-ND for Neighborhood Development.³⁷

A. LEED for New Construction and Major Renovations (Version 2.2)

As the name implies, this rating system provides guidelines for new building construction and major renovation projects. Credits can be earned in six different categories. The Bicycle Facility Master Plan for the Town of Penfield responds to the guidelines found in the following categories: Sustainable Sites, and Materials & Resources.

1. Sustainable Sites

- a. Alternative Transportation: Bicycle Storage and Changing Rooms (SS Credit 4.2)
Provide transportation amenities such as bicycle racks and showering/changing facilities.
Intent: Reduce pollution and land development impacts from automobile use.
- b. Alternative Transportation: Parking Capacity (SS Credit 4.4)
Minimize parking lot size, or consider shared parking facilities. Consider alternatives that will limit the use of single occupancy vehicles. Intent: Reduce pollution and land development impacts from automobile use.
- c. Site Development: Protect or Restore Habitat (SS Credit 5.1)
Carefully locate development to minimize disruption to existing ecosystems and design to minimize development footprint. Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. Intent: Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.
- d. Heat Island Effect: Non-roof (SS Credit 7.1)
Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hardscape. Intent: Reduce heat islands to minimize impact on microclimate and human and wildlife habitat.
- e. Light Pollution Reduction (SS Credit 8)
Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Technologies to reduce light pollution include full cutoff luminaires, low-angle spotlights, and low-reflectance surfaces. Intent: Minimize light trespass from the site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

2. Materials & Resources

- a. Materials Reuse: 5 or 10% (MR Credits 3.1 and 3.2)
Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least

5% (10%) of the total value of materials on the project. Intent: Reuse construction materials in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

- b. Recycled Content: 10 or 20% (MR Credits 4.1 and 4.2)
Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (20%) of the total value of the materials in the project. Intent: Increase demand for construction products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.
- c. Regional Materials: 10 or 20% (MR Credits 5.1 and 5.2)
Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (20%) of the total materials value. Intent: Increase demand for construction materials that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

B. LEED for Existing Buildings Operations & Maintenance (Version April 2008)

This rating system provides guidelines for the sustainable ongoing operation of buildings not undergoing major renovations. Credits can be earned in six different categories. The Bicycle Facility Master Plan for the Town of Penfield responds to the guidelines found in the Sustainable Sites category.

1. Sustainable Sites

- a. Building Exterior and Hardscape Management Plan (SS Credit 2)
Intent: To encourage environmentally sensitive building exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations. A plan for snow and ice removal and cleaning of sidewalks, pavements and other hardscape is required for this credit.
- b. Alternative Commuting Transportation: 10% to 75% reduction or greater (SS Credits 4.1, 4.2, 4.3 and 4.4)
Reduce the number of commuting round trips made by regular building occupants using single-occupant, conventionally powered and conventionally fueled vehicles. Alternative transportation includes bicycles for this credit.
- c. Light Pollution Reduction (SS Credit 8)
For exterior and site lighting, choose one of the following options:
 - Option A: If the project is certified under LEED for New Construction or LEED for Schools, show that SS Credit 8 was earned. If the project is certified under LEED for Core and Shell and 75% of the floor areas is LEED for Commercial Interiors, show that Light Pollution Reduction was earned for both systems.
 - Option B: Partially or fully shield all fixtures 50 watts and over so that they do not directly emit light to the night sky.
 - Option C: Measure the night illumination levels at regularly spaced points around the perimeter of the property, taking the measurements with the building's exterior and site lights both on and off. The illumination level measured with the lights on must not be more than 20% above the level measured with the lights off.

Intent: Minimize light trespass from the site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

C. LEED for Neighborhood Development (Pilot Version 2007)

This rating system is designed to certify exemplary development projects that perform well in terms of smart growth,

new urbanism, and green building. Projects may constitute whole neighborhoods, fractions of neighborhoods, or multiple neighborhoods. Credits can be earned in four categories.

The Bicycle Facility Master Plan for the Town of Penfield responds to the guidelines found in the following categories: Smart Location & Linkage, Neighborhood Pattern & Design, and Green Construction & Technology.

1. Smart Location & Linkage

- a. Bicycle Network (SLL Credit 5)
Design or locate the project such that a biking network that will be completed as part of the project and provide bicycle parking spaces or storage. Intent: To promote bicycling and transportation efficiency.
- b. Steep Slope Protection (SLL Credit 8)
Options include: Avoid disturbing portions of project sites that have pre-project slopes greater than 15%. Intent: Minimize erosion to protect habitat and reduce stress on natural water systems by preserving steep slopes in a natural, vegetated state.
- c. Site Design for Habitat or Wetland Conservation (SLL Credit 9)
If significant habitat occurs on the site, protect this habitat and its identified buffers from development in perpetuity. If the project is located on a previously developed site, use native plants for 90% of vegetation, and use no invasive plants. Design the project to conserve 100% of all water bodies and wetlands on the site. Intent: Conserve native wildlife habitat, wetlands and water bodies.
- d. Restoration of Habitat or Wetlands (SLL Credit 10)
Using only native plants, restore native habitat or pre-development water bodies or wetlands on the project site and remove any invasive species. Protect such areas from development in perpetuity. Intent: Restore wildlife habitat and wetlands that have been harmed by previous human activities.

2. Neighborhood Pattern & Design

- a. Street Network (NPD Credit 8)
Intent: Encourage the design of projects that incorporate high levels of internal connectivity and the location of projects in existing communities in order to conserve land, promote multimodal transportation and promote public health through increased physical activity.
- b. Access to Surrounding Vicinity (NPD Credit 11)
Intent: Provide direct and safe connections, for pedestrians and bicyclists as well as drivers, to local destinations and neighborhood centers. Promote public health by facilitating walking and bicycling.
- c. Access to Active Spaces (NPD Credit 13)
Locate and/or design the project so that the following amenities are within walking distance: an active open space facility, a multi-use trail, a Class I bikeway, a public recreation center, a gym with outdoor facilities, or a park with active recreational facilities. Intent: To provide a variety of open spaces close to work and home to encourage walking, physical activity and time spent outdoors.
- d. Universal Accessibility (NPD Credit 14)
Intent: Enable the widest spectrum of people, regardless of age or ability, to more easily participate in their community life by increasing the proportion of areas that are usable by people of diverse abilities.
- e. Community Outreach and Involvement (NPD Credit 15)
Encourage community participation in the project design and planning and involve the people who live in a community in deciding how it should be improved or how it should change over time.

3. Green Construction & Technology

- a. Minimize Site Disturbance Through Site Design (GCT Credit 6)
Intent: Preserve existing tree canopy, native vegetation and pervious surfaces while encouraging high

density, smart growth communities.

b. Minimize Site Disturbance Through Construction (GCT Credit 7)

Intent: Conserve existing natural areas and protect trees to provide habitat and promote biodiversity.

c. Stormwater Management (GCT Credit 9)

Intent: Reduce adverse impacts on water resources by mimicking the natural hydrology of the region on the project site, including groundwater recharge. Reduce pollutant loadings from stormwater discharges, reduce peak flow rates to minimize stream channel erosion, and maintain or restore chemical, physical, and biological integrity of downstream waterways.

d. Recycled Content in Infrastructure (GCT Credit 17)

Use recycled materials in the sub-base and base of roadways, parking lots, sidewalks, and curbs. Intent: Use recycled materials to reduce the environmental impact of extraction and processing of virgin materials.

e. Construction Waste Management (GCT Credit 18)

Recycle and/or salvage non-hazardous construction and demolition debris. Intent: Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

APPENDIX F: Key Components of Bicycle Education Information and Programs

Bicycle safety education programs and information should include the following topics:

- Obey NY traffic laws.
- Bicyclists follow the same laws that apply to motorists and yield to pedestrians. Bicyclists must follow all traffic controls, especially traffic signals.
- Motorists must obey speed limits, obey signs, signals and markings, and never run red lights.
- Be alert and aware. Motorists should look for bicyclists when turning right or left and opening doors. When passing bicyclists, motorists should give bikes at least three feet of space. Avoid the use of horns when close to bicyclists. Watch for children and bicyclists at night.
- Equipment requirements for bicyclists, including proper usage. For example, riders should wear a properly fit helmet.
- Share best practices for safety concerns with multi-use roadways and shared pathways for bikers, pedestrians and motorists
- Be visible. When riding at night, use lights, reflectors and bright clothing.
- Avoid accidents due to:
 1. Wrong-way riding (facing traffic)
 2. Sidewalk riding
 3. Night-time riding
 4. Biking next to parked cars
- Use proper signals & communicate with others
- Ride on roadways or shared paths not on sidewalks. If the bicyclist must ride on the sidewalk, maintain jogging speeds. Exceptions for riding on the sidewalk include:
 1. Bicyclists traveling more slowly than a slow jogger (including child bicyclists).
 2. Bridges without on-road bicycle facilities.
 3. Using a sidewalk to avoid crossing a multi-lane roadway to ride in the same direction as traffic for a short distance.
 4. Short distances on one-way streets.
- Ride away from parked cars (and their driver-side doors)
- Info on preventing bicycle theft
- At intersections, avoid pulling out from behind turning automobiles
- Ride safely near large trucks, especially when trucks are making right-turn movements. Trucks turning right move to the left and open space along the curb to their right. This space is difficult for truck drivers to see and must be avoided by bicyclists.

APPENDIX G: Sources, Resources and Footnotes

Sources

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- <http://www.slobikelane.org/sharetheroad.htm>
- <http://www.bicyclinginfo.org/education/>
- http://safety.fhwa.dot.gov/ped_bike/bike/index.htm
- http://www.nhtsa.dot.gov/people/injury/pedbimot/bike/bicycle_safety/index.htm
- Bicycle Street Smarts info
 - <http://www.azbikeped.org/azbss.htm>
 - <http://www.toronto.ca/cycling/safety/please-dont-squeeze.htm>
- Bike safety class info:
 - Pedal Power in Portland, (<http://www.altaplanning.com/pdfs/SR2S.pdf>)
- Campaign ideas
 - <http://www.healthystreets.org/>
- <http://www.cbcef.org/>
- Brochures available to order from the FHWA:
 - http://safety.fhwa.dot.gov/ped_bike/ped_bike_order.htm
- <http://www.tfhr.gov/safety/pedbike/pubs/05085/index.htm>
- Place to Submit your Bike Map online:
 - <http://www.bicyclinginfo.org/bikemore/map-submit.cfm>
- Bicycle Benefits programs
 - <http://www.healthtransportation.org/Bicycle%20Benefits.htm>
- Measurement: (<http://www.altaplanning.com/pdfs/SR2S.pdf>)
- Benefits of bicycling: <http://www.bicyclinginfo.org/why/>
 - <http://www.bicyclinginfo.org/promote/case-studies.cfm>

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