



# Village of Grafton Bicycle and Pedestrian Plan

Plan Commission Recommendation: December 15, 2015

Village Board Adoption: December 21, 2015



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# Chapter 1

## Introduction

In Grafton—like in many communities across America—there is growing desire for enhancing and expanding opportunities for walking and biking. These activities are low-impact and inexpensive modes of transportation, enjoyable forms of recreation, incredibly effective ways to improve one’s health, and valuable components of community quality of life. This Bicycle and Pedestrian Plan (the Plan) was developed by the Village of Grafton in order to identify “quick win” priority improvements to increase the usefulness and safety of the Village’s streets for people biking and walking. Another primary objective of this project is the development of strategies for incorporating bicycle and pedestrian infrastructure improvements into the Village’s street maintenance and capital improvement programs.

## Project Background

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Since the development of the Village’s first bicycle and pedestrian plan in 1996, the Village of Grafton has actively planned for bicycling and walking as part of its multi-modal transportation system, and as a key recreational amenity in the community. Since 1996, several bicycle and pedestrian improvements in the community have been made, including the development of the Ozaukee Interurban Trail through the Village, addition of bike lanes to First Avenue and Washington Street, and streetscape enhancements in downtown.

Over the same period, the tool box of engineering best practices to incorporate bicycle and pedestrian accommodations has expanded significantly to include treatments such as shared lane markings, buffered bike lanes, green bike lanes, bike boxes, bicycle boulevards, rectangular rapid flash beacons, and greatly improved crosswalk marking materials, among others. The approach that communities take has also evolved, focusing much more on accommodating the average adult bicyclist rather than focusing primarily on the highly-skilled cyclist. As such, this new Plan was developed to provide needed assessments of the existing transportation system and to identify priorities for the future.

With this Plan, the Village of Grafton is taking a holistic approach to sustainable transportation, community well-being, and quality of life. This Plan will reinforce these values and be designed to serve all users, including children, the elderly, persons with disabilities, and those wishing to use non-motorized travel modes for commuting. To ensure implementation, the recommendations made by this Plan provide details describing the type of improvement to be made, the method of implementation, and the probable cost of construction.

## Goals

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The following goals were crafted based on input from stakeholders and the general public. Although this Plan was developed to work toward achieving these goals, several aspects of these goals reach beyond what this Plan can accomplish on its own. Therefore, they are truly long-term goals for the future of walking and bicycling in the Village of Grafton and will require ongoing work and commitment by the public, stakeholder groups, Village officials, and Village staff in order to be fully achieved.

**Encouragement** – Encourage more people to walk and bike for transportation and recreation purposes by increasing awareness of existing opportunities and building support through the promotion of the Bicycle and Pedestrian Plan.

**Connectivity** – Provide interconnected bicycle and pedestrian networks that link neighborhoods and destinations within the Village, create loops for recreational biking, and connect to surrounding communities.

**Usefulness** – Improve the accessibility, comfort, and usefulness of bikeways and paths through wayfinding and regulatory signage, pavement markings, high-visibility crosswalks, and additional access points to major paths and bikeways including the Ozaukee Interurban Trail.

**Safety** – Increase safety and comfort for everyone—whether they drive, bike, or walk—through a combination of engineering, education, and enforcement strategies.

**Health** – Nurture healthy and active lifestyles by expanding opportunities for people of all ages and abilities to walk and bike on a daily basis.

**Implementation** – Ensure timely implementation of the Bicycle and Pedestrian Plan by appropriating funding, performing regular maintenance, forming multi-jurisdictional partnerships, and continuing the practice of building accommodations as part of larger street and road projects.

## Planning Approach

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People in Grafton vary considerably in terms of physical ability, comfort in sharing the road with cars, endurance, reason for walking or biking, cultural perspective, and age, among other factors. This Plan will focus not just on the people that are already out there biking and walking, but also on the large portion of our population that would like to bike and walk more, but need more and better accommodations in order to do so comfortably.

Anecdotal experience<sup>1</sup> supplemented with survey-based research<sup>2</sup> indicates that people (whether or not they regularly ride a bicycle) can be described based on their comfort or willingness to interact with motor vehicle traffic (also known as “traffic stress tolerance”). The findings are that the majority of people are uncomfortable interacting with any significant amount of motor vehicle traffic and most are very worried about being struck by a motor vehicle while biking. As part of the public participation process that was performed for this Plan, a short survey was administered in order to ascertain the traffic stress tolerance of people in Grafton. After accounting for unintentional bias on the part of the participants, the results generally show similar preference for limiting interactions with motor vehicles. In other words, the majority of the population is interested in biking but does not currently do so because of fear of interacting with motor vehicle traffic.

The bicycle recommendations of this Plan, therefore, focus on providing accommodations that reduce interactions between people biking and driving or increase awareness where these interactions occur. These accommodations range from signs and pavement markings that direct people along very low-traffic streets to wide designated bike lanes on busier streets. Some locations require an even higher level of separation, so the Plan also includes recommendations for multi-use paths along roadways in some locations.

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<sup>1</sup> Geller, R. “Four Types of Cyclists.” Portland Office of Transportation. (<https://www.portlandoregon.gov/transportation/article/264746>)

<sup>2</sup> Dill, J. and N. McNeil. (2013, January) “Four Types of Cyclists? Examining a Typology to Better Understand Bicycling Behavior and Potential.” Paper presented at the Annual Meeting of the Transportation Research Board.

From a pedestrian perspective, the sidewalk network in Grafton is substantially more developed than the Village's bikeway network. As such, this Plan focuses primarily on eliminating gaps in the sidewalk network and resolving specific safety concerns at key locations, primarily at intersections.

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# Chapter 2

## Context

The recommendations, strategies, and priorities of this Plan are based on a thorough analysis and understanding of the context in which the planning occurs as well as the existing conditions in terms of infrastructure, demand, safety, and other factors.

This chapter includes the following elements:

- Study Area Definition
- Population Characteristics
- Bicycle and Pedestrian Mode Share
- Existing Plans & Policies

This context informed the identification of the bicycle study network and pedestrian priority improvement areas, which are the focus of recommendations for this Plan.

### Study Area Definition

The Village of Grafton is located in the center of Ozaukee County and is bordered by the City of Cedarburg and the Town of Grafton. The Village’s planning area (including the incorporated civil division boundary and the surrounding unincorporated area over which the Village has planning authority) encompasses 10,127.5 acres. The study area for this project includes the entire incorporated Village, much of its surrounding planning area, and additional areas extending west to County Highway I and south to County Highway C/Pioneer Road. This plan will consider connections into the Town of Grafton and to the nearby City of Cedarburg and will include basic recommendations that cross the boundary between Grafton’s planning area and that of Cedarburg.

Map 1 depicts the general study area for this plan.

### Population Characteristics

Since the 1970 Census, the Village of Grafton has experienced a growth rate significantly outpacing the statewide average and the average for Ozaukee County. Table 1 illustrates the historic and projected populations for Grafton, several nearby peer communities, Ozaukee County, and the State of Wisconsin.

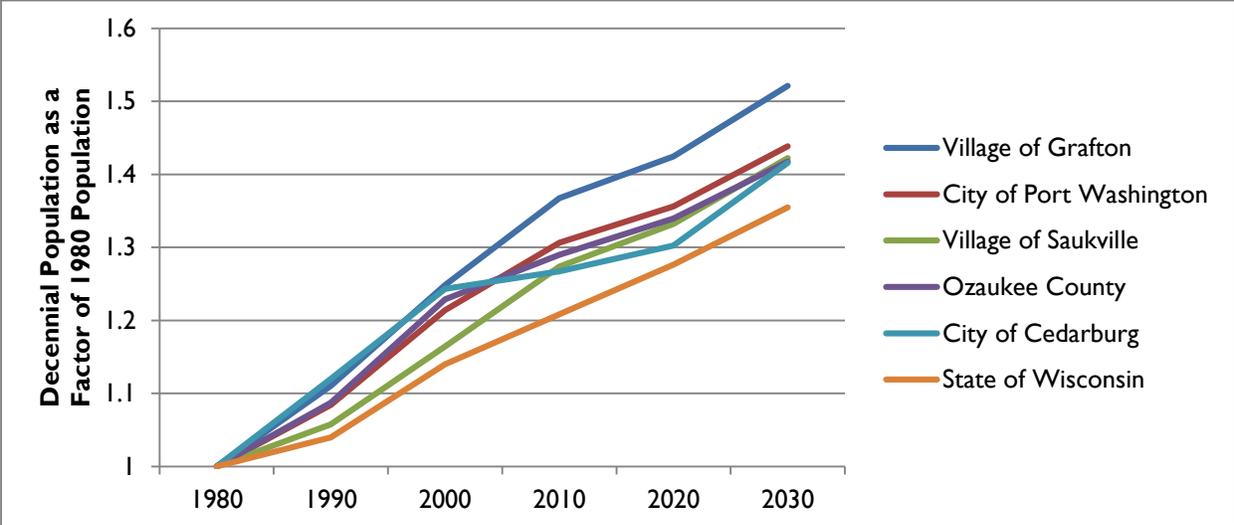
Table 1: Historic and Projected Populations for Grafton and Comparison Geographies

	1970	1980	1990	2000	2010	2015 (est)	2020	2030
<b>Village of Grafton</b>	<b>5,998</b>	<b>8,381</b>	<b>9,304</b>	<b>10,464</b>	<b>11,459</b>	<b>11,519</b>	<b>11,940</b>	<b>12,750</b>
City of Cedarburg	7,967	9,005	10,086	11,196	11,412	11,500	11,730	12,250
City of Port Washington	8,752	8,612	9,338	10,457	11,250	11,459	11,680	12,390
Village of Saukville	1,389	3,494	3,695	4,068	4,451	4,464	4,655	4,970
Ozaukee County	54,461	66,981	72,831	82,317	86,395	87,682	89,715	94,955
State of Wisconsin	4,417,821	4,705,642	4,891,769	5,363,715	5,686,986	5,733,324	6,005,080	6,375,910

Source: State of Wisconsin Department of Administration

When comparing population levels over time (historic and projected) relative to the 1980 Census, Grafton has grown and is forecasted to continue growing at a faster rate than other communities in Ozaukee County (see Figure 1). Interestingly, as of 2010 three of the largest communities in Ozaukee County are similarly sized; the populations of Cedarburg and Port Washington were within 200 people or 2% of Grafton's population.

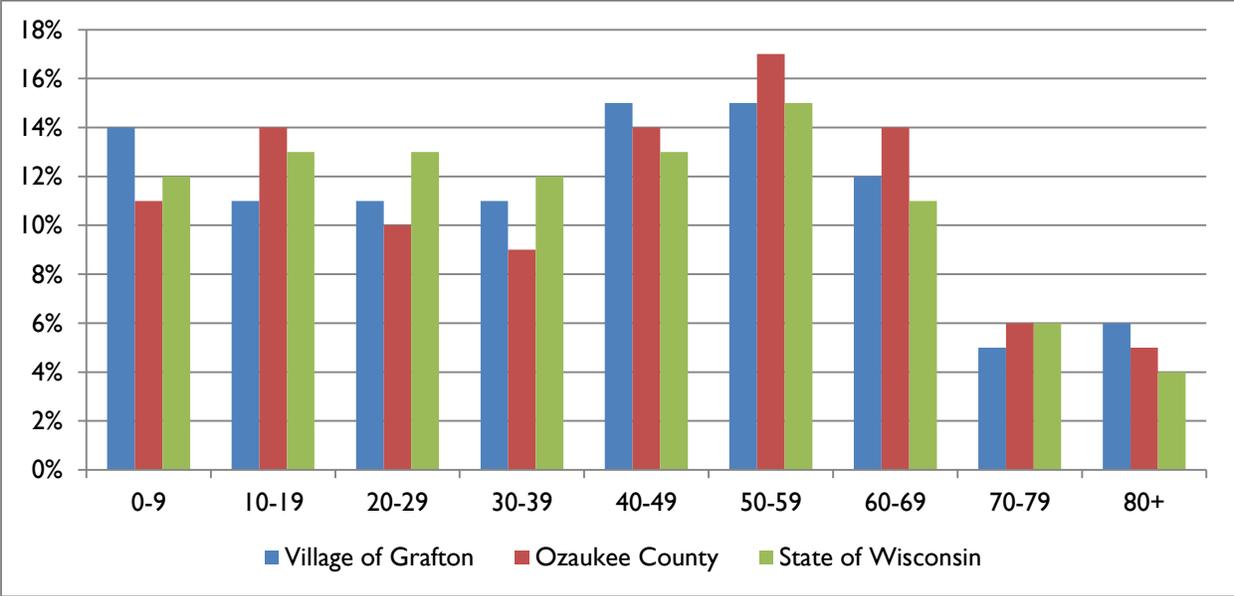
Figure 1: Growth Comparison of Grafton and Comparison Geographies



Source: State of Wisconsin Department of Administration

The median age in Grafton is 41.8 years, which is lower than the median in Ozaukee County (44.5) but significantly higher than the median age in Wisconsin (38.7). People age 65 and older comprise 16% of the population and people under age 18 comprise 22%. Not considering migration and assuming birth and death rates remain stable, in 10 to 20 years the portion of the population age 65 and older could increase to nearly 20% and the portion under age 18 could increase to nearly 25%. Figure 2 depicts the 2013 population breakdown by age range for the Village of Grafton and compares it to that of Ozaukee County and the State of Wisconsin as a whole.

Figure 2: Population by Age Range



Source: American Community Survey 2013 5-year (accessed via CensusReporter.org)

# Bicycle and Pedestrian Mode Share

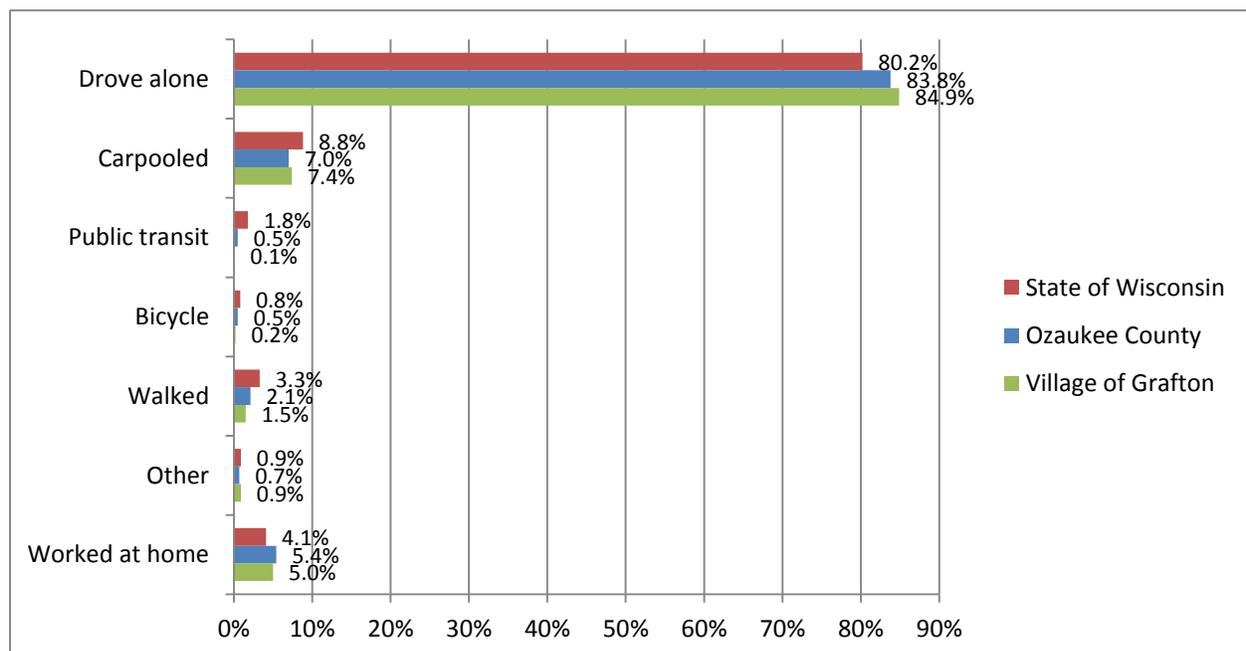
The American Community Survey (ACS) is the best and most reliable dataset relating to how people travel around Grafton. The survey includes questions about the modes of transportation that people use to get around. The results indicate the relative magnitude of walking and biking trips made in the community (that is, their mode share).

There are, however, some limitations to the ACS data. The survey asks “thinking about the previous week, what was your primary mode of transportation to work?” The narrow scope of this question presents some issues for accurately determining mode share:

- If someone drove to work three days out of the week and biked the other two days, they are recorded only as driving to work.
- The weather at the time the survey was administered can strongly impact results from year to year.
- The data only represent trips to work, which are a small percentage of the total number of trips people typically make over the course of a week. The survey ignores trips to a restaurant, park, playground, or school, as well as recreational trips.

Despite these drawbacks, ACS data is one of the best resources available for determining mode share because the survey maintains the same format for all municipalities from year to year. Figure 3 compares the commute mode share of the Village of Grafton with that of Ozaukee County and the State of Wisconsin as a whole.

Figure 3: Commute Mode: Village of Grafton, Ozaukee County, and State of Wisconsin



Data source: 2013 American Community Survey (ACS) 5-Year Estimates

Non-motorized transportation (bicycling and walking) currently comprises a total of 1.7% of commute-related travel in Grafton, compared to 2.6% in Ozaukee County as a whole and 4.1% in the state as a whole. People in Grafton are more likely to drive alone or work from home than the averages for Wisconsin. However, it is important to remember that this measure does not capture walking and bicycling for recreational purposes or for going to school, going shopping, running errands, or other non-work-related trips.

# Summary of Plan and Policy Review

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There are numerous local, regional, and statewide background plans and policy documents that are relevant to this Plan. This summary identifies issues that may impact the findings and ultimate recommendations of this project.

A detailed review of these documents is provided as an appendix.

## Wisconsin Department of Transportation (WisDOT) Documents

- **Wisconsin State Bicycle Transportation Plan 2020** (1998) – This plan provides guidance on the state-owned and state-supported transportation systems in Wisconsin. Several policies included in the plan apply to state-owned roadways within Grafton.
- **Wisconsin Pedestrian Policy Plan 2020** (2002) – The Pedestrian Policy Plan encourages local governments, MPOs, and Regional Planning Commissions (RPCs) to devote attention to meeting pedestrian needs on roadways in their areas.
- **Connections 2030** – This is WisDOT’s comprehensive transportation plan and it not only supports the recommendations of the State Bicycle Transportation Plan 2020 and Pedestrian Policy Plan 2020, but calls for the incorporation of bicycle and pedestrian accommodations into projects now widely known as “complete streets.”
- **Wisconsin Bicycle Facility Design Handbook** (2004) – This handbook is the primary source for bicycle facility design guidance in the state of Wisconsin.
- **Wisconsin Guide to Pedestrian Best Practices** (2010) – This guide provides detailed design, planning and program information for improving all aspects of the pedestrian environment.
- **Wisconsin Rural Bicycle Planning Guide** (2006) – This guide’s purpose is to provide general guidelines for planning and developing bicycle facilities in counties and smaller communities.
- **WIS 60 (US 45-11th Ave.) Corridor Study, Jackson to Grafton** (ongoing/on hold) – This project includes studying WIS 60 (Washington Street in the Village of Grafton) to analyze the existing and projected conditions on the highway through 2040. The scope of the study includes evaluating alternatives to accommodate anticipated changes in traffic volumes and regional development, potentially including adding lanes to the roadway. This project has been on hold since 2012 with no plans to resume at the time of writing.

## Southeastern Wisconsin Regional Planning Commission (SEWRPC) Documents

- **Regional Transportation System Plan for Southeastern Wisconsin: 2035** (2006) – This is the regional multi-modal transportation plan for Southeastern Wisconsin, including Ozaukee County, and it includes a bicycle and pedestrian element.

## Village of Grafton Documents

- **1996 Bicycle and Pedestrian Plan** – As the Village’s first bicycle and pedestrian plan, this document set the stage for the development of Grafton’s existing active transportation system, including influencing the development of the Ozaukee Interurban Trail and identifying opportunities for bicycle and pedestrian corridors along the Milwaukee River, Cedar Creek, and future street and bridge connections.
- **Comprehensive Plan for 2035** (2009) – This plan was prepared as part of a multi-jurisdictional partnership including Ozaukee County and 13 other local governments. The transportation element closely aligns with the SEWRPC Regional Transportation System and shares many of its recommendations.

- **Comprehensive Outdoor Recreation Plan 2014–2018** – The Comprehensive Outdoor Recreation Plan reflects Grafton’s vision and near-term priorities for developing its parks system.
- **Downtown Vision 2025 Workshop Report** – This document summarizes the outcomes of a workshop, held in June 2010, to formulate the future direction of downtown for the next 15 years, which included strategies for improving walkability.
- **Capital Improvement Program 2015–2019** – The Capital Improvement Program (CIP) is the Village of Grafton’s five-year budget and plan for capital projects. It details how much will be spent each year on specific projects and specifies the source of the funding.
- **Village Municipal Code** (Title 10 Vehicles and Traffic and Title 11 Streets, Sidewalks and Public Places) – This portion of the Municipal Code relates to bicycle and pedestrian regulations within the Village.
- **Village Subdivision Code** (Title 18) – The Subdivision Code is a special provision that dictates how land is divided into smaller lots or parcels when being developed for residential, commercial, industrial, or other purposes. This section includes requirements related to walking and biking including street width, sidewalk provision, etc.

### **Summary of Background Information**

There were several themes present in multiple documents that relate to improving conditions for walking and bicycling. These include:

- A preference for making multi-modal investments over investments that only benefit driving
  - SEWRPC Regional Transportation System Plan for Southeastern Wisconsin: 2035, several Village plans
- A preference for following a Complete Streets approach (planning and designing streets and roads to adequately accommodate all anticipated user, such as people driving, walking, or biking)
  - Several WisDOT plans, SEWRPC Regional Transportation System Plan for Southeastern Wisconsin: 2035, Village of Grafton Comprehensive Plan for 2035
- The importance of eliminating the barrier effect of state highways
  - Several WisDOT plans
- A vision for the development of a regional system of paths and on-street bikeways
  - SEWRPC Regional Transportation System Plan for Southeastern Wisconsin: 2035 (which calls for 575 miles of paths and bikeways), several Village plans
- The desire to “right-size” streets (so that they are not overbuilt) and walkable development patterns
  - SEWRPC Regional Transportation System Plan for Southeastern Wisconsin: 2035, Village of Grafton Comprehensive Plan for 2035, Downtown Vision 2025 Workshop Report

# Public Input

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## Steering Committee

A Steering Committee composed of members of the community oversaw the development of this Plan. The Steering Committee's role included setting goals for the future, identifying key links and challenge areas for walking and biking in Grafton, reviewing recommendations, and setting priorities for implementation.

The following needs and desires for this Plan (or for biking and walking in Grafton in general) were identified early on by the Steering Committee.

- There is a need to foster greater awareness across the community of this Plan, the existing biking and walking opportunities (including where to access the Ozaukee Interurban Trail and regional connections such as to Milwaukee), and traffic law.
- Increasing signage and other wayfinding aids will make it easier to follow preferred bike routes. Identification, mapping, and signing of loops around the Village will give alternative routes for people to choose from.
- Paths and bikeways should take advantage of and connect to scenic areas in and around Grafton (such as the Milwaukee River, Lake Michigan, Ozaukee Interurban Trail, etc.).
- The greatest challenge is east-west connectivity across the Milwaukee River and the Village as a whole.
- Kids should be encouraged to walk and bike to school.
- In addition to infrastructure, there is a role for education aimed toward people that bike (e.g., safe biking classes) and people that drive (e.g., bicyclists' rights and the 3-foot passing law).
- There is also a need for education related to traffic control devices (e.g., the pedestrian hybrid beacon or "HAWK signal" on Washington Street at 13<sup>th</sup> Avenue, which many people do not understand or fail to comply).

## Public Workshop

A Public Workshop was held on the evening of June 10, 2015, to introduce the project to the public, discuss background information, and seek input on the plan's goals, priorities, and areas of focus. The project team presented an overview of the project timeline, discussed the approach to analyzing bicycle and pedestrian needs and making recommendations, gave an overview of background information, and discussed opportunities and challenges.

Meeting participants were given the opportunity to participate and provide input at several activity stations located around the room. These stations included posters with space for people to comment on the Plan's goals, identify priority bicycle and pedestrian facility types and treatments, and state their top priority for the plan. In addition, people were invited to identify on a large map of the village their priority links for biking and walking as well as challenge areas and important destinations.

Outcomes of the Public Workshop include strong support for investing in infrastructure, education, and enforcement for bicycling and walking. People were especially supportive of increasing signage for wayfinding, warning, and regulatory purposes (e.g., "Bike May Use Full Lane" signs). Furthermore, people agreed with an approach of focusing on low-cost/high-value investments early on and coordinating further implementation with planned roadway maintenance projects.

Finally, with regard to specific types of bicycling and walking facilities/treatments, Public Workshop participants were most interested in rectangular rapid flash beacons (see Chapter 4), wide or buffered bike lanes, standard bike lanes, and using high-visibility pavement markings (e.g., green pavement) at conflict points between bicyclists and motor vehicles.

### **Online Interactive Mapping**

An online interactive mapping exercise—referred to as a “WikiMap”—was utilized during the development of this Plan. The WikiMap allowed participants to identify and comment on specific challenge areas and opportunities to improve walking and biking. The WikiMap was publicized on the Village’s website.

The map was open for participation from Monday June 8 through Friday July 24, 2015. During this time, 89 people logged into the WikiMap site and created accounts. Not everyone fully participated, however. All participants completed the Registration Survey, but only 26 provided input on the map itself. Map input includes identifying specific locations (points) that are barriers, destinations, or opportunities, as well as routes (lines) that are desirable for walking and/or biking.

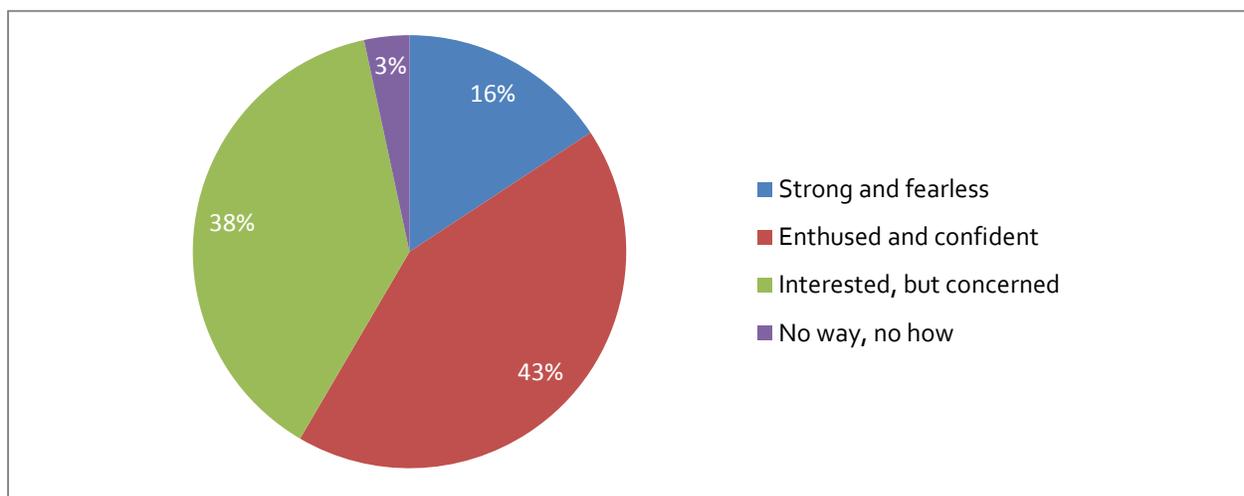
### **How would you describe your biking habits and comfort level?**

When people first visited the WikiMap, they were presented with a demographic survey. As part of that survey, and to better understand the types of bicyclists participating in the exercise, the first question asked participants to describe their biking habits and comfort levels by selecting one of the following options:

- I am willing to ride in mixed traffic with automobiles on almost any type of street  
(intended to correlate with Strong and fearless)
- I am willing to ride in traffic, but I prefer dedicated bicycle lanes/routes  
(intended to correlate with Enthused and confident)
- I would like to bicycle more, but I prefer not to ride in traffic  
(intended to correlate with Interested, but concerned)
- I do not ride a bicycle and am unlikely to ever do so  
(intended to correlate with No way, no how)

The results are shown in Figure 4.

Figure 4: How would you describe your biking habits and comfort level?



As far as implications for this Plan, it is important to acknowledge that the self-described “strong and fearless” and “enthused and confident” bicyclists in Grafton are important stakeholders in this process. In addition, if one assumes that these results reflect the Village of Grafton as a whole, a sizeable portion of the community (at least 38%) is interested in bicycling but needs improvements to be made in order to feel safe and comfortable moving around the community by bike.

### **Summary of Input**

Key take-away information from the WikiMap exercise is that the majority of challenges, destinations, and desired connections are along or within a short distance of Washington Street. In other words, Washington Street not only poses the greatest challenge to walking and biking in the community, it is also at the center of people’s desired travel patterns. Although Washington Street has continuous sidewalks and portions have bike lanes, additional infrastructure improvements (especially between 11<sup>th</sup> Avenue and Cheyenne Avenue) are desired to enhance safety and comfort.

Second only to Washington Street, the Green Bay Road corridor (north and south of Downtown, including connections between the two legs of the Ozaukee Interurban Trail and to the more remote portions of the Village north of Cedar Creek Road) and the County Highway V/17<sup>th</sup> Avenue corridor are both high priorities for the community for infrastructure enhancements.

Finally, there is an expressed need for improved bicycle and pedestrian infrastructure in the more disconnected, car-oriented portions of the Village south of Washington Street between 17<sup>th</sup> Avenue and Port Washington Road, as well as north of Cedar Creek Road.

Several participants also identified desired connections for biking or walking that fall outside of the Village yet connect the Village to surrounding rural areas, nearby communities (such as Saukville and Port Washington), and Lake Michigan.

A full analysis of the WikiMap input is provided in the appendix.

# Demand Analysis

A bicycle and pedestrian demand analysis was conducted in order to assess the probable demand for non-motorized transportation infrastructure in various parts of the Village. Probable demand is not based on existing bicycle and pedestrian infrastructure, conditions, or use; rather, it is based on the destinations and origins of trips for which people might choose to bike or walk if infrastructure conditions were desirable or even simply adequate. Evaluating demand allows the Village to focus investments in locations that have the greatest potential for increased walking and biking.

## Methodology

The demand factors were chosen to estimate demand for utilitarian and recreational trips based on potential growth for each trip type. For utilitarian trips (going out to eat, dropping children off at school, shopping, etc.) the primary proxy is intersection density, which is an indicator of the density of development patterns and street network connectivity. Areas with high levels of intersection density tend to have high densities and diversities of utilitarian destinations and are therefore locations in which utilitarian trips are more likely to occur. Population density is another major demand determinant for both recreational and utilitarian trips as it indicates the origin of a large portion of biking and walking trips. For recreational trips, proximity to the Ozaukee Interurban Trail was added to the analysis. Schools were also included in the analysis to supplement the intersection density proxy for utility trips.

Table 2 shows the types of generators used to determine demand and the weight assigned to each. The weighting of intersection density higher than employment density reflects the fact that more trips (whether by car, bike, or on foot) are taken for utilitarian purposes than for commuting purposes.

Table 2: Demand Map Factors

Factor	Radius (miles)	Weight
Intersection Density	0.25 (polygon)	40
Population Density	None (contiguous polygons)	30
Ozaukee Interurban Trail	0.25 (line)	20
Schools	0.25 (points)	10

Map 2 shows the result of the demand analysis. Areas with higher scores, i.e., greater demand, considered “hot spots,” are shown as the red areas on the map.

## Findings

The primary hotspots appearing on the demand map include downtown Grafton, First through 12<sup>th</sup> Avenue between North Street and Washington Street, and the Ozaukee Interurban Trail corridor (especially west of First Avenue). Demand is also high in Cedarburg, which correlates with the popularity of the segment of the Ozaukee Interurban Trail that connects Cedarburg to Grafton. Areas east of the Milwaukee River show lower levels of demand. This does not mean that people living in that area are disinterested in biking and walking; rather, it means that the current conditions are not highly conducive to biking or walking.

Connecting these hotspots via low-stress bikeways and ensuring adequate pedestrian accommodations within each hotspot are priorities of this Plan.

# Overview of Opportunities and Issues

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## Opportunities

Broadly speaking, Grafton has the opportunity to provide residents with the ability to bike or walk everywhere within the Village. With relatively short distances between destinations within the Village and even to nearby Cedarburg, every trip that begins and ends in Grafton (or Cedarburg for that matter) is a potential biking or walking trip manageable by a wide cross-section of the population.

Contributing to this broad opportunity are several individual assets in Grafton, including:

- **Well-connected street grid** – Many parts of Grafton, especially the west side, have interconnected street grids, which provide multiple low-traffic routes. A grid of streets inherently provides the shortest distance between practically all origin-destination pairs (especially compared to a suburban pattern of cul-de-sacs and meandering streets). This results in good conditions for biking and walking. The value of a street grid can be seen in areas where one is not present, such as the Port Washington Road corridor, where there are few choices for north-south travel for people driving, biking, or walking.
- **Regional connections** – Increasing connections and access to the Ozaukee Interurban Trail is a significant opportunity for Grafton to build upon what is already a very valuable resource for people walking and biking. Relatively low-cost improvements (such as wayfinding signage) can substantially enhance the utility of the trail.
- **Relatively low traffic** – There are numerous streets in Grafton (such as North Avenue, Beech Street, and many others) that provide longer-distance connections and have relatively low levels of motor vehicle traffic, which makes them highly suitable for bicycling.
- **Generous pavement width** – Several streets in Grafton (such as 17<sup>th</sup> Avenue) have extra pavement width on which bike lanes can be striped. In most cases, on-street parking can be retained as well. An example of where extra pavement width has been utilized for bike lanes is First Avenue between Washington Street and the Ozaukee Interurban Trail.
- **Complete streets “culture”** – The Village of Grafton has a culture of taking a “Complete Streets” approach when planning, designing, and constructing/reconstructing streets. This means that the needs of all users—whether they are driving, bicycling, or walking—are considered and adequately accommodated. The Wisconsin Department of Transportation also typically takes a similar approach.
- **Downtown destination** – Downtown Grafton is a destination of growing importance in the Village and surrounding area. With new businesses, mixed-use developments, events, and other activities, there is demand to increase connectivity to downtown from the Ozaukee Interurban Trail and other locations within the Village.

## Issues

While the above opportunities put Grafton in a great position to dramatically improve conditions for walking and bicycling, there are certain issues that may pose challenges or careful consideration moving forward. The most relevant of these include:

- **Limited River Crossings** – The Milwaukee River is a very valuable asset to Grafton, but it is also a major transportation barrier for all modes of transportation. There are limited existing crossings and no foreseeable opportunities for additional crossings in the future. As a result, all traffic is funneled to just a few crossings (Washington Street, Bridge Street, and Falls Road, as well as the Ozaukee Interurban Trail

bridge). The Ozaukee Interurban Trail bridge is the only crossing with any dedicated bicycle accommodation. This means that improving connectivity across the river for bicycling will be a challenge.

- **Vital links without accommodations** – Related to the limited river crossings issue, there are key links in Grafton (such as Washington Street, Falls Road, Wisconsin Avenue, and Port Washington Road) that are vital for people driving, bicycling, or walking. However, these vital links lack bicycle and/or pedestrian accommodations (or have gaps in accommodations).
- **Vital accommodations without links** – What is meant by this is that the Ozaukee Interurban Trail is a very important facility for bicycling and walking but is not as accessible or connected to the broader bikeway and sidewalk networks as it should be.
- **Disconnected newer development patterns** – Newer parts of Grafton, especially east of 17<sup>th</sup> Avenue, were built with what has become the conventional suburban development pattern. This pattern is characterized by meandering streets with limited connectivity to each other (as opposed to the interconnected street grid found west of the river). This pattern reduces connectivity for bicycling and walking and effectively makes distances between destinations longer.
- **Funding limitations** – While conditions in Grafton are favorable for enhancing conditions for bicycling through relatively low-cost investments (e.g., signs, striping, etc.), it is still important to recognize that building infrastructure requires funding, which is limited in a community as small as Grafton. Overcoming this challenge will require diligent budgeting, partnerships with other agencies, seeking economies of scale, and exploring other cost effective ways of implementing projects.

These primary opportunities and issues, as well as numerous smaller factors, guided the development of recommendations for bicycle and pedestrian infrastructure, which are outlined in Chapters 3 and 4, respectively.

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# Chapter 3

## Bicycle Facility Recommendations

### Approach

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Bicycle recommendations were developed with the goal of accommodating the “interested but concerned” portion of the population, as described in Chapter 1. As a result, some recommendations cover roadways where cycling infrastructure is already present but the existing facilities are not comfortable for all types of users. The types of bicycle facilities recommended vary based on factors such as a roadway’s traffic context, planned upcoming roadway projects, existing conditions, and facilities needed to improve a street’s traffic stress level (see Chapter 1).

Relative to other communities in Wisconsin and across the country, Grafton already has good conditions for bicycling along many of its streets, especially those with low traffic volumes and low speed limits. As part of the Village’s interconnected street grid, these low-traffic streets provide numerous opportunities for low-stress bicycling. In many cases, minimal investments in signage and minor pavement markings can further enhance such streets and encourage more bicycle use. However, one cannot currently reach many areas within the community solely using low-traffic streets. For this reason, this Plan also identifies locations along higher-stress streets to which bicycle accommodations (such as bike lanes or paths) can be added in order to form a community-wide network that is coherent, visible, and interconnected.

The recommendations begin with an initial network of bikeway improvements that can be implemented in a relatively low-cost manner. This network, which is referred to in this document as “quick wins,” builds upon the Ozaukee Interurban Trail and existing bike lanes to provide basic connectivity across the Village through minor improvements like signage and shared lane markings (sharrows) that can be rapidly implemented over the next one to two years. Bikeway corridors were defined to serve east-west, north-south, and loop movements, as well as connections into Downtown. Once implemented, the network of quick wins projects will provide an enhanced level of connectivity through the areas of Grafton that show the highest potential for travel by bicycle.

## Recommendation Categories

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Implementation of some of the bicycle network recommendations can be very rapid due to the extensive opportunities provided by excess pavement width and low traffic levels on many streets. On the other hand, some of the recommendations require more substantial investment and may best be delayed until street reconstruction occurs. Therefore, recommendations were developed to fall within one of three categories:

- **Quick Wins** – Improvements that require minimal capital investment, can be implemented quickly, and contribute to establishing an initial interconnected bikeway network. The Village anticipates implementing projects in this category over the next three to four years.
- **Routine Maintenance** – Facilities that can be installed as part of routine maintenance (including repaving, resurfacing, pavement replacement, and restriping) on a roadway. These projects tend to involve some reallocation of roadway space, such as striping bike lanes. The Village anticipates implementing projects in this category over the next 15 to 20 years as streets are restriped, repaved, or reconstructed.
- **Long Term Vision** – Major projects that are more challenging and require significant capital investment or will have to wait until a street is reconstructed, a traffic study is performed, etc. This category also includes recommendations for paths, which are substantially more expensive than recommendations in the other two categories.

Some streets may have a recommendation in multiple categories. In these cases, the **quick wins** or **routine maintenance** recommendation is an interim solution that will provide some level of improvement but will not yield the ultimate desired level of comfort for bicyclists. The **long term vision** recommendation is then what is ultimately required (but likely cannot be accomplished immediately) in order to accommodate bicyclists of various abilities and levels of comfort.

However, it is important to note that these three categories are not necessarily linear (that is, there is no requirement that all recommendations within one category be implemented before implementation of recommendations in a subsequent category commences). It may be possible and in some cases advantageous for the Village to skip a **routine maintenance** or **quick wins** recommendation and go straight to the **long term vision** recommendation if funding and public support is available.

## Methodology

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Recommendations were developed in the various categories according to the following methodology:

1. Street segments identified as part of the initial network previously discussed were assessed for their current suitability for bicycling. If conditions were considered appropriate as currently configured, a **quick wins** recommendation for signage and minimal pavement markings (such as shared lane markings) was made. If roadway conditions warranted a higher level of bicycle facilities, the **quick wins** recommendation reflects a minor investment that provides an improvement in comfort for bicyclists and does not require significant capital investment or reallocation of roadway space (e.g., striping a bike lane without adding pavement).
2. Streets within the study network were examined for the potential to reallocate roadway space for bicycle facilities. Where existing available roadway space and traffic conditions will permit reallocation of space, recommendations for facilities that require only striping and signage were made as part of the **routine maintenance** category. Vehicular capacity was preserved where it was needed based on existing traffic

conditions. Lane narrowing or repurposing was recommended in key locations with excess roadway capacity.

3. Streets throughout the community were assessed to determine what kind of bicycle facility would be ideal given each street's importance in the transportation network and potential for serving bicycle trips. Where current facilities or the existing **quick wins** and **routine maintenance** recommendations did not meet the ideal, a **long term vision** recommendation was developed to reflect the need for more intensive bicycle infrastructure.

## Network Recommendations

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### Quick Wins

With the goal of identifying projects requiring minimal investment that can be quickly implemented, many of the street segments comprising the **quick wins** network are already suitable for bicycling. Recommendations along these streets are primarily for signage and shared lane pavement markings (also known as "sharrows"), which will enhance the identities of these streets as part of the bike network. Bike lanes (in the form of simple pavement striping) are also recommended along portions of Falls Road where traffic conditions warrant additional separation between motor vehicle and bicycle traffic. In a related manner, restricted lanes (which allow bicycle traffic and parking, as discussed in the following section) are recommended along 17<sup>th</sup> Avenue and a portion of Falls Road.

Also identified as part of the **quick wins** network is the need to provide bicycle accommodations on Bridge Street between 11<sup>th</sup> Avenue and 13<sup>th</sup> Avenue. The block between 11<sup>th</sup> and 12<sup>th</sup> Avenues is one-way for all traffic. For bicycle traffic flowing in the direction of one-way motor vehicle traffic, shared lane markings are likely adequate; for people wishing to travel the opposite direction by bike, the possibility might exist to provide a contraflow bike lane in the opposite direction. Doing so may require shifting on-street parking and potentially eliminating one to two on-street parking spaces. Further study is needed for this recommendation.

See Map 3 for **quick wins** recommendations.

### Routine Maintenance

With the goal of providing low-stress bikeways across the Village, the **routine maintenance** category includes recommendations along many streets in Grafton and along roads in the surrounding areas. Fully implemented, the **routine maintenance** network will build upon the **quick wins** network to provide a high level of low-stress connectivity across the community. For these recommendations in general, the pavement cross section will not require modification, nor will there be a need to remove motor vehicle travel lanes. However, some of these recommendations may require removing or shifting on-street parking. Such projects, when implemented as part of a maintenance regime such as roadway repaving, can be completed inexpensively because work is already being performed on the roadway.

With the exception of 17<sup>th</sup> Avenue and Falls Road, all of the streets with **quick wins** recommendations also have recommendations for enhanced facilities in the **routine maintenance** network (primarily adding restricted lanes, which are described in the following section). Furthermore, there are many streets with recommendations the **routine maintenance** category (mostly restricted lanes with a few bike lane recommendations) that do not have **quick wins** recommendations. These include Fifth Avenue, Hickory Street, Keup Road, Washington Street, Grafton Avenue, and Cheyenne Trail.

See Map 4 for **routine maintenance** recommendations.

### Long Term Vision

The **long term vision** recommendations expand the network that will result from implementation of the **quick wins** and **routine maintenance** recommendations, making additional connections or further decreasing stress along on-street bikeways. Within the Village of Grafton, these recommendations include the addition of traffic calming measures (along streets such as Hickory Street, North Avenue, and 17<sup>th</sup> Avenue) and multi-use paths (along Port Washington Road, Grafton Avenue, River Bend Road, an extension of the Ozaukee Interurban Trail across Wisconsin Avenue to Kennedy Elementary School, and a few other short path connections). In many cases, these recommendations are most feasible if constructed as part of a larger street or road reconstruction projects. However, projects should be performed as funding becomes available, which may mean some occur prior to projects in the **routine maintenance** category.

Furthermore, the **long term vision** network includes several recommendations for paving shoulders and building paths along roads outside of the Village of Grafton. The facilities recommended would improve connections between the Village of Grafton and the Town of Grafton, Saukville, and Cedarburg.

See Map 5 for **long term vision** recommendations.

### Bicycle Network at Full Buildout

To illustrate the relationships between the various bicycle facility recommendations, Map 6 depicts the bicycle network at full buildout, if all of the recommendations in the **quick wins**, **routine maintenance**, and **long term vision** categories were to be implemented.

See Map 6 for a depiction of the full bicycle network at buildout.

## Bicycle Facility Types

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The Plan's bicycle infrastructure recommendations are categorized into the seven facility types listed below. Some of these facility types include variations, such as the addition of a striped buffer to a standard bike lane. Variations and optional treatments are described in more detail in the following pages.

**Bike lanes** provide delineated space for bicyclists; this category includes standard bike lanes and bike lanes that are wider than usual or include striped buffers.

**Restricted lanes** expand the utility of underutilized on-street parking space by separating bikes from moving motor vehicle traffic while still allowing parking on the street.

**Paths** (multi-use paths and sidepaths) provide accommodations for bicyclists and pedestrians. Most of the path recommendations in this Plan are along streets with particularly high motor vehicle traffic volumes and speeds as alternatives to on-street facilities.

**Paved shoulders** are typically reserved for rural cross-sections and are relatively easy to construct where adequately wide earth or gravel shoulders exist.

**Separated bike lanes** (also known as a "cycletracks") provide vertical separation (by way of curbs, plastic bollards, or some other means) between bicycles and motor vehicles. Separated bike lanes should be explored for high-traffic arterials.

**Sharrow** treatments increase awareness, visibility, and wayfinding along bikeways without separate space for bicycles. This treatment is recommended along streets that are already low-stress due to relatively low volumes of motor vehicle traffic.

**Traffic calming** can be achieved through numerous types of treatments (such as road humps or curb extensions) and is used on streets that are generally low-stress but may have occasional conflicts created by drivers speeding.

In general, facility recommendations for each of the seven facility types are for the standard treatment. For example, bike lane recommendations generally indicate standard 4- to 5-foot wide bike lanes unless otherwise noted. However, the appropriate variation or treatment type for each recommendation should be investigated in more detail during the development of a specific project. In cases where a lower-stress variation (such as a wider or buffered bike lane) is feasible, it should be considered even if the plan recommendation only calls for standard bike lanes.

Descriptions and common variations for the seven recommended facility types are included on the following pages and are color-coded to match Maps 3 through 8.

### Bike Lane – Standard

A bike lane is a pavement marking that designates a portion of a street for the preferential or exclusive use of bicycles. Bike lane markings are typically dashed where vehicles are allowed to cross the bike lane, such as for right turns or at bus stops. Bike lanes are best suited for two-way arterial and collector streets where there is enough width to accommodate a bike lane in both directions, and on one-way streets where there is enough width for a single bike lane.

The “Bike Lane” sign (R3-17 in the MUTCD) is commonly used in conjunction with bike lane pavement markings (described in section 9C.04 in the MUTCD).

Standard bike lanes exist on First Avenue and Washington Street. Recommendations for standard bike lanes in this plan are primarily found in the **routine maintenance** category, although bike lanes are recommended along Falls Road as a **quick wins** project.



### Bike Lane – Buffered

Buffered bike lanes are created by striping a buffer zone between a bike lane and the adjacent travel lane, between a bike lane and adjacent parking lane, or both. Buffered bike lanes should be considered at locations where there is excess pavement width or where adjacent traffic speeds are at or above 35 mph.

The “Bike Lane” sign (R3-17 in the MUTCD) is commonly used in conjunction with buffered bike lanes.

Several of the bike lane recommendations in this Plan specify the buffered bike lane variant due to adequate available pavement width.



### Bike Lane - Contraflow

Contraflow bike lanes run in the opposite direction of other traffic on a one-way street. Contraflow bike lanes provide legal bike access on one-way streets where bicyclists may otherwise ride against traffic or on the sidewalk. Contraflow bike lanes may be separated from other traffic by painted lines, a painted buffer, or a physical barrier.

The “Bike Lane” sign (R3-17 in the MUTCD) is commonly used in conjunction with contraflow bike lanes. In addition, an “Except Bicycles” plaque should be added below “Do Not Enter” signs when a contraflow bike lane is provided.

The only recommended contraflow bike lane is on Bridge Street between 11<sup>th</sup> and 12<sup>th</sup> Avenues as part of the **quick wins** category.



### Restricted lane (bicycles, parking, and right turns)

A restricted lane limits certain types of use. Restricted lanes recommended in this Plan only allow bicycles, parking, and right turns. This allows underutilized pavement space on wider streets to be repurposed to serve bicyclists while eliminating impacts to on-street parking, especially in residential areas. Since conflicts between parked cars and bicycles will still be present, this treatment works best where on-street parking utilization and turn-over is low. If parking utilization is high, this treatment can be used if the lane is at least 12 feet wide and traffic volumes are lower.

A “Right Lane: Bicycles, Parking and Right Turns Only” sign should be used. Sharrows may be applied to restricted lanes at least 14 feet wide and should then be placed at least 11 feet from the face of curb.

Restricted lanes are recommended extensively in this plan, due to the surplus of pavement width available on many of the Village’s streets.



### Path – Multi-Use

A multi-use path is a shared use path that is located in an independent right-of-way such as in a park, stream valley, greenway, along a utility corridor, or an abandoned railroad corridor. Multi-use paths are utilized by other non-motorized users including pedestrians, skaters, people in wheelchairs, joggers, and sometimes equestrians. The life span of a bike path can be as many as 20 years with regular maintenance.

Section 9B of the MUTCD and Section 5.4.2 of the AASHTO Guide for the Development of Bicycle Facilities (4<sup>th</sup> Edition) provide guidance for application of signs for paths.

A **long term vision** recommendation is for a path connecting Falls Road to Yuma Court.



### Path – Sidepath

A sidepath is a shared use path located adjacent to a roadway. It is designed for two-way use by bicyclists and pedestrians. Sidepaths are sometimes created by designating a wide sidewalk for shared use, or they may be a segment of a longer path system. Sidepaths sometimes facilitate connections to on- and off-street bicycle facilities. A sidepath is not generally a substitute for on-street bicycle facilities, but may be considered in constrained conditions, or as a supplement to on-street facilities. Sidepaths may not be appropriate in areas of high pedestrian activity unless there is space to successfully manage conflicts. The use of sidepaths should be limited to roadways with limited points of conflict at intersections and driveways. The life span of a bike path can be as many as 20 years with regular maintenance.

Section 9B of the MUTCD and Section 5.4.2 of the AASHTO Guide for the Development of Bicycle Facilities (4<sup>th</sup> Edition) provide guidance for the selection and application of signs for shared use paths. Special consideration should be given to traffic control where sidepaths pass through signalized intersections.

The **long term vision** recommendations include several sidepath projects, mostly along higher-traffic state and county highways as supplements to on-street bike facilities (paved shoulders or bike lanes).



### Paved Shoulder

The shoulder is the section of a rural roadway outside of the travel lanes. When paved and of sufficient width, paved shoulders can serve as a bicycle accommodation. Additionally, paved shoulders provide safety and maintenance benefits. Paved shoulders should typically be 4 feet or wider to serve as a bicycle accommodation, although 3 feet may be acceptable on lower volume roads.

If at least 4 feet wide, paved shoulders may be marked and signed as bike lanes, so long as they are designed and operate in the same manner as a bike lane. Otherwise, specific signs are generally not used, although some communities choose to erect "Bike Route" signs (D11-1 in the MUTCD).

Most of the recommendations for paved shoulders involve widening existing paved shoulders by 2 to 3 feet. However, a few involve constructing entirely new paved shoulders (usually on top of existing gravel shoulders). These nuances have been noted in individual recommendations.



### Separated Bike Lane (Cycletrack)

A separated bike lane, sometimes called a cycletrack, is a bicycle facility that is physically separated from both the street and the sidewalk. A separated bike lane may be constructed at street level using street space, or at the sidewalk level using space adjacent to the street. Separated bike lanes isolate bicyclists from motor vehicle traffic using a variety of methods, including curbs, raised concrete medians, bollards, on-street parking, large planting pots/boxes, landscaped buffers (trees and lawn), or other methods. Separated bike lanes can be one way for bicycles on each side of a two-way street, or two-way and installed on one or both sides of the street. Separated bike lanes provide cyclists with a higher level of comfort compared to bike lanes, and are typically used on arterials where higher vehicle speeds exist. They may also be appropriate on high-volume but lower-speed streets, such as Washington Street between First Avenue and 12<sup>th</sup> Avenue.

The provision of separated bike lanes should consider the design and function of intersections, which may require adjustments to signal timing and phasing and/or modifications to pavement and curb sections. Traffic studies should be performed before implementing separated bike lanes.



## Sharrow

Shared lane markings (sharrows) are used on streets where bicyclists and motor vehicles share the same travel lane. The sharrow helps position bicyclists in the most appropriate location to ride. It also provides a visual cue to motorists that bicyclists have a right to use the street. Sharrows should be placed at least 4 feet (on center) from the face of curb where on-street parking is prohibited, or 11 feet (on center) from the face of curb where on-street parking is allowed. Sharrows are not appropriate on streets with speed limits greater than 35 mph.

The “Bicycles May Use Full Lane” sign (R4-11 in the MUTCD) is commonly used in conjunction with shared lane markings (Figure 9C-9 in the MUTCD). Sharrow pavement markings should be epoxy for longevity and durability.

Because of their low cost and high visibility, sharrows are recommended extensively by this Plan, especially as part of the **quick wins** category.



## Traffic calming

Traffic calming is a broad category that includes incorporating elements such as speed cushions/road humps, chicanes, median islands, neighborhood traffic circles, and traffic diverters into neighborhood streets where speeding traffic is a concern. In addition to lowering traffic stress for bicyclists, traffic calming can also improve conditions for pedestrians (such as by adding curb extensions to shorten crosswalks).

Many different types of signs may be used as part of traffic calming projects, including warning signs, regulatory signs, object marker signs, and signs prohibiting motor vehicles from certain movements (such as “Do Not Enter Except Bicycles” or “No U Turns” signs).

Traffic calming, in conjunction with sharrows and signage, is often implemented in the form of a “bicycle boulevard,” which is a street with low amounts of low-speed motor vehicle traffic on which bicycling is encouraged.

Recommendations for traffic calming in this Plan are **long term vision** recommendations that should be in addition the recommendations in the **quick wins** and **routine maintenance** categories.



## Ozaukee Interurban Trail Wayfinding

The Ozaukee Interurban Trail does not continue as a shared use path through the Village of Grafton. Rather, it terminates at Seventh Avenue and at North Street/11<sup>th</sup> Avenue. Users must then use one of several on-street routes to navigate from one terminus to the other. While there are several options for low stress routes connecting the two termini, without some sort of wayfinding it is difficult for people new to the area or new to bicycling to navigate between the two. Wayfinding signs should be installed between the two termini to direct users along preferred routes that utilize low stress streets. This plan recommends that signs be installed to direct people along both the Seventh Avenue/Beech Street/11<sup>th</sup> Avenue route (marked as the “via Downtown” route) and the First Avenue/North Street route.

Furthermore, awareness of access to the Ozaukee Interurban Trail would be greatly improved by installing wayfinding signs directing people to the trail along major nearby bikeways, including:

- Falls Road
- Beech Street
- Washington Street
- 17<sup>th</sup> Avenue
- Bridge Street

Shown below are two example wayfinding sign configurations that could be used to direct people along preferred on-street routes between the two termini of the Ozaukee Interurban Trail (left) and to direct people to the Ozaukee Interurban Trail itself (right).



# Chapter 4

## Pedestrian Facility Recommendations

### Approach

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Most pedestrian trips are less than a mile in length and are likely to be focused around activity centers and in compact neighborhoods where destinations are close together. In addition to the fact that Grafton already has an established interconnected city-wide network of well-maintained sidewalks, the areas in which the public has expressed concerns related to pedestrian safety are relatively concentrated. Therefore, rather than performing an exhaustive review of the broad pedestrian network, this Plan's analysis of pedestrian needs and recommendations for infrastructure improvements focuses on pedestrian priority improvement locations. These locations were identified based on the selection criteria listed below.

#### **Selection Criteria for Pedestrian Priority Improvement Locations**

- High crash/conflict locations or corridors, especially related to crossings
- Proximity to activity centers (e.g., downtown, parks, library, etc.) and other areas with high current or potential pedestrian activity
- Connections to the Ozaukee Interurban Trail and other trails
- Proximity to schools or routes along which children are most likely to walk to school

In addition, consideration was given to the ability of pedestrian improvement locations to be used to foster greater awareness across the community of the existing walking opportunities in Grafton, encourage children to walk to school, and educate motorists and pedestrians alike on the laws regarding various traffic control devices and pavement markings (e.g., HAWK signals, rectangular rapid flash beacons, marked crosswalks, etc.).

#### **Pedestrian Priority Improvement Location Types**

Pedestrian priority improvement locations are divided into two categories:

- **Sidewalk gaps** – locations where sidewalks are missing.
- **Challenging intersections** – intersections with higher levels of known or potential conflicts between pedestrians and motor vehicles.

Using these two categories, specific pedestrian priority improvement locations and associated recommendations are discussed on the following pages.

## Sidewalk Gaps

While most streets in the Village of Grafton have sidewalks on both sides, there are several locations where sidewalks do not exist. Closing these gaps may require building a sidewalk on at least one side of the street, potentially necessitating right-of-way acquisition, working with other jurisdictions (e.g., the Town of Grafton, City of Cedarburg, etc.), and/or installing curb ramps at intersections. Significant gaps identified by Village staff, the Steering Committee, and/or the public through the Online Interactive Mapping exercise are listed in Table 1.

Table 1. Streets with Significant Sidewalk Gaps

Street	From	To	Side of Street	Length <sup>1</sup>	Cost Estimate	Notes
<b>Cheyenne Avenue</b>	Ottawa Lane	Seminole Street	West	313 lf	\$15,337*	Continuous sidewalk exists on the east side of Cheyenne Avenue. The gap is located in the Town of Grafton.
<b>N Green Bay Road</b>	Shoreland Lane	Hickory St	West	1,500 lf	\$73,500*	A portion of the gap is located in the Town of Grafton.
<b>Grafton Avenue</b>	Washington Street	Cheyenne Avenue	West	4,300 lf	\$180,600**	Includes a small portion on the east side of the road near Washington Street.
<b>Columbia Road</b>	First Avenue	Keup Road	North	1,750 lf	\$85,750*	The gap is located in the Town of Cedarburg.
<b>River Bend Road</b>	17th Avenue	Zaun Field (Grafton Soccer Club)	West/north	3,200 lf	\$156,800*	The gap is located in the Town of Grafton.
<b>Port Washington Road</b>	Existing sidewalk south of Washington Street	Falls Road	West	3,000 lf	\$126,000**	The gap is located in the Town of Grafton.
<b>Cedar Creek Road</b>	Maple Road	Fifth Avenue	South	1,000 lf	\$49,000*	
<b>Cedar Creek Road</b>	Ninth <sup>th</sup> Avenue	N Green Bay Road	South	1,200 lf	\$58,800*	Includes a small portion that is in the Town of Grafton (near N Green Bay Road).
<b>N Green Bay Road</b>	Cedar Creek Road	Northbrooke Drive	West	1,800 lf	\$88,200*	May require culvert widening.
<b>Port Washington Road</b>	Arrowhead Road	Existing sidewalks north of Washington Street	West	2,000 lf	\$84,000**	This section will be constructed as part of a future urbanization project.
<b>Arrowhead Road</b>	Grafton Ave	Port Washington Road	South	2,400 lf	\$117,600*	
<b>Green Bay Road</b>	Chateau Drive	Existing sidewalk south of Falls Road	Varies	1,900 lf	\$93,100*	New sidewalk on the west side of the street south of Lime Kiln Park, and the east side through Lime Kiln Park. A portion of the gap is located in the Town of Grafton.

<sup>1</sup> Lengths expressed in linear feet (lf). \*Estimate based on 5-foot sidewalk. \*\*Estimate based on 10-foot sidepath.

### **Sidewalk Gap Recommendations**

For each of the gaps identified in Table 1, and for all new sidewalks constructed in the Village of Grafton, sidewalks must be constructed of concrete with a minimum width of 5 feet, in accordance with the Village of Grafton’s Subdivision Code. A 4 to 6-foot wide terrace should be provided between sidewalks and the back-of-curb (or edge of paved shoulder). For sidewalks built along higher-speed or higher-traffic, wider terraces should be considered.

### **Wider Sidewalks and Sidepaths**

Along higher-speed or higher-traffic roadways (such as Green Bay Road and Columbia Road), wider sidewalks (6 to 8 feet) may be warranted to accommodate higher volumes of pedestrian traffic and occasional use by youth and less-confident bicyclists. In locations where a significant portion of bicyclists are likely to ride on the sidewalk instead of on the street, an 8- to 10-foot wide sidepath (concrete or asphalt multi-use path along a roadway) may be constructed instead of a sidewalk to provide adequate space for pedestrians and bicyclists. Example locations where a sidepath is appropriate is Grafton Avenue and Port Washington Road (paths along these roads are recommended in Chapter 3: Bicycle Facility Recommendations). This would be in addition to any bicycle network recommendations for the roadway.

### **Curb Ramps and Crosswalks**

Curb ramps compliant with federal accessibility guidelines (Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way, often referred to as “PROWAG”) should be installed at each intersection and midblock crossing. These must include truncated dome detectible warning surfaces.

Marked crosswalks should be installed with sidewalk construction along arterial and collector streets as well as near activity centers such as schools, parks, the library, and other pedestrian-oriented areas. Crosswalks must be a minimum of 6 feet wide, or the full width of the connecting sidewalk or sidepath, whichever is wider. High-visibility crosswalks (continental, ladder, or zebra patterns) are preferred for crossings of arterial streets and higher-speed roads, near schools, and in locations frequently used by pedestrians.

### **Typical Cost Estimates**

The cost to construct sidewalks and sidepaths is dependent on pavement type (typically concrete for sidewalks and concrete or asphalt for sidepaths), pavement thickness, number of intersections (which necessitate installing curb ramps and often marked crosswalks), whether grading is needed, drainage considerations, and potentially right-of-way acquisition. In addition, the cost to construct sidewalks can be substantially lower when built as part of a larger roadway construction or reconstruction project. Therefore, actual costs will vary from project to project. Table 2 illustrates typical unit costs for sidewalks and sidepaths in Wisconsin.

Table 2. Sidewalk and Sidepath Construction Costs

<b>Facility Type</b> (costs assume adequate right-of-way width, flat slope, and minimal drainage impacts)	<b>Cost per Linear Foot</b> (2015 dollars)	<b>Cost per Mile</b> (2015 dollars)
Sidewalk – Concrete, 5 feet wide, 6 inches thick	\$49	\$258,720
Sidepath (multi-use path along a roadway) – Asphalt, 10 feet wide	\$42	\$221,760

## Sidewalk Gaps Outside of the Village

Several public comments on the Online Interactive Map tool identified sidewalk gaps or desired pedestrian connections that are outside of the Village of Grafton and/or outside of the broader study area established for this project. Furthermore, they are generally in areas with lower population and destination density and therefore do not meet the established selection criteria. However, future development in these areas will gradually increase the importance of sidewalks. These locations include:

- Port Washington Road from the south edge of Falls Crossing subdivision to Lakefield Road
- Connection to Lake Michigan along Ulao Road
- Falls Road from Port Washington Road to Lake Shore Road
- Lakefield Road from River Bend Road to Port Washington Road

## Challenging Intersections

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Other than sidewalk gaps, the greatest barrier to pedestrian mobility is interacting with motor vehicle traffic at intersections. There are a variety of countermeasures that can improve the safety of pedestrians at intersections. Several are pictured and described below. The countermeasure that is appropriate for an intersection depends on the context of each location. The application of countermeasures to specific challenging intersections in Grafton is described on the following pages.

### Pedestrian Countermeasure Toolkit

#### High-Visibility Crosswalks

Crosswalks marked with continental (shown in the photo), ladder, or zebra patterns have been found to be significantly more visible to motorists<sup>2</sup> and to reduce crashes by a statistically significant 48 percent.<sup>3</sup> High-visibility crosswalks are especially beneficial on multi-lane streets in conjunction with additional countermeasures, such as median refuge islands and rectangular rapid-flash beacons.

In Wisconsin, crosswalks are typically marked with waterborne paint or epoxy. Waterborne paint is usually cheaper, but can last less than a year. Epoxy costs more than waterborne paint but is substantially more durable, lasting two to four years. The most expensive and durable option is thermoplastic, but it must be inlaid in the pavement in order to avoid damage from snowplows.

**Typical Cost:** \$1,000 (32 feet long, epoxy paint)



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<sup>2</sup> K. Fitzpatrick, S. Chrysler, V. Iragavarapu, and E.S. Park. Detection Distances to Crosswalk Markings: Transverse Lines, Continental Markings, and Bar Pairs. Transportation Research Record: Journal of the Transportation Research Board, No. 2250. Transportation Research Board of the National Academies, Washington, DC, 2011.

<sup>3</sup> L. Chen, C. Chen, R. Ewing, C. McKnight, R. Srinivasan, and M. Roe. Safety Countermeasures and Crash Reduction in New York City—Experience and Lessons Learned. Accident Analysis and Prevention. In print, 2012. Retrieved August 14, 2015. <http://dx.doi.org/10.1016/j.aap.2012.05.009>

### Curb Extensions

Curb extensions shorten crossing distances for pedestrians, thereby reducing exposure to conflicts with motor vehicles. They also have a traffic calming effect. Curb extensions can also be used to reduce excessive corner radii at intersections (as shown in the photo).

**Typical Cost:** *Varies*



### Median Refuge Islands

Raised median islands (minimum of 6 feet wide, ideally 8 feet wide to accommodate strollers, bicycles, etc.) located along the centerline of a street provide refuge for pedestrians and allow multi-stage crossings of wide streets. Furthermore, refuge islands provide a significant crash reduction factor for crashes involving pedestrians. These features also have traffic calming effects and improve crossings at unsignalized locations or locations with Rectangular Rapid Flash Beacons (RRFBs), since pedestrians are only required to negotiate one direction of traffic at a time.

**Typical Cost:** *\$3,000 (8 feet wide, 6 feet long on each side)*



### Rectangular Rapid-Flash Beacons (RRFB)

RRFBs consist of a crosswalk warning sign and orange high-intensity flashing LED lights. RRFBs are activated by users (using push buttons) or automatically (using video, microwave, or infrared detection). RRFBs increase the visibility of crosswalks and increase motorist compliance with state laws regarding yielding to pedestrians in crosswalks.

When installed, push buttons should ideally be positioned within the reach of pedestrians and bicyclists in the roadway alike. Alternatively, separate pedestrian and bicyclist push buttons can be provided.

**Typical Cost:** *\$5,000 (per beacon, typically installed in pairs)*



### Leading Pedestrian Intervals (LPI)

Traditional signal timing often results in pedestrian signals entering the "WALK" phase at the same time left-turning traffic is given the green arrow (on divided roadways) or straight-through traffic is given the green light, allowing right-turning traffic to cross the crosswalk). This creates conflicts between pedestrians in the crosswalk and turning motorists who either do not see the pedestrian or believe they can pass through the intersection before the pedestrian arrives at the conflict point.

Leading pedestrian intervals start the "WALK" phase 3 to 10 seconds before any motor vehicle traffic is allowed to proceed. This allows pedestrians to enter the crosswalk before turning motor vehicles begin moving through the intersection, thereby reducing crashes by as much as 60 percent.<sup>4</sup>

**Typical Cost:** *Varies. May have no cost depending on existing equipment programming capabilities*



### Pedestrian Countdown Signals

Countdown timers added to pedestrian signals inform pedestrians of the amount of time remaining before the solid "DON'T WALK" phase of the signal cycle. This tool increases compliance by discouraging pedestrians from beginning to cross near the end of the cycle. Reduced crash rates and delays can be realized through the installation of such signals.

**Typical Cost:** *\$2,000-4,000 (per intersection depending on existing signal equipment)*



### Advance Yield Lines

Advance yield lines, which are composed of solid white isosceles triangles (often referred to as "shark's teeth"), indicate where drivers should yield to pedestrians in crosswalks. Especially on multi-lane streets, they improve visibility for pedestrians in the crosswalk of advancing drivers that might not be yielding. When applied to midblock crosswalks, advance yield lines should be 20 to 50 feet from the crosswalk. See MUTCD Section 3B.16 for more information.

**Typical Cost:** *\$400 (four-lane street, epoxy paint)*



<sup>4</sup> A.C. Fayish and Frank Gross. Safety effectiveness of leading pedestrian intervals evaluated by a before-after study with comparison groups. Transportation Research Record No. 2198 (2010): 15-22.

## Priority Intersection Improvements

Several challenging intersections were identified by Village staff and the Steering Committee. The majority of these were also identified by the public through the Online Interactive Mapping exercise or Open House as challenging locations for pedestrians. Furthermore, two locations (both intersections of the Ozaukee Interurban Trail) were identified by the public.

### **Washington Street between First Avenue and the Milwaukee River**

There are intersections along Washington Street between First Avenue and the Milwaukee River approximately every 325 feet. All but one (Second Avenue) have marked crosswalks. Based on public input and the demand analysis, there is a significant level of current and potential pedestrian activity in this area. Improvements to increase pedestrian visibility and motorist awareness may improve safety and compliance with state law to yield to pedestrians in crosswalks. For several intersections, installation of high-visibility crosswalks and RRFBs will improve comfort and safety for pedestrians as well as bicyclists crossing Washington Street.

The following provides an overview of priority intersections for enhancement:

- **First Avenue** – This is a signalized intersection with pedestrian signals. However, existing curb ramps are not compliant with accessibility requirements and are not aligned with marked crosswalks. Recommendations include installing new, compliant curb ramps, new pedestrian signal heads with countdown timers and leading pedestrian intervals, and high-visibility crosswalks.
- **Fifth Avenue** – This intersection has marked crosswalks across all four approaches. Recommendations include installing a high-visibility crosswalk across both Washington Street approaches and user-activated RRFBs.
- **Seventh Avenue** – Seventh Avenue is a T intersection with Washington Street and is in front of St. Paul Lutheran School. A high-visibility crosswalk (zebra pattern) exists across Washington Street on the east approach to the intersection. Recommendations include augmenting the existing high-visibility crosswalk with user-activated RRFBs.
- **11<sup>th</sup> Avenue** – This intersection has marked crosswalks across all four approaches. Due to the proximity to the 12<sup>th</sup> Avenue intersection, traffic flow along Washington Street through this intersection is often continuous. Recommendations include installing user-activated RRFBs and a median refuge island. In 2012 the Wisconsin Department of Transportation initiated a study of this section of Washington Street (WIS 60) to consider whether capacity expansion (two lanes to four lanes) is needed. If roadway expansion occurs, these pedestrian recommendations may need to be revised or reconsidered.
- **13<sup>th</sup> Avenue** – This intersection has a pedestrian hybrid beacon (often referred to as a HAWK signal). Multiple complaints have been received stating that motorists do not comply with the signal. It is likely that many users do not understand what the signal means and therefore a non-infrastructure solution is needed. Targeted enforcement and education strategies, including increasing law enforcement patrol of this area and adding explanatory signs (e.g., “Stop on Flashing Red Then Proceed When Clear”) to the signal poles, may increase compliance.

### **Washington Street between 17<sup>th</sup> Avenue and Cheyenne Avenue**

The 17<sup>th</sup> Avenue and Cheyenne Avenue intersections are approximately one-half mile apart without any additional intersections or crosswalks in between. Development on the north side of Washington Street between these two intersections consists of Grafton Elementary School and Grafton High School. Most students must cross Washington Street (whether on foot, by bike, or in a car) to get to/from school each day. It is probable that a significant amount of pedestrian traffic crosses Washington Street between these two intersections because a path connects the south side of Washington Street to Centennial Park and neighborhoods to the south.

- **Midblock Crossing** – A two-stage midblock crossing should be constructed in front of Grafton High School in line with the existing crosswalk through the high school's south parking lot. This will include high-visibility marked crosswalks, curb ramps, a median refuge island, advanced yield lines, and two independent sets of RRFBs (one for crossing the eastbound side of Washington Street and one for crossing the westbound side). Due to the lack of turning motor vehicles, there are fewer conflicts for pedestrians at midblock crossings such as this.
- **17<sup>th</sup> Avenue and Cheyenne Avenue** – These intersections have low-visibility crosswalks and pedestrian signals. The crosswalks should be re-applied using a high-visibility pattern and leading pedestrian intervals should be programmed into the signal cycles. Furthermore, the addition of pedestrian countdown timers and replacement of existing curb ramps with compliant curb ramps would provide additional pedestrian benefits. At the Cheyenne Avenue intersection, the northwest and southeast corner radii appear to be significantly oversized, greatly increasing the crossing distance for pedestrians and encouraging faster cornering for people driving. These radii should be decreased by constructing curb extensions.

### **17<sup>th</sup> Avenue at Grafton Avenue/Sunset Court**

Motor vehicle traffic heading north on 17<sup>th</sup> Avenue and traffic heading southwest on Grafton Avenue are not required to stop at this intersection. Traditional transverse line crosswalks exist across the southwest Grafton Avenue approach, but there are not crosswalks crossing 17<sup>th</sup> Avenue. In the past, there have been incidents of people driving southbound on Grafton Avenue veering onto the sidewalk on the west side of 17<sup>th</sup> Avenue (luckily, no collisions with pedestrians have occurred). There is a possibility that redevelopment may occur on the triangle of land bordered by Washington Street, Grafton Avenue, and 17<sup>th</sup> Avenue. If this occurs, the segment of Grafton Avenue between Washington Street and 17<sup>th</sup> Avenue may be abandoned, which would allow the intersection in question to be reconfigured in a more traditional, pedestrian-friendly manner.

In the meantime, short term improvements include replacing the existing crosswalks with high-visibility crosswalks, installing a high-visibility crosswalk across 17<sup>th</sup> Avenue, and installing two sets of RRFBs (one across the southwest approach of Grafton Avenue and one across the 17<sup>th</sup> Avenue approach).

### **Green Bay Road at Falls Road (southern intersection)**

There are two T intersections of Green Bay Road and Falls Road. This priority area focuses on the southern intersection near Lime Kiln Park. This is a low-density area of the Village, so many drivers might not expect pedestrians to be present. However, it is near two popular recreation areas (Lime Kiln Park and Muttland Meadows) and therefore generates a significant amount of pedestrian activity. Due to the curvature of the roadway's west and northeast approaches, visibility from and toward the crosswalk is limited. Advance crosswalk warning signs are not present. Recommendations for this intersection are first and foremost to provide advance crosswalk warning signs 150 to 200 feet before the crosswalk and to trim vegetation to improve sight lines. Additional desirable improvements to increase visibility and safety are the installation of a high-visibility crosswalk, RRFBs, and potentially a median refuge island.

### **Green Bay Road at Falls Road (northern intersection)**

This priority area focuses on the northern T intersection of Green Bay Road and Falls Road. This intersection is immediately adjacent to the Falls Road Bridge over the Milwaukee River, one of only four locations in Grafton that pedestrians can cross the river. There is one marked crosswalk at this intersection, crossing the northern approach. Motor vehicle traffic heading north and south are required to stop at this intersection, but cars heading west are not required to stop. Recommendations for this intersection are to replace the existing transverse line crosswalk with a high-visibility crosswalk.

### **Wisconsin Avenue at Cedar Street**

This T intersection is located near the Grafton Fire Station (on Cedar Street) and is on a main route for fire trucks during emergency calls. As such, the intersection has an emergency traffic signal, which normally flashes yellow for Wisconsin Avenue and red for Cedar Street until activated by the Fire Department (at which time the signal turns solid red for Wisconsin Avenue and solid green for Cedar Street). Due to its normal flashing yellow/red operation, this signal does not include pedestrian signals. In addition to a nearby urban-style retirement community, a mixed-use redevelopment project will occur immediately adjacent to this intersection, likely generating increased volumes of pedestrian traffic. The current intersection design will be reevaluated after the build-out of this mixed-use project. In the interim, crosswalk warning signs should be placed at the intersection.

Depending on traffic changes in the future, one solution for this intersection would be to replace the existing emergency signal with an emergency hybrid beacon (see MUTCD Section 4G.04) and add a stop sign on Cedar Street. An emergency hybrid beacon uses the same equipment and operates the same way as a pedestrian hybrid beacon (also known as a HAWK signal) except that it is activated by the Fire Department. Allowing pedestrian push-button activation and providing pedestrian signals would improve conditions for pedestrians, still allow Fire Department priority during emergency calls, and would not impact normal traffic flow on Wisconsin Avenue. Explanatory signs (e.g., “Stop on Flashing Red Then Proceed When Clear”) may increase comprehension and compliance with the beacon.

### **Ozaukee Interurban Trail at Bobolink Avenue**

Near the border between the Village of Grafton and City of Cedarburg, the Ozaukee Interurban Trail diagonally crosses the Bobolink Avenue/Falls Road intersection. Nearby, a new subdivision is being constructed in the City of Cedarburg that will have access to Bobolink Avenue and this intersection, likely increasing motor vehicle, bicycle, and pedestrian traffic. Although the crosswalk is marked using a high-visibility pattern, sight lines are somewhat obscured and there are not any crosswalk warning signs on Bobolink Avenue, which does not have stop signs. An immediate recommendation is to make this location an all-way stop intersection. A longer term improvement would be to reroute the trail’s approaches to the intersection, so that the crosswalk only crosses the northern Bobolink Avenue approach (rather than diagonally through the center of the intersection).

### **Ozaukee Interurban Trail at North Green Bay Road**

On the border between the Village of Grafton and the Town of Grafton, the Ozaukee Interurban Trail crossing utilizes a high-visibility crosswalk pattern and has advance crosswalk warning signs. However, it does not have crosswalk warning signs at the crossing itself. Furthermore, the existing crosswalk uses narrow striping and is a zebra pattern, which is somewhat difficult to see since the crosswalk is at a skew across the roadway. Recommendations include restriping the crosswalk with a more pronounced high-visibility pattern (e.g., using 10-16 inch wide stripes and a continental pattern) and adding RRFBs at the crossing. As an alternative to RRFBs, non-illuminated crosswalk signs could be added immediately at the crossing.

### **Blackfoot Court Path at Falls Road**

With the recent Falls Road reconstruction, a multi-use path was constructed on the south side of Falls Road from approximately Blackhawk Drive east to Port Washington Road. Just east of the Blackhawk Drive intersection, a short segment of path connects Falls Road north to Blackfoot Court. As part of the Bicycle Facility Recommendations, this Plan recommends a new path connection from this location along Falls Road south to Yuma Court. As such, a high-visibility crosswalk, crosswalk warning signs, and advance yield lines are recommended on Falls Road where the existing path to Blackfoot Court intersects the roadway.

### **Fifth Avenue at Mayfair Road and Green Valley Road**

This intersection is adjacent to Woodview Elementary School and John Long Middle School. Fifth Avenue experiences moderately high volumes of motor vehicle traffic during morning and afternoon rush hours, but has a low speed limit of 25 miles per hour. One crosswalk exists at Green Valley Road to the north, but is of the typical transverse line pattern. This crosswalk should be retrofitted into a high-visibility “ladder” crosswalk. An additional high-visibility crosswalk at Mayfair Road would help provide safe access for students living across Fifth Avenue from the schools.

# Chapter 5

## Implementation

### Relationship to the Village Budgeting Process

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Based on stakeholder and public involvement, Village staff input, and quantitative analysis, this Plan was developed to guide future decisions in terms of bicycle and pedestrian infrastructure funding and implementation. However, the adoption of this plan in and of itself does not represent a commitment of funding on the part of the Village of Grafton to implement any of the Plan's recommendations. Rather, decisions to implement any of the bicycle or pedestrian projects identified in this Plan will be a result of the Village's five-year Capital Improvement Plan and budgeting process. This Plan will guide the decisions of Village staff and officials during this process in order to identify appropriate projects to which funding should be committed over the next several years.

From an implementation perspective, the focus of this Plan is on projects that can be cost-effectively implemented in the near term. This includes strategic independent retrofit projects (for example, adding crosswalks or sharrows and signage to a street exclusive of any other road work, such as many of the projects in the **quick wins** category of bicycle facility recommendations) and larger retrofit projects that are incorporated into regular restriping, resurfacing, and reconstruction projects (such as striping bike lanes or building sidewalks at the same time as a street is being reconstructed). However, it is important for the Village to keep in mind the long term vision recommendations of this plan and seek opportunities to secure funding and implement those recommendations as part of the Village's long-term capital budgeting process. This is especially true for those projects that may have the greatest impact on enhancing connections for bicycling and walking, such as extending the Ozaukee Interurban Trail across Wisconsin Avenue and partnering with Ozaukee County, the Town of Grafton, and Saukville to construct a multi-use path along County Highway O.

### Implementation Strategies

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There are many ways to implement bicycle and pedestrian infrastructure projects. The following section outlines the most common and practical strategies that will be used to implement the recommendations of this Plan. However, this list is not exclusive and unique opportunities or approaches that fall outside of these strategies should be considered if they will produce the same results.

#### **Enhance Low-Stress Streets with Wayfinding and Regulatory Signs and Pavement Markings**

Many streets in Grafton are suitable for bicycling without dedicated accommodations (such as bike lanes, paved shoulders, or paths). However, many could benefit substantially from additional treatments that enhance the routes for bicycling. Such treatments include shared lane markings (sharrows), bike route and wayfinding signs, and providing an online map of preferred bike routes. These simple, low-cost treatments can provide considerable benefit to the user simply by confirming that they are on a designated bikeway. The **quick wins** network is primarily composed of such streets, with recommendations to implement these simple measures.

### **Reconfigure Streets to Better Utilize Existing Pavement**

One of the most significant opportunities for providing bicycle facilities in Grafton is the available pavement width found along many streets. Most streets in Grafton have enough pavement width for two travel lanes (one in each direction) and on-street parking on one or both sides (which is generally underutilized outside of Downtown). Simply striping a 10 to 14-foot wide restricted lane (a lane that only allows bicycles, parking, and right turns) is an opportunity that allows rapid implementation of this Plan in a very cost-effective manner, without reducing on-street parking capacity in most cases.

### **Coordinate Bikeway, Path, and Sidewalk Implementation with Upcoming Roadway Projects**

The most cost-effective and coordinated way to provide bicycle and pedestrian infrastructure (bike lanes, sidepaths, sidewalks, curb extensions, etc.) is to do so as part of a larger roadway reconstruction, rehabilitation, or repaving project. Conversely, it is not typically cost-effective or even feasible to widen roadways as a stand-alone project solely intended to accommodate bicycle infrastructure (especially in locations with curbs and gutters, storm sewer inlets, and constrained rights-of-way). The Village of Grafton can implement this strategy within its incorporated area by adopting a Complete Streets policy that applies to new construction, reconstruction, and 3R (resurfacing, restoration, or rehabilitation) projects on all streets and roads in the community. For projects that affect Grafton but cross jurisdictional boundaries, the Village should seek opportunities to collaborate with the Wisconsin Department of Transportation, Ozaukee County, the City of Cedarburg, Town of Grafton, Town of Cedarburg, and Town of Saukville in order to achieve the desired outcomes for bicycle and pedestrian accommodations.

### **Prioritize Stand-Alone Projects that Provide High-Value Connections**

In some instances, stand-alone projects will be necessary in order to provide bicycle and pedestrian infrastructure—this is especially true for paths. These projects tend to be the most costly and local, state, and federal funding dedicated for bicycle and pedestrian infrastructure is very limited. One mile of path can cost as much as 5 to 10 miles of projects involving reconfiguring roadways to add bike lanes. Therefore, stand-alone projects should be prioritized by the Village in the future based on their ability to provide high-value connections to destinations and other low-stress bikeways.

### **Develop an Official Bicycle Parking Policy**

The Village of Grafton currently requires new development and redevelopment projects to include bicycle parking facilities (consisting of bike racks in an appropriately accessible location) on a case-by-case basis. The Village should develop and adopt an official bicycle parking policy that:

1. Requires all projects subject to Plan Commission review—including new development and redevelopment projects, site plan applications, and conditional use applications—to provide bicycle parking prior to receiving a certificate of occupancy.
2. Specifies the minimum number of bicycle parking spaces for commercial properties. Many communities adopt a standard of one (1) bicycle parking space per ten (10) vehicle parking spaces with a minimum of two (2) bicycle parking spaces. A common standard for multi-family is one space per dwelling unit (one- or two-bedrooms) and an additional one-half space per additional bedroom. In downtowns and other mixed-use areas, most communities base the required number of spaces on the leasable square footage for retail and office (e.g., 1 space per 10,000 leasable square feet or a number of spaces that equals 5 or 10% of the establishment's capacity of persons, with a minimum of two spaces per establishment). Note that most racks serve as two parking spaces.

3. Specifies the location of bicycle parking relative to the establishment that it serves. The Association of Pedestrian and Bicycle Professionals makes the following recommendations in its Bicycle Parking Guidelines, 2nd Edition (APBP Guide):
  - a. The rack area should be no more than a 30-second walk (120 feet) from the entrance it serves and should preferably be within 50 feet.
  - b. A rack area should be as close as or closer than the nearest car parking space.
  - c. A rack area should be clearly visible from the entrance it serves.
  - d. A rack area should be provided near each actively used entrance.
  - e. In general, multiple buildings should not be served with a combined, distant rack area. It is preferred to place smaller rack areas in locations that are more convenient.
4. Contains standards for bike rack design. Racks that only support the front wheel of a bicycle (these racks are often found at schools) are inadequate for public use. Instead, racks should support the bicycle in at least two places. While there are many types of racks that meet this requirement, inverted U type and post-and-loop type racks are the most common and most flexible in terms of placement. Popular "wave" style racks with a single member that bends up and down to accommodate multiple bikes (usually four to 10) are not adequate.
5. States that Bicycle parking areas shall be designed such that when fully occupied, the bicycles (including trailers) shall not obstruct an adjacent sidewalk, path, or other pedestrian way. The aforementioned APBP Guide provides example site plans and other recommendations on how to achieve this in constrained areas. The City of Cambridge, MA Bicycle Parking Guide is another good resource for this and other bicycle parking considerations.

In addition, the Village should work with existing business and property owners to provide bike parking in potentially high-demand areas, such as downtown. In downtown and potentially other locations, limited sidewalk space may make providing bike parking a challenge. If so, consider using a bike corral, which places six to 10 parking spaces (three to five inverted U racks) in an on-street parking space. Bollards or curb stops should be provided around the bike corral to delineate the space.

## Priorities for Near Term Implementation

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Projects assigned to the **quick wins** category have the ability to quickly make substantial improvements to Grafton's bikeway system. The majority of these projects are along low- to moderate-stress streets that are already largely suitable for bicycling, but can be greatly enhanced with simple signage and pavement markings. The **quick wins** projects have been further prioritized for near term implementation by the project Steering Committee and Village staff based on cost, ability to enhance connections between the two segments of the Ozaukee Interurban Trail, and ability to form a continuous network of low-stress bikeways (see below). In addition, high-priority improvements for pedestrians have been identified and added to this list.

In total, implementing the bicycle-oriented projects will cost approximately \$102,000 (2015 dollars) and result in 5.5 miles of interconnected bikeways. Relative to typical roadway project costs, the total cost for these bikeway projects is about 17% of the cost of resurfacing a single mile of two-lane street in Wisconsin.<sup>1</sup>

### **Priority One**

The top priority projects include several low-cost-per-mile investments that stand to make substantial improvements to wayfinding and legibility for people biking and walking in Grafton. They include:

- First Avenue (Falls Road to the Ozaukee Interurban Trail and Washington Street to North Street) – Add sharrows and “Bikes May Use Full Lane” signage.
- Seventh Avenue (Ozaukee Interurban Trail to Beech Street) – Add a restricted lane and appropriate signage (bikes, parking, and right turns only) on the southbound side and a buffered bike lane on the northbound side (buffer between the bike lane and on-street parking). At the same time, add a high-visibility crosswalk and crosswalk warning signs where the Ozaukee Interurban Trail intersects Seventh Avenue.
- 11<sup>th</sup> Avenue (Beech Street to North Street) – Add sharrows and “Bikes May Use Full Lane” signage.
- 12<sup>th</sup> Avenue (Falls Road to Beech Street) – Add sharrows and “Bikes May Use Full Lane” signage.
- Beech Street (First Avenue to 11<sup>th</sup> Avenue) – Add sharrows and “Bikes May Use Full Lane” signage.
- Beech Street (11<sup>th</sup> Avenue to Wisconsin Avenue) – Add buffered bike lanes and through the 11<sup>th</sup> Ave intersection, add green paint for extra visibility in both directions.
- Beech Street (Wisconsin Avenue to 12<sup>th</sup> Avenue) – Add sharrows and “Bikes May Use Full Lane” signage.
- Bridge Street (11<sup>th</sup> Avenue to 12<sup>th</sup> Avenue) – Explore the possibility of installing a contraflow bike lane for eastbound bicycle traffic, and sharrows and “Bikes May Use Full Lane” signage for westbound bicycle traffic.
- Bridge Street (12<sup>th</sup> Avenue to 17<sup>th</sup> Avenue) – Add sharrows and “Bikes May Use Full Lane” signage.
- North Street (First Avenue to 12<sup>th</sup> Avenue) – Add sharrows and “Bikes May Use Full Lane” signage.
- Washington Street (at First, Fifth, Seventh, 11<sup>th</sup>, and 13<sup>th</sup> Avenues) – Implement the recommendations specified in Chapter 4 for each of these locations.

The total cost of projects in this priority group is approximately \$28,000 (2015 dollars) excluding pedestrian intersection improvements. Note that this total does not include the cost of the contraflow bike lane on Bridge Street between 11<sup>th</sup> and 12<sup>th</sup> Avenues, the cost of which could vary significantly.

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<sup>1</sup> Wisconsin Department of Transportation: Historic Statewide Estimated Highway Improvement and Item Costs (September 2014)

## **Priority Two**

The second tier of priority projects focus on Falls Road between First Avenue and the recently-completed Falls Road reconstruction east of Blackhawk Drive. Specific components include:

- Falls Road (First Avenue to Wisconsin Avenue) – Prohibit on-street parking and add bike lanes.
- Falls Road (Wisconsin Avenue to South Green Bay Road) – Prohibit on-street parking and add buffered bike lanes.
- Falls Road (Green Bay Road to 12<sup>th</sup> Avenue) – On the east side prohibit on-street parking and add a bike lane, on the west side add a restricted lane and appropriate signage (bikes, parking, and right turns only).
- Falls Road (12<sup>th</sup> Avenue to 16<sup>th</sup> Avenue) – Prohibit on-street parking and add bike lanes.
- Falls Road (16<sup>th</sup> Avenue to Blackhawk Drive) – Add restricted lanes and appropriate signage (bikes, parking, and right turns only).
- Ozaukee Interurban Trail (at Bobolink Avenue and at North Green Bay Road) – Implement the recommendations specified in Chapter 4 for each of these locations.

During the design phase, the Wisconsin Avenue intersection on Falls Road needs further study to identify how best to treat bike lanes going through the intersection. If possible, bike lanes should be continuous up to the intersection on both sides, but limited right-of-way, utilities, and other physical constraints can pose considerable challenges. See section 4.8 of the 2012 AASHTO *Guide for the Development of Bicycle Facilities: Fourth Edition* for more information and guidance.

Community events are held in Lime Kiln Park several times throughout the year. Parking is at a premium during these events, so the Village will post temporary signs to allow on-street parking along Falls Road between Wisconsin Avenue and the Milwaukee River. The Village will also post “Bike Lane Closed Ahead” warning signs in advance of Wisconsin Avenue and the Milwaukee River, as well as “Bikes May Use Full Lane” signs during the same period.

The total cost of projects (excluding Ozaukee Interurban Trail intersection improvements) in this priority group is approximately \$49,000 (2015 dollars).

## **Priority Three**

The third tier of priority projects focus on 17<sup>th</sup> Avenue between Washington Street and Falls Road. This portion of 17<sup>th</sup> Avenue is amply wide and although on-street parking is allowed, it is seldom utilized. Specific components include:

- 17<sup>th</sup> Avenue (Washington Street to approximately 200 feet south of the intersection; e.g., the section with a raised concrete median) – Add sharrows and “Bikes May Use Full Lane” signs until this section is reconstructed in the future. Future reconstruction should remove the concrete median (or widen the roadway) in order to allow continuous bike lanes through the intersection.
- 17<sup>th</sup> Avenue (approximately 200 feet south of Washington Street to Falls Road) – Add restricted lanes and appropriate signage (bikes, parking, and right turns only).

The total cost of projects in this priority group is approximately \$25,000 (2015 dollars).

## Education and Awareness Initiative

In support of the continued development and enhancement of Grafton’s bicycle and pedestrian infrastructure, the Village will advance education and awareness for people that drive, ride a bike, or walk within the community. This initiative will include educating people about the rules of the road, raising awareness about the rights of each type of transportation user, and discouraging distracted driving. Furthermore, awareness of this Plan and its recommendations is an important component of this initiative.

The following menu of actions and programs provides an overview of the potential elements of the Village’s education and awareness initiative. In addition to elements on this menu, the Village will consider other opportunities for education and awareness initiatives, especially those proposed by a partner agency or organization that is dedicated to implementing the program.

Table 1: Menu of Potential Education and Awareness Actions and Programs

Action / Program	Brief Description	Partners	Resources
On-the-bike Training for Children and Youth	Partner with local organizations on bicycle education events such as bicycle rodeos and other activities	Police, schools, local cycling clubs, Wisconsin Bike Fed	League of American Bicyclists Rodeo Manual: <a href="http://goo.gl/UQfMB3">http://goo.gl/UQfMB3</a>
Mailed Education Materials	Regularly include bicycle and pedestrian education in Village communications to residents (Village newsletter, utility bills, tax bills, etc.)	Utility companies, local newspapers and newsletters, Ozaukee County Public Health	Boulder, Colorado utility bill inserts: <a href="https://goo.gl/Y2EovG">https://goo.gl/Y2EovG</a> <a href="https://goo.gl/arOGCR">https://goo.gl/arOGCR</a> <a href="https://goo.gl/vKgZid">https://goo.gl/vKgZid</a>
Website	Create a page on the Village website to provide bicycle and pedestrian safety and education materials	Wisconsin Bike Fed	See the City of Madison’s webpage for an example: <a href="https://goo.gl/ZtNFCj">https://goo.gl/ZtNFCj</a>
Defensive Driving, Biking, and Walking Course	Investigate offering a bicycle and pedestrian education course as an alternative for bicyclists, pedestrians, and motorists who are first-time minor offenders of bicycle and pedestrian-related rules of the road	Police, Wisconsin Bike Fed	The City of Madison offers a ticket dismissal course for drivers, bicyclists, and pedestrians.  Online example from The Center for Cycling Education: <a href="http://goo.gl/LnD88W">http://goo.gl/LnD88W</a>
Bike to Work Week and Bike & Walk to School Day	Multiple events can be held during the week including: Ride with the Village President, basic education sessions, commuter refreshment stations, etc.	Police, schools, library, local cycling clubs, Wisconsin Bike Fed, Ozaukee County Public Health	The League of American Bicyclists National Bike Month Guide: <a href="http://goo.gl/PpjpSJ">http://goo.gl/PpjpSJ</a>

Action / Program	Brief Description	Partners	Resources
Share & Be Aware Ambassadors	The Wisconsin Bike Fed has regional Ambassadors available to assist with local education efforts	Wisconsin Bike Fed	The Bike Fed's Share & Be Aware webpage: <a href="http://goo.gl/TKkyFD">http://goo.gl/TKkyFD</a>
Family Bike Events	Sponsor and/or support local family-friendly events that promote bicycling or walking	Police, schools, local cycling clubs, Wisconsin Bike Fed, Ozaukee County Public Health	Milwaukee's recent Ciclovía / Open Streets Event: <a href="http://en.cicloviamke.org/">http://en.cicloviamke.org/</a>
Crosswalk Enforcement Program	Perform "stings" to enforce the state law requiring motorists to yield to pedestrians in crosswalks, particularly in the Downtown area, intersections with higher levels of bicyclist and pedestrian traffic, and near schools throughout the community	Police	The City of Chicago's Crosswalk Enforcement Initiative: <a href="http://goo.gl/QjmZxK">http://goo.gl/QjmZxK</a>

### **Program and Action Descriptions**

#### ***On-the-bike Training for Children and Youth***

Bike Rodeos and other on-the-bike training programs are great ways to direct and deliver bicycle related curricula to children and youth. Topics discussed typically include the parts of a bicycle, how a bike works, how to fix a flat tire, proper helmet fitting, rules of the road, road positioning, and on-bike skills. These events are often facilitated by local police departments, schools, or cycling clubs and model programs are available through the League of American Bicyclists website.

#### ***Mailed Education Materials***

Including bicycle related educational pieces in utility or tax bills, newsletters, and other mailed communications is an easy way to reach a large group of people. Simple communications could cover a seasonal topic such as rules of the road, local bicycling ordinances, and back-to-school safety information.

#### ***Website***

Providing bicycle and pedestrian safety and education material to residents via the Village's webpage is another excellent way to reach potential and current users. Information should include the following:

- Maps and other resources.
- Links to laws, statutes, and ordinances related to walking and biking – both local and state.
- Information about local biking and walking events.
- List of and links to local bike shops and their numbers.
- List of and links to all walking and biking groups, including clubs, racing teams, and advocacy groups.

### ***Defensive Driving, Biking, and Walking Course***

Offering a bicycle and pedestrian education course as an alternative for bicyclists, pedestrians, and motorists who are first-time minor offenders of bicycle and pedestrian-related rules of the road is an efficient and cost effective way to deal with infractions. The Village should explore this option, especially in partnership with surrounding jurisdictions, for educating rather than punishing some rules of the road violators. Online courses are offered by private companies and non-profits and may be a more administratively-feasible option for the Village.

### ***Bike to Work Week and Bike & Walk to School Day***

Bicycling to work or to other destinations is a great way to get exercise, save money, reduce pollution, and have some fun. Bike to Work weeks and Bike and Walk to School days are national activities and are easily organized with help from the League of American Bicyclists website. Information on the website includes a listing of national and local events, suggested promotional materials, and a handbook. Bike and Walk to School Day is an important component of Safe Routes to School as it both encourages and educates students on how to get to school via bike or their feet. Activities for these events may include the following:

- Morning commute stations where cyclists are treated to free coffee and breakfast, bike tune ups, and other incentives.
- Group rides with local civic leaders.
- Themed rides, such as a bike parade to school.
- Discounts at local businesses for commuters and participants.

### ***Share & Be Aware Ambassadors***

The Wisconsin Bike Fed's Share & Be Aware program offers educational materials and programs for making biking and walking safer across the state. In addition, the program has regional Ambassadors that are available to attend local events and help provide educational training.

### ***Family Bike Events***

Family friendly events can be a great way to encourage the portion of the population that is interested in bicycling but concerned about interacting with motor vehicle traffic, as well as a great way to introduce kids to cycling as part of everyday normal life. Often these events are community oriented and can be as simple as a group ride organized on a Sunday. Other events include Ciclovias, themed rides, and rides organized around existing neighborhood festivals, parks, or cultural destinations.

### ***Crosswalk Enforcement Program***

Crosswalk enforcement programs, also known as "stings" or "walk-outs," have proven to be an effective way to train motorists to yield to pedestrians in crosswalks. Plain-clothed police officers attempt to cross in designated crosswalks and motorists who fail to yield are issued warnings, educational materials, or citations. If this campaign is done frequently enough, but at unpredictable times, it can be a very effective way to increase compliance with yield to pedestrian laws within the community.

# Maps

The maps on the following pages are referenced throughout the Plan. They include:

Map 1: Existing Infrastructure

Map 2: Demand Analysis Results

Map 3: Quick Wins Recommendations

Map 4: Routine Maintenance Recommendations

Map 5: Long Term Vision Recommendations

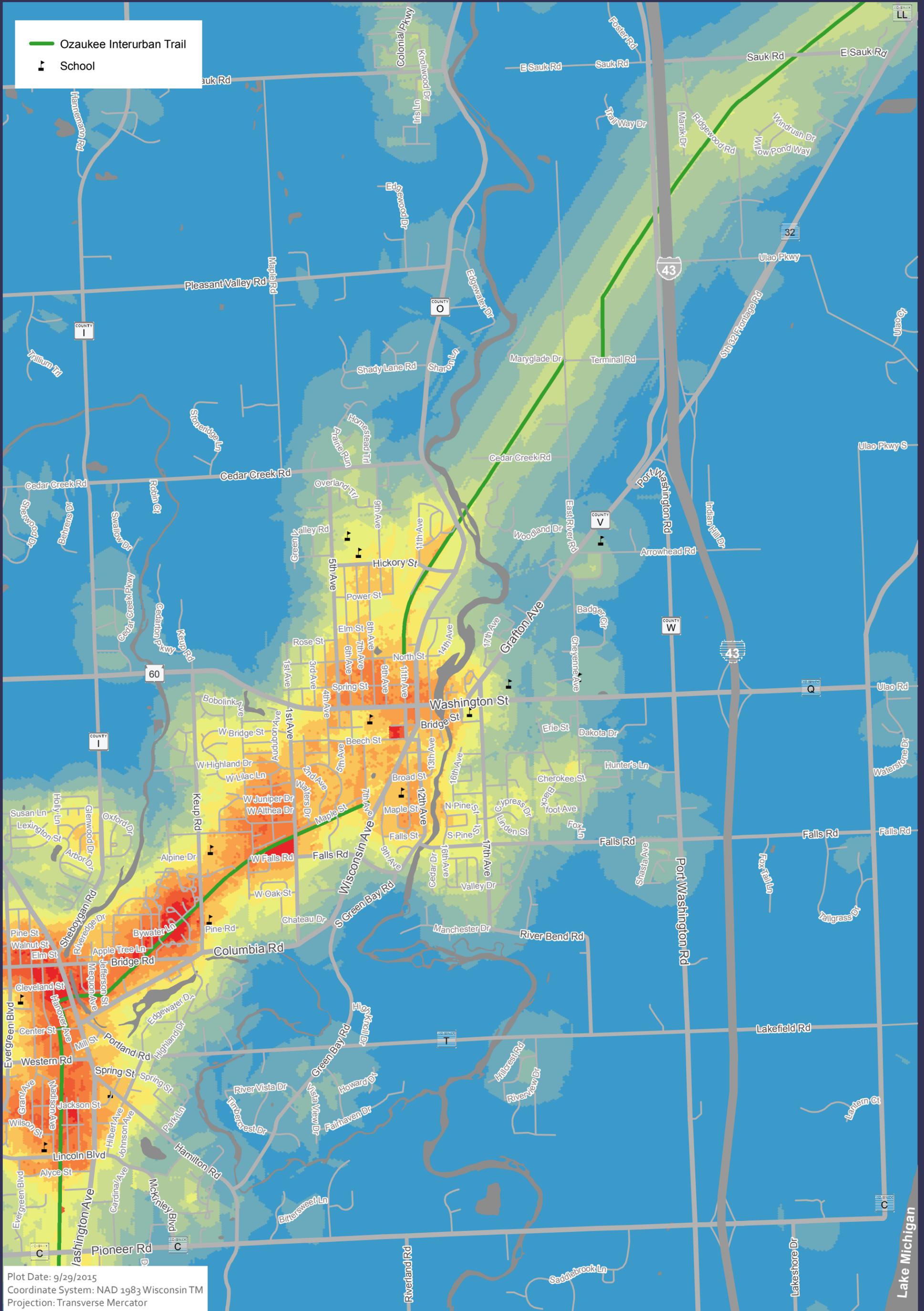
Map 6: Bicycle Network at Full Buildout

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# Map 2: Demand Analysis Results

Village of Grafton Bicycle and Pedestrian Plan

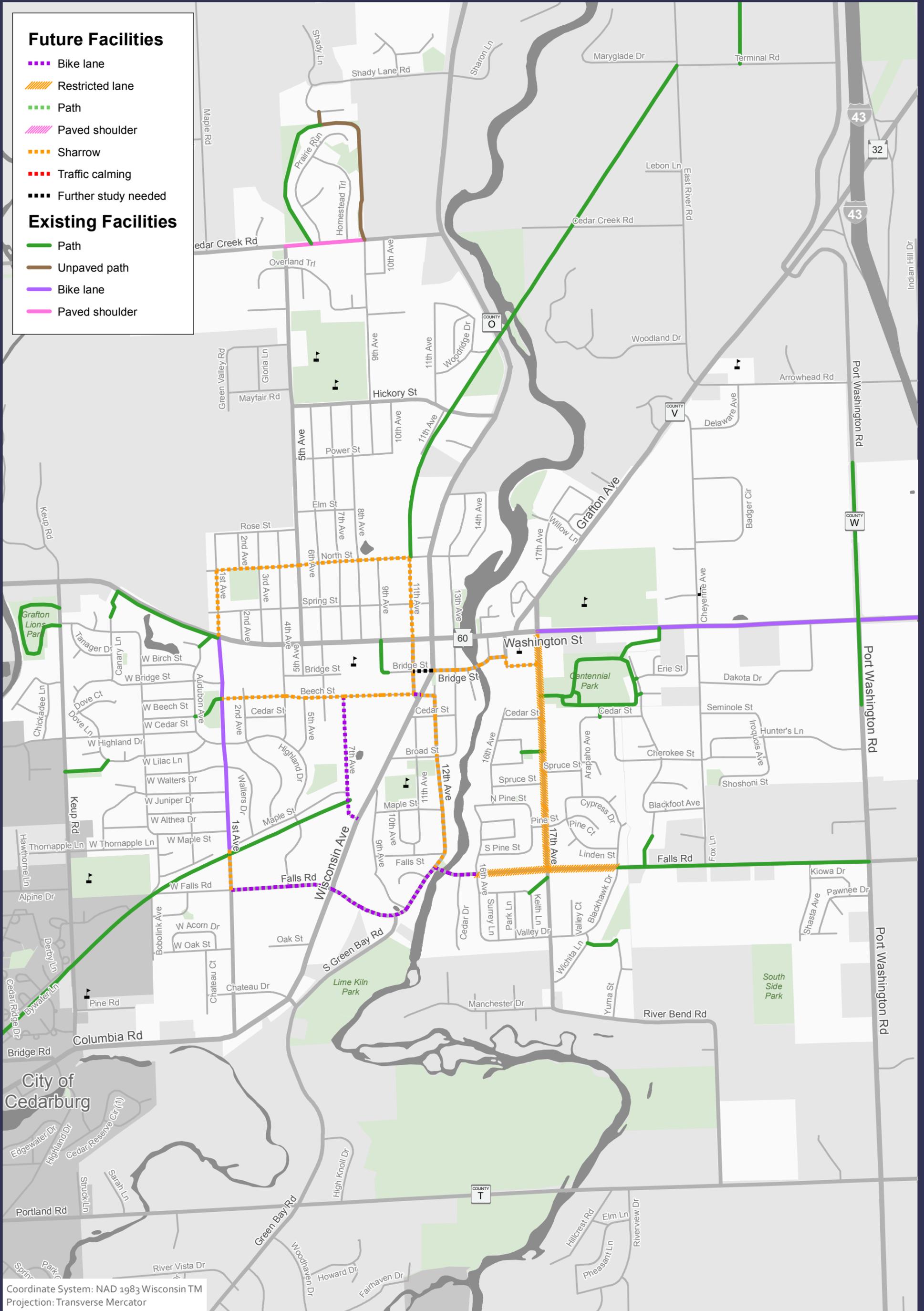


Plot Date: 9/29/2015  
Coordinate System: NAD 1983 Wisconsin TM  
Projection: Transverse Mercator



# Map 3: Quick Wins Recommendations

Village of Grafton Bicycle and Pedestrian Plan

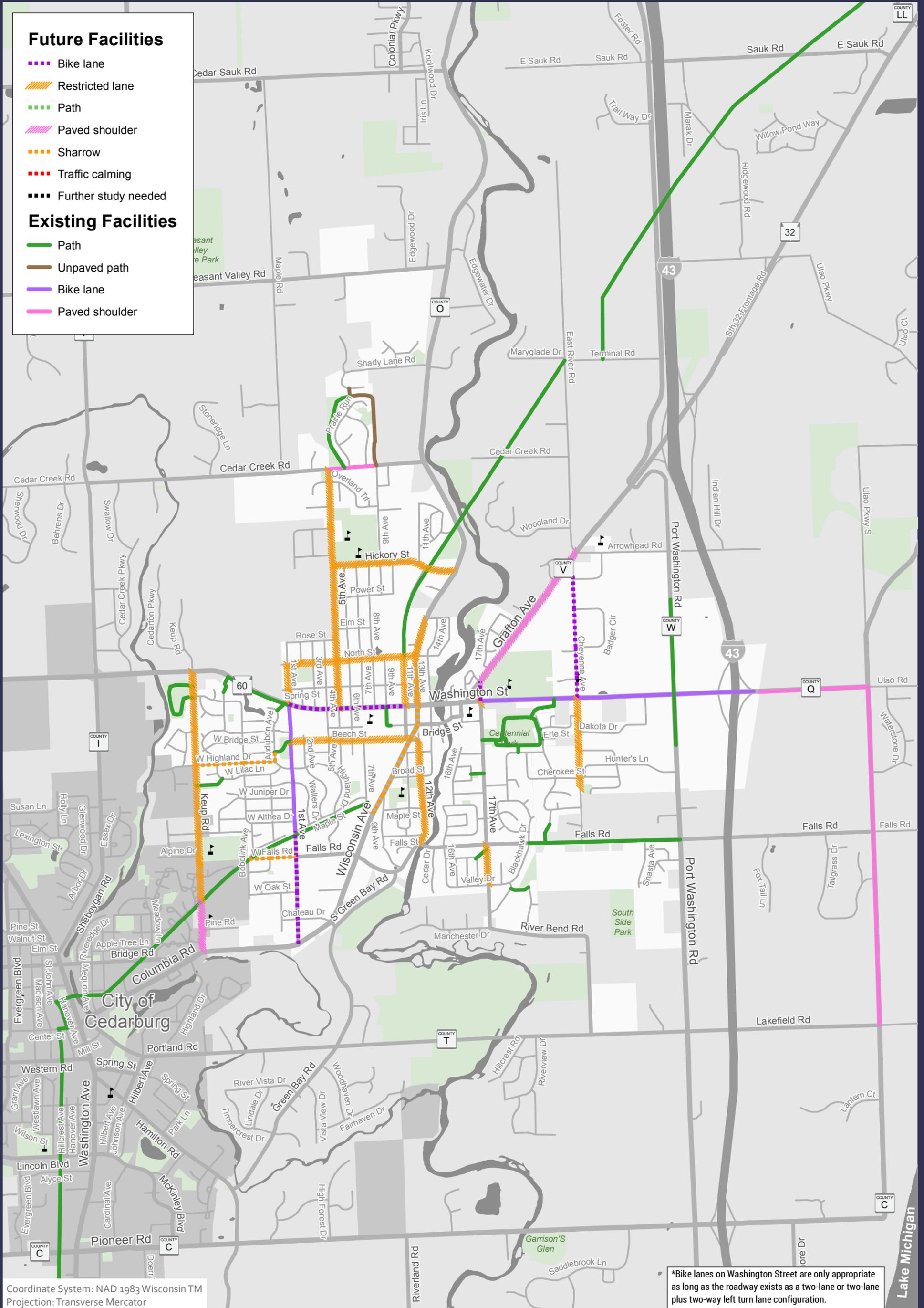


Coordinate System: NAD 1983 Wisconsin TM  
Projection: Transverse Mercator



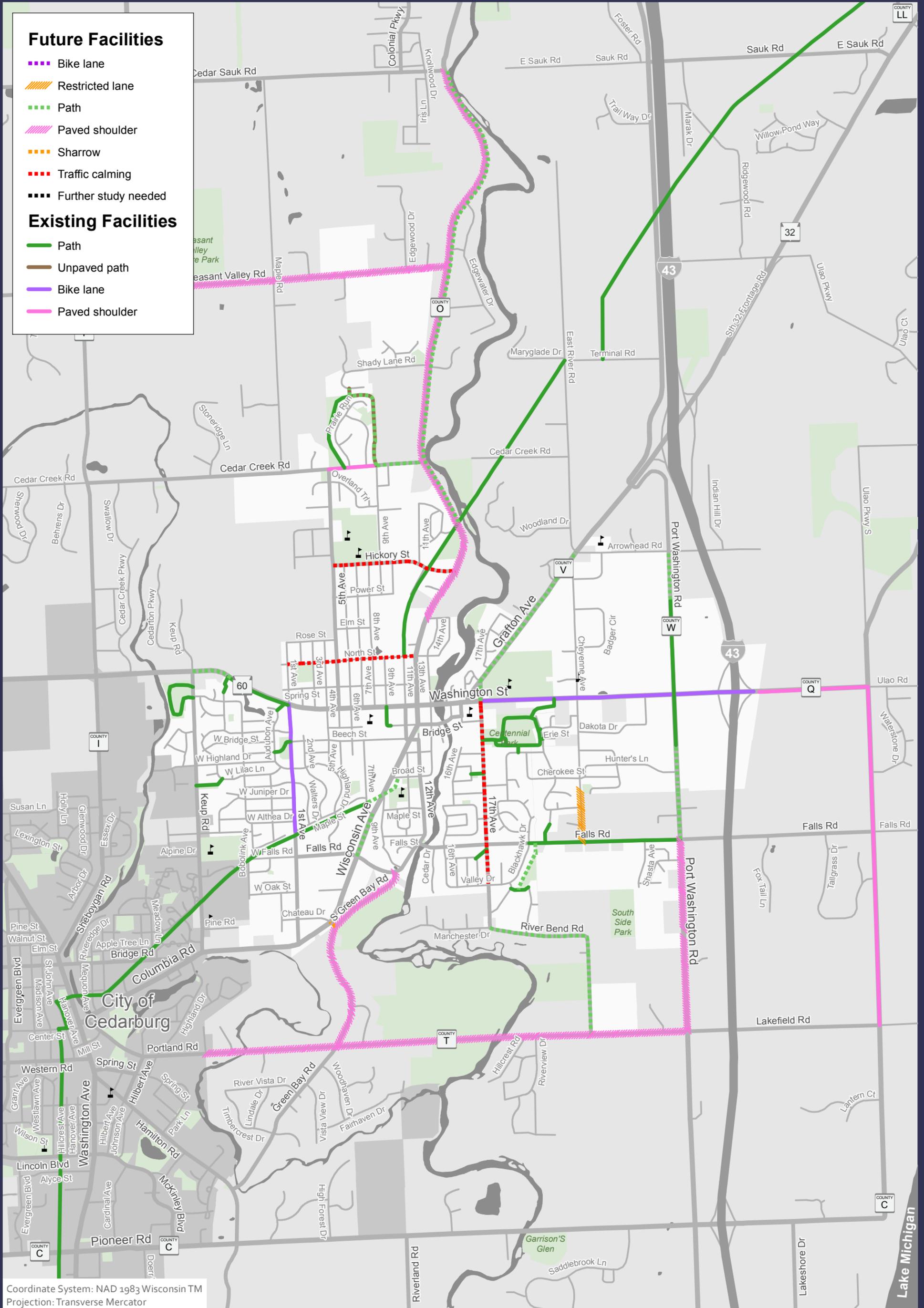
# Map 4: Routine Maintenance Recommendations

Village of Grafton Bicycle and Pedestrian Plan



# Map 5: Long Term Vision Recommendations

Village of Grafton Bicycle and Pedestrian Plan

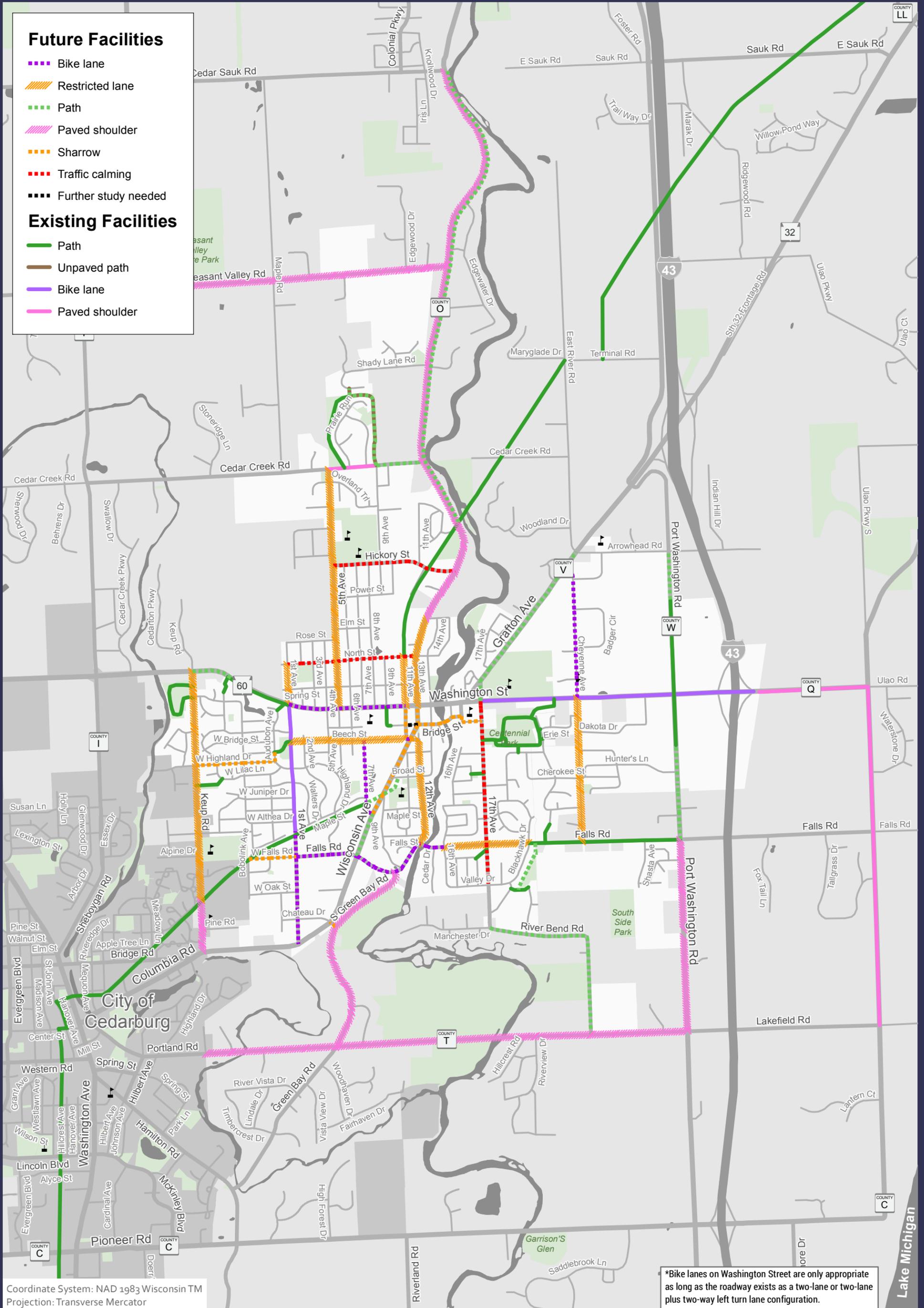


Coordinate System: NAD 1983 Wisconsin TM  
Projection: Transverse Mercator



# Map 6: Bicycle Network at Full Buildout

Village of Grafton Bicycle and Pedestrian Plan



**Future Facilities**

- ▬▬▬ Bike lane
- ▨▨▨ Restricted lane
- ▬▬▬ Path
- ▨▨▨ Paved shoulder
- ▬▬▬ Sharrow
- ▬▬▬ Traffic calming
- ▬▬▬ Further study needed

**Existing Facilities**

- ▬ Path
- ▬ Unpaved path
- ▬ Bike lane
- ▬ Paved shoulder

Coordinate System: NAD 1983 Wisconsin TM  
Projection: Transverse Mercator

\*Bike lanes on Washington Street are only appropriate as long as the roadway exists as a two-lane or two-lane plus two-way left turn lane configuration.

