The Thumb Region
Non-motorized Transportation Plan

Prepared for:

Counties of Tuscola, Sanilac and Huron

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Contents

1. Introduction

The Thumb Region is now poised to take its bicycle and pedestrian facilities, policies and programs to the next level. This document, funded by the Federal Energy Efficiency Block Conservation Grant program, lays out a systematic way to support non-motorized transportation in the Thumb region.

Helping to shape this plan, has been a dedicated group of elected officials, appointed officials, public employees and the general public. The results of an on-line survey, input gathered at during community visits, and results from previous studies guided the proposed non-motorized network.

The Non-Motorized Transportation Plan is comprised of two concurrent implementation tracts that focus on both the region and the local shoreline communities. When these two tracts are employed in concert, it will establish a physical and cultural environment that supports and encourages safe, comfortable and convenient ways for pedestrians and bicyclists to travel throughout the region and into the local communities.

It is anticipated that the cultural changes will result in a greater number of individuals choosing walking and bicycling as their preferred mode of transportation for many local trips. These choices will lead to healthier lifestyles, improved air and water quality, a more energy efficient and sustainable transportation system and a stronger local economy.

1.1 Why Walking and Bicycling Are Important

A comprehensive non-motorized transportation system based on best practices is of paramount importance to the health, safety and general welfare of the citizens of the Thumb Area. The benefits of a comprehensive non-motorized transportation system extend beyond the direct benefits to the users of the system but also to the public as a whole. A well-implemented non-motorized transportation system will reap rewards by:

- Providing viable transportation alternatives for individuals who are capable of independent travel yet do not hold a driver's license or have access to a motor vehicle at all times.
- Improving safety, especially for the young and old who are at most risk due to their dependence on non-motorized facilities and their physical abilities.
- Improving access for the 20% of all Americans who have some type of disability and the 10% of all Americans who have a serious disability.[1]
- Improving the economic viability of a community by making it an attractive place to locate a business while simultaneously reducing public and private health care costs associated with inactivity.
- Encouraging healthy lifestyles by promoting active living.
- Reducing the water, air, and noise pollution associated with automobile use by shifting local trips from automobiles to walking or bicycling.
- Improving the aesthetics of the roadway and community by adding landscaping and medians that improve the pedestrian environment and safety.
- Providing more transportation choices that respect an individual's religious beliefs, environmental ethic, and/or uneasiness in operating a vehicle.
- Reducing the need for parking spaces.
- Creating a stronger social fabric by fostering the personal interaction that takes place while on foot or on bicycle.
- Reducing dependence on the use of fossil fuel with the resulting positive impact on climate change.

Improvements to non-motorized facilities touch all individuals directly, as almost all trips begin and end as a pedestrian.

Where We Are Now

There is little question that the most significant influence on the design of American communities is the automobile. About eighty percent of America has been built in the last fifty years.[2] During those years, the design of everything from homes, neighborhoods, shopping center, schools, workplaces and churches have been profoundly shaped around the car. This is true not only for the site-specific placement of driveways and parking lots, but also the distribution and mixing of land uses.

[1] Disability Status: 2000 - Census 2000 Brief.
[2] Jim Kunstler, *Geography of Nowhere.*

Accommodations to the automobile came not simply as the logical outgrowth of an additional mode of travel, but often at the expense of bicycling, walking and transit. Increases in automobile volumes and speeds have made sharing a roadway uncomfortable and often unsafe. Also, the need for additional rights-of-way to accommodate added vehicle lanes has regularly come at the expense of space typically set aside for sidewalks.

The pattern of public investment in motor vehicle transportation above all other modes has resulted in an overall reduction in transportation options for the average citizen. Communities are now weighing the convenience of the automobile against the consequences of its use at current levels and trying to strike a balance. The direct and indirect consequences include:

- Current guidelines for exercise call for one hour of activity daily. Physical inactivity is a primary factor in at least 200,000 deaths annually and 25% of all chronic disease-related deaths.[1] Forty percent of adults do not participate in any leisure time physical activity;[2] of those who do participate in exercise, 66.1% use their local streets.[3]
- About 40% of all trips are estimated to be less than two miles which is an easy distance for walking or bicycling, provided appropriate facilities are available. In practice, automobiles are used for 76% of all trips under one mile and 91% of all trips between one and two miles.[4]
- While money for bicycle and pedestrian projects has increased dramatically since 1989 with the passage of federal transportation programs known as ISTEA and TEA-21, in Michigan, only $0.16 per person is spent on pedestrian facilities vs. $58.49 per person on highway projects annually.[5]
- The nation is experiencing an obesity epidemic; 61% of Michigan's adults are considered overweight, which is the second highest rate in the country.[6] While there may be other significant factors, the increase in obesity nationally over the past fifteen years corresponds with an increase in the number of miles driven and a decrease in the number of trips made by walking and bicycling. This epidemic is estimated to result in $22 billion a year in health care and personal expenses.[7]
- In southeast Michigan, people spend on average 18.8% of their income on transportation, second only to shelter at 19.1%.[8]
- The number of children that walk or bike to school has dropped 37% over the last twenty years.[9] The increase in traffic caused by parents taking their children to and from school and other activities has been estimated to be 20 to 25% of morning traffic. Half of the children hit by cars while walking or bicycling to school were hit by parents of other children.[10] Today only about 8% of children walk to school.

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[1] Ibid.
[2] W.C. Wilkinson, et. al. Increasing Physical Activity through Community Design: A Guide for Public Health Practitioners. Washington: National Center for Bicycling and Walking. May 2002.
[3] Brownson, Dr. Ross, et.al. "Environmental and policy determinants of physical activity in the United States", American Journal of Public Health, Dec 2001.
[4] Chicago Department of Transportation
[5] Surface transportation Policy Project, "Mean Streets 2000", 2000.
[6] Michigan Governor's Council on Physical Fitness, Health, and Sports.
[7] Ed Pavelka, "Can Commuting Help You Lose Weight?", League of American Bicyclists, Summer 2002.
[8] Surface Transportation Policy Project, "Driven to Spend", 2000.
[9] W.C. Wilkinson, et. al. Increasing Physical Activity through Community Design: A Guide for Public Health Practitioners. Washington: National Center for Bicycling and Walking. May 2002.
[10] Michigan Governor's Council on Physical Fitness, Health, and Sports.

- The result of automobile emissions on public health is just beginning to be understood. In Atlanta during the 1996 Olympics, there was a 22.5% reduction in automobile use; during the same period of time admissions to hospitals due to asthma decreased by 41.6%.[1] In Michigan, non-motorized trips account for about 7% of all trips, but make up about 12% of all traffic fatalities and severe injuries. Non-motorized modes are not inherently dangerous; communities have been able to significantly increase the non-motorized mode-share while simultaneously decreasing the number of non-motorized crashes. Emerging research is showing the single most important factor for improving bicycle and pedestrian safety is increasing the number of bicyclists and pedestrians.

The Intention of This Plan

The purpose of this plan is to provide a general background on the issues of non-motorized transportation as well as to present a proposal on how to address the issues through policies, programs, and design guidelines for facility improvements. This is not intended to be a replacement for the *AASHTO Guide for the Development of Bicycle Facilities, AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO Guide for Achieving Flexibility in Highway Design,* USDOT's *Designing Sidewalks and Trails for Access – Part II, Best Practices Design Guide*, the pending *Guidelines for Accessible Public Rights-of-Way*, MUTCD, MMUTCD or any other applicable federal, state, or local guidelines. Rather, it is intended as a synthesis of key aspects of those documents to provide an interpretation on how they may be applied in typical situations in the Thumb Region. Given the evolving nature of non-motorized transportation planning, these guidelines should be periodically reevaluated to determine their appropriateness.

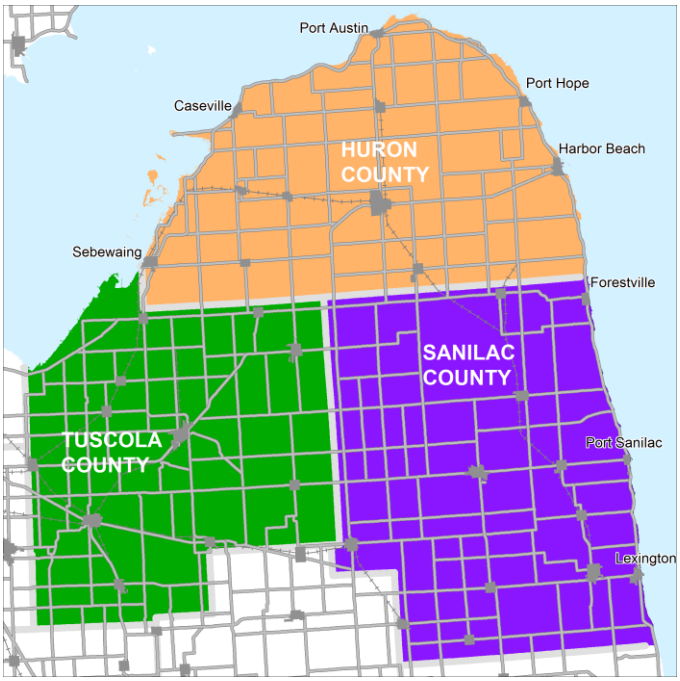
The recommendations in this plan are separated into two different strategies, regional and local. The regional strategies focus on the counties of Tuscola, Huron and Sanilac and the type of impact they can have together on increasing non-motorized travel in the region. The local strategies focus on the nine shoreline communities and how they can individually implement the non-motorized plan recommendations. Please note that although the recommendations are separated into these two categories, there are still elements that may not have a clear delineation between local and regional strategies because they could apply to both.

The specific facility recommendations within this plan represent a Master Plan level evaluation of the suitability of the proposed facilities for the existing conditions. Prior to proceeding with any of the recommendations in this report though, a more detailed corridor level assessment or traffic study may be required in order to fully investigate the appropriateness of the proposed roadway modifications and/or proposed bicycle or pedestrian facilities.

[1] Friedman, Michael S., et. al. Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma, Journal of the American Medical association, February 21, 2001.

1.2 Defining Characteristics of the Thumb Region

The Thumb Region is made up of Huron, Sanilac and Tuscola County. These three counties geographically are located in Michigan's "Thumb" and share many of the same characteristics. The region consists of a largely rural area with cities and villages scattered throughout. Agriculture is the dominant land use although there are some stretches of woodland. The topography is generally flat with some dunes and bluffs along the shoreline and some rolling hills in the central part of the thumb. This area is unique in that there are no freeways. Although this may hinder access to the area via automobile, the result is an area very friendly to bicyclists.



The highlight of the region is it's approximately 150 miles of Lake Huron Shoreline. In recent years the Michigan Department of Transportation has been working on installing a paved shoulder suited for bicycling along the 150 miles of the M-25 coastline. Scattered along the 150 mile route are a number of small shoreline communities with marinas and campgrounds. In between the communities are small roadside parks, historical and natural features, and scenic pull-offs, so every six miles or so along the route there is a place of interest such as a town or park.

In recent years the area has given rise to renewable energy development. The region is home to the first commercial scale wind energy developments in the state and it is expected to be one of the focus locations for more wind energy development in Michigan.

Many of the lakeshore communities include a number of seasonal residents. There are also are numerous campgrounds and RV parks scattered near the shoreline that cater to seasonal residents. The towns of Caseville, Port Austin, Port Sanilac and Lexington attract the largest number of tourist. Another major draw to the area is the Tip of the Thumb Heritage Watertrail, a 103 mile trail along the Huron and Tuscola Counties shoreline of Lake Huron.

The Thumb Region does not have a single attraction that brings people to the area. Rather it is the pastoral landscape, great lake shoreline, numerous smaller attractions and small town charm that bring people to the Thumb. The Thumb Region's strengths are the sum of its parts and its identity as a whole. The Thumb Regional Non-Motorized Transportation Plan works within this context to add one more facet to the region's brand.

The Vision

Envision a time in the not too distant future where the Thumb Area's identity is strongly correlated with outstanding pastoral bicycling routes, walkable small towns and a unique link between the water and land.

This plan presents a concise vision of how the counties and communities may transform their streets into outstanding attractive public spaces that are friendly to bicyclists and pedestrians while continuing to serve the needs of motorized traffic. It is anticipated that in the future the outcome of this plan will reduce vehicle miles traveled. This effort has been designed to complement the goals the Tip of the Thumb Heritage Water Trail. Together, these efforts will help the Thumb Region continue to be an attractive place to live, work, visit and play.

The purpose of this plan is to identify the non-motorized network and the support systems necessary for safe and convenient non-motorized travel. As the network and systems are implemented it is envisioned that the Thumb Region will become a statewide destination for one to three day bike trips and will be known for its bicycle and pedestrian friendly communities.

The plan consists of both regional and local strategies. Regional strategies are focused on making the region a destination for one to three day bicycle trips. The local strategies are focused on making the shoreline communities more walkable and bikeable.

2. Regional Strategies

Recommendations for the Thumb Region are outlined in this section.

Topics:

2.1 Vision & Objectives

Regional Vision

Become a statewide destinations for one to three day bike trips

Objectives:

- Increase in the number of visitors
- More local non-motorized trips by visitors
- Improve quality of life for residents
- Reduced energy use

2.2 Key Elements for Regional Strategies

The following key elements provide regional recommendations that define the current best practices for non-motorized facilities and describe the support system necessary for a successful network to help achieve the vision of the Thumb Region becoming a statewide destination for one to three day bicycle trips.

Key Elements:

- Develop a Regional "Bike Destination" Brand
- Produce a Regional Bicycle Map
- Create a Website to Promote Biking in the Region
- Install Wayfinding Stations
- Implement Bike Route Guide and Wayfinding Signs
- Develop Recommended Bike Route Trips
- Establish a Regional Safety & Fitness Campaign
- Establish the Thumb Region as the Midwest's Premier Mixed Surface Riding Experience
- Invite the Bicycling and Travel Press on Guided, Exclusive Tours
- Organize Signature Large Scale Ride
- Expand Cycle Touring Support Infrastructure
- Host League of Michigan Bicyclists Shoreline Tour
- Implement Regional Supportive Policies
- Institute Regional Evaluation System

Develop a Regional "Bike Destination" Brand

A non-motorized transportation system isn't of much use if people do not use the system. Too often there is a reliance on a "build it and they will come" approach. This ignores the fact that the Thumb Region and many other communities have been designed around automobile use for the last 50 years. Thus, many residents may not naturally feel comfortable using a non-motorized system and will benefit from some encouragement. Also, visitors from out of town may not even be aware of the non-motorized opportunities that the Thumb Region has to offer. A branded program gives the region a tool for promoting, communicating and creating buy-in for its facilities and initiatives.

Most brands form an identity through creating a name, determining the mission for the program, creating program goals, identifying what it is the brand does and finally what it looks like (logo, website, etc.). This image doesn't have to be anything fancy, but it does have to distinguish the brand as something unique and worth paying attention to.

Once a brand is developed it can be marketed. The brand should be incorporated into events, bike maps, signage, tourist information and websites. Key elements to bring forward in the brand are the great lakes shoreline, building on the "thumb's" regional identity and of course biking.

Fig 2.2A Example Logo

A logo should be developed that is representative of the thumb region. Above is an example of what a logo and name could look like.

Produce a Regional Bicycle Map

A map does more than simply provide wayfinding information. It defines an area as accommodating and welcoming to bicyclists and pedestrians and encourages exploration. A map produced by a region's tourism partners can also be an effective marketing tool for local merchants and businesses by offering advertising and sponsorship space, which can offset the cost of production and printing.

The three counties of Huron, Tuscola and Sanilac, should partner on the production of a regional bike map. The map should provide recommended bicycle routes, with emphasis on connectivity using existing infrastructure for all residents to destinations (including trails, other routes and surrounding communities). For the Thumb Region bike map it is recommended that local loops, such as 15 mile, 30 mile and 60 miles be identified to encourage local cycling trips starting and returning to the major shoreline communities. Other information such as identifying gravel roads and rolling terrain may be valuable on a regional map.

The bike map should include the entire street network as a base. On top of this base many maps rank on-street routes by color corresponding with the necessary traffic tolerance a cyclist would need to feel comfortable using them. The map should also include basic traffic cycling safety and trails etiquette information, including equipment choice, helmet information, locking information, and how drivers should pass cyclists on the street.

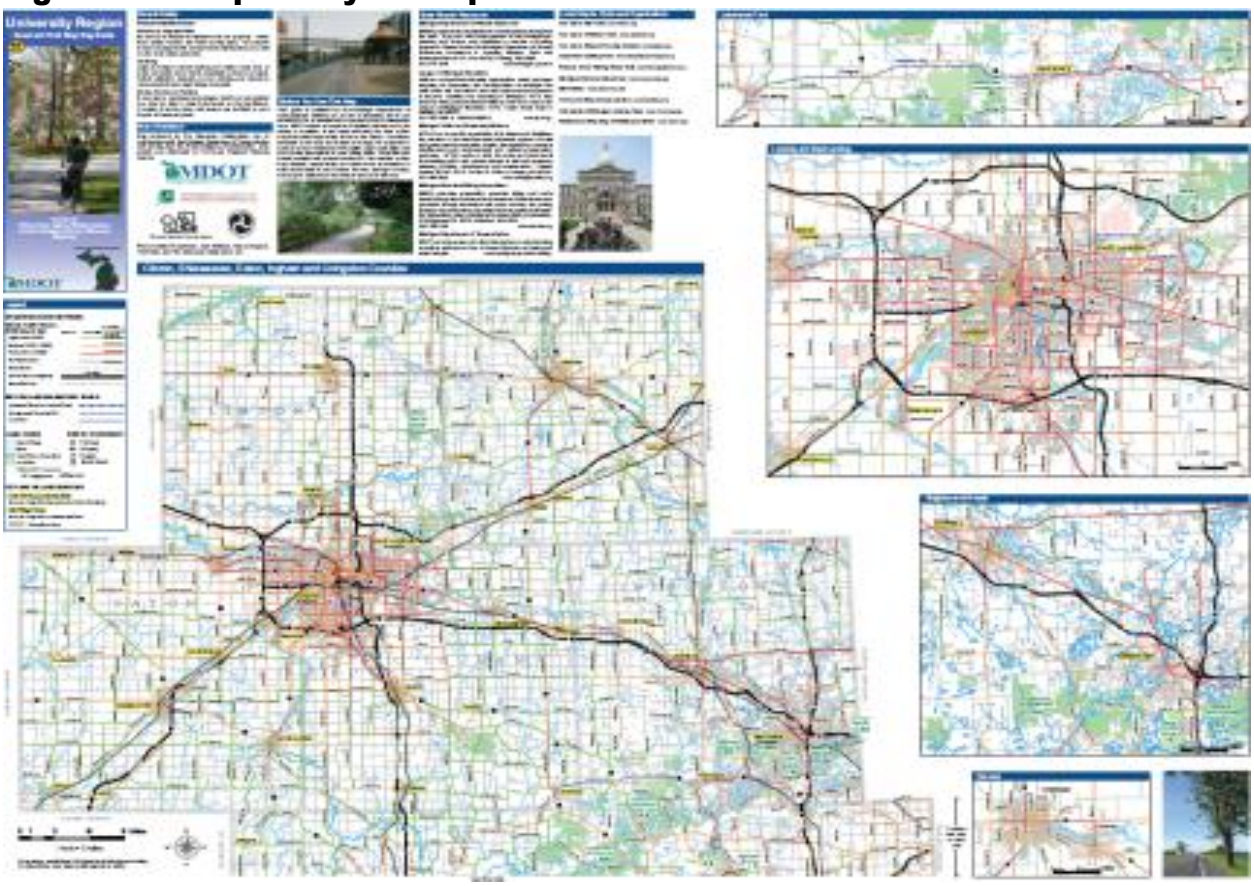
The bike map should be a stand-alone document distributed freely to generate excitement and awareness about cycling in the region. The goal should be to provide the map at no cost to the end user. This can be done by offsetting the map production and print costs by selling advertising or underwriting from regional tourism organizations. The map should also be located at welcome centers and at the proposed orientation kiosks for further distribution.

While MDOT already produces a bike map that includes the region, a Thumb Region specific map offers a number of advantages. First, it can recommend routes, something that the MDOT maps specifically avoid doing. Second, it can be more geared towards tourist information. Third, there is the opportunity to create more detailed inset maps of the communities. And last, there is the opportunity to strongly tie the map with the brand.

An attractive and useful map for the region also has the benefit of likely being used by non-bicyclists as well. This provides a means to reach a group of people who are not necessarily inclined to bike but by using the map for other purposes will be exposed to an alternative transportation mode as well as important bike safety issues. The regional map that was prepared for this project is an excellent start towards a regional bike map. With relatively little effort, it could be transformed into a regional bike map.

Michigan is home to several large, active bicycle organizations that can become outstanding distribution centers for the Thumb Region maps. National organizations, such as Adventure Cycling and the International Mountain Bicycling Association, would be willing and natural outlets for the map as well.

Fig 2.2B Example Bicycle Map



Create a Website to Promote Bicycling in the Region

The branded program should have its own website presence. The website should offer the following information:

- Downloadable version of the bike map. This map could even have layers that could be turned on and off depending on what the user wanted to see
- Specific detailed maps of recommended routes of various lengths and those that are directed as specific interests such as a birder's tour or a backcountry gravel road routes.
- Places to stay
- Places to eat
- Points of interest such as historical markers and unique natural features
- Calendar of biking and walking related events
- Updates regarding grants, awards, and new facilities
- Links to local community websites
- Merchandise (optional)
- Advertisements (optional)

The website should be complimented by links to follow the region on Facebook and Twitter. A Facebook page was created for this project and it should be expanded on and updated on a regular bases. It is important that the social networking feeds post about any information about walking or biking in the region. The Facebook page should be open to all notes, commentary and encouragement regarding the current cycling and walking experience, good and bad. Both Facebook and Twitter can build community but only if communication is two-way and open. The goal of this type of media is to start and grow a conversation around the shared vision of a bicycle and pedestrian friendly community. The payoff is community buy-in, a rich source of viewpoints, a ready company of potential volunteers, and a qualified audience for programming and events.

Intall Wayfinding Guides

Wayfinding Guides help to orient and guide non-motorized users along identified routes to key destinations. Signage and information kiosk are examples of wayfinding guides.

Orientation Kiosks

The Orientiation Kiosk contains a map of the non-motorized network noting the current location and additional information about the route . Orientation kiosks are proposed in existing roadside parks and between local communitties along the M-25 Heritage route. They would be spaced approximately every 6 to 8 miles.

Active Transportation Hubs

Active Transportation Hubs are located in the downtown area in an easily accessible location. These hubs will serve as orientation and resources centers for non-motorized trips. In addition to the Orientation Kiosks, the Active Transportation Hubs will contain addition information and amenities.

Active Transportation Hubs should include the following amenities:

- Downtown Information Kiosk
    - county bike map
    - list of downtown attractions
    - bulletin board that lists resources and events
    - general tourist information
- Compressed Air or heavy duty fixed hand pump
- Vending Machine that dispenses basic bicycle supplies such as tubes and repair kits.
- Bike Parking
- Bench
- Trash Receptacle
- Lighting

Fig 2.2C Orientation Kiosk

Fig 2.2D Active Transportation Hub

Fig. 2.2E Active Transportation Hubs and Orientation Kiosk Locations

There are 22 proposed Orientation Kiosks to direct people between the shoreline communities. These kiosks may be expanded to provide orientation points for the in-land bike routes.

The Active Transportation Hub's will be located in each shoreline community and some of the larger communities may also have bike rental.

Implement Bike Route Guide and Wayfinding Signs

In order to navigate the inland bike routes, route guide signs should be incorporated. They help to note changes in direction in the route and identify major destinations.

On-Road Bike Routes

Bike Route Guide Signs are used along designated bike routes to inform bicyclists of bike route direction changes and to confirm route direction, distance and destiantion. When used, these signs should be repeated at regular intervals so that bicyclists entering from side streets will have an opportunitiy to know that they are on a bicycle route.

Bicycle Destination Signs (MUTCD D1-1c) are about the size of a street sign and indicate the direction to bicycle destinations along with the distance.

Alternative Bike Route Guide Signs (MUTCD D11-1c) are used to provide information on the destination and reassure bicyclists that they are on the correct route.

Named Bike Routes

In addition to Bike Route Guide Signs, the bike route that follows the M-25 Heritage Route along the shoreline is significant enough to warrant a name designation. In this case, the Bike Route Identification Sign (MUTCD M1-8a) should be used.

Bike Route Identification Signs establish a unique identifcation for a bike route. These signs are typically used with auxilary plaques that indicate the direction of travel and any changes in direction of the route. A custom logo and route name can be applied to these signs.

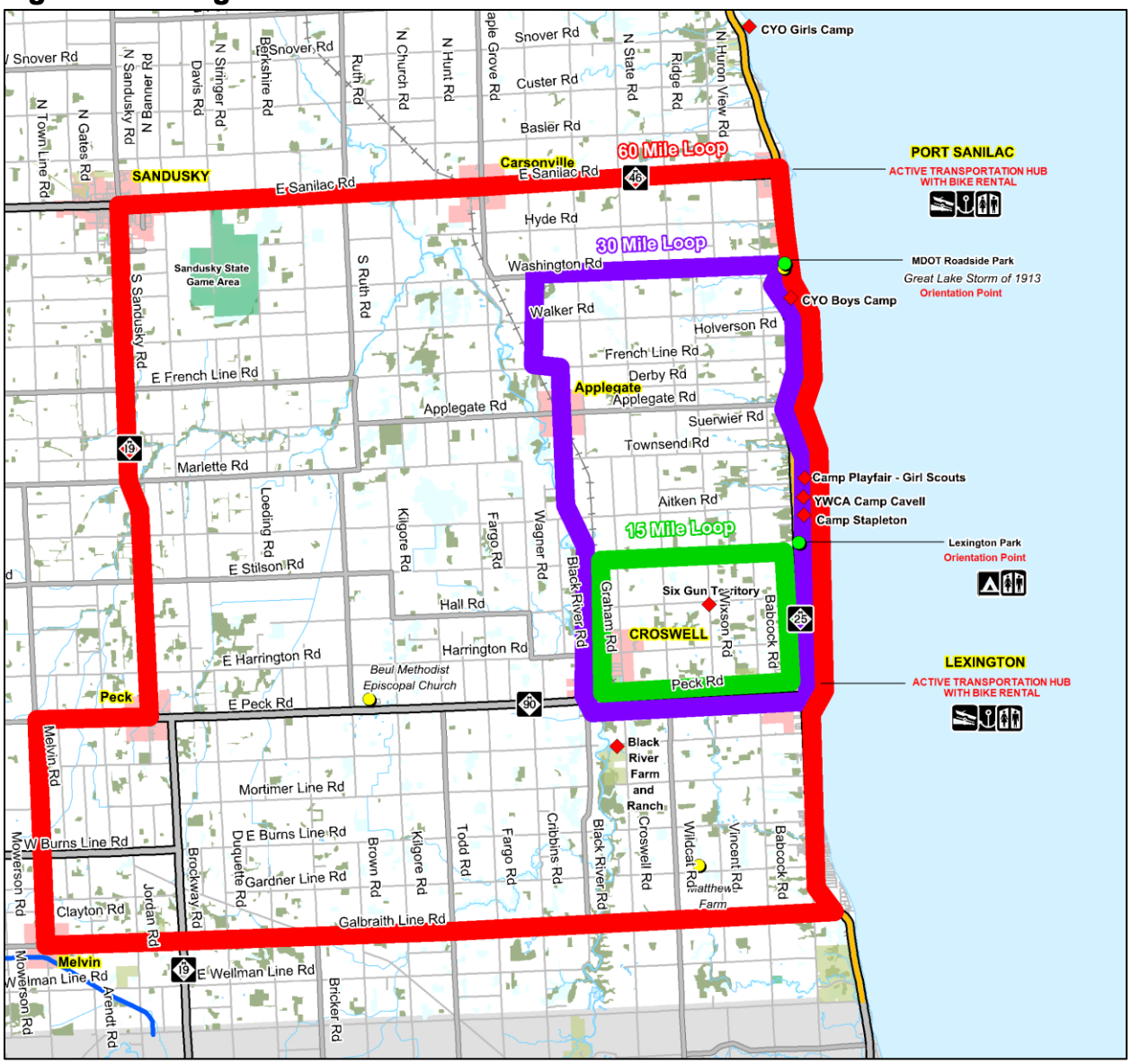
MUTCD M1-8a

Develop Recommended Bike Route Trips

Using a combination of in-land and shoreline bike routes, each shoreline community should establish approximately 15 mile, 30 mile and 60 mile loops. The loops should connect to nearby communities, parks, and historical destinations. Wayfinding and route identification signage should be added to provide guidance along the routes. Below is an example of how the routes would work in Lexington.

Preliminary routes have been identified for all of the shoreline communities and are indicated on The Proposed Regional Network Map. These routes interconnect to create a system of bike routes throughout the Thumb. Below is an example of how the bike routes from Lexington.

Fig. 2.2F Lexington Recommended In-land Bike Routes



Establish a Regional Safety & Fitness Campaign

The Issue
Generate regional awareness and excitement by developing a Regional Fitness and Safety Campaign that will help support active and healthy lifestyles and promote non-motorized transportation in the region.

The Idea
Though a partnership between Tuscola, Huron and Sanilac Counties create a regional campaign that presents a simple focused message to all roadway users. Have a key safety message and a key health message that stresses only a few focused points to the public.

The safety message should be "Understand and Respect All Roadway Users." The message should be a two-way conversation between non-motorized users and motorists. The message should not be condescending or accusing but rather be structured to foster a better understanding of the perspective of other users. Another key aspect is that bicyclists, pedestrians and motorists should be seen as people, not modes. The message should highlight that all of the users of the roadway should be treated as your neighbors, friends, family and guests. The following are three points to focus on:

- Bikes are Vehicles – Bicyclists on the roadways need to operate the same as motor vehicles and motorists should accord bicyclists the same the same rights they would for other motorists.
- Using Crosswalks – Pedestrians should use crosswalks when available and motorists should be acutely aware of the potential for pedestrians at crosswalks and yield to pedestrians in crosswalks.
- See and be Seen – Bicyclists and pedestrians should be encouraged to wear bright and reflective clothing and use lights at night and motorists should be encouraged to keep an eye out for pedestrians especially at dusk and at night.

The key health message could be "Active Transportation Improves Quality of Life." The message should stress the individual benefits gained from walking and bicycling. It should avoid being condescending, overloading people with statistics and setting unrealistic expectations. Rather it should be encouraging people to simply integrate walking and/or bicycling into everyday activities such as a trip to school, the store or to see a friend. The following are three points to focus on:

- Improved Fitness Level – How improving your physical fitness does not necessarily require joining a gym.
- Mental Well Being – How physical activity has a positive impact on a person's mood.
- Air Quality – How driving less improves the air that you breathe.

How it Works

A regional safety and fitness campaign acts as the support system necessary for setting up and coordinating non-motorized events and activities throughout the region. If the outreach and education program is going to be successful, its development, direction and oversight needs to include key stakeholders, including interested residents. Forming a Regional Fitness & Safety Campaign Task Force that engages stakeholders helps provide buy-in from important groups as they are involved in the process of creating this program. They'll also be important channels for promoting efforts and programs to their constituencies, enabling the program to tap a much larger pool of potential volunteers, resources, energy and enthusiasm.

The primary responsibility of the Task Force will be to establish the needs of the community for non-motorized transportation education, information, promotion and events, and to provide the expertise, partnerships, resources and coordination to fulfill them.

This plan recommends that the Task Force have members from Tuscola County, Huron County, Sanilac County, representatives from the local cities and villages and other key stakeholder groups in the community. Suggested stakeholders for this Advisory Board include the following:

- Staff member from the different municipalities that represent parks and recreation
- Staff members from the different municipalities that represents transportation, public relations
- Representatives of the Chamber of Commerce
- Representatives from the Police Department
- Representatives from the County Road Commissions
- Representative from the business community
- Representatives from the Hospital
- Representatives from Michigan Trails and Greenways Alliance
- Up to three residents interested in bicycling and walking
- Representative of the Public Schools, potentially working on Safe Routes to School issues

The Task Force will also help to establish relationships among groups that are effected by non-motorized and sustainable transportation issues, highlight programs and services that should not be duplicated and generally contribute to a program that is more likely to meet the needs of the community.

This Task Force should meet on a monthly basis to provide input on the direction of the program and help find ways to partner with the program once it is created.

Example Programs

Targeted Promotion: The most cost effective and best way to communicate to an audience is to target the message specifically to them. An effective public outreach and education campaign recognizes that different audiences have different needs. Residents, for example, are going to need different information and have different needs for non-motorized transportation than commuters. The same goes for students versus youth versus seniors. While there are a myriad of audiences for any public outreach and education campaign, it would be completely overwhelming to try to reach all of them. So an education and outreach campaign should start by identifying the key groups to focus the program on to begin with. Once the key audiences are identified, there are many techniques to try and figure out what messages might work for those audiences. These techniques include focus groups made up of the audience, surveys of the audience and interviews with key stakeholders.

The following are example of five different target groups and the specific message for that group that the Regional Fitness & Safety Campaign may want to focus on.

- Children – Physical Fitness
- Residents – Healthy Lifestyles
- Seniors – Physical Activity
- Business Community – Keeping the Work Force Healthy

Gas Pump Campaign: It can be difficult to reach Motorists with a message, especially if motorists do not live in the area or are just passing through town. However, filling up at the Gas Station may present an opportunity to get their undivided attention. It is recommended that the Task Force develop a gas pump campaign and coordinate with the local Gas Stations to provide educational and safety information at gas pumps.

Public Service Adds: A public service announcement can be a cost-effective and powerful way to send your message. Although public service announcements are no longer mandated by law to air for free, many new ones are still being produces and aired today via sponsorship of local businesses or organizations. The Task Force should contact the local television and radio stations and speak with the public affairs director to find out what guidelines and format are required for a submission. Some TV and radio stations may also offer these details on their website.

Establish the Thumb Region as the Midwest's premier mixed-surface riding experience

Mixed surface riding taps the growing appeal of back road bicycle touring and cyclists' natural inclination toward exploration and personal challenge. In addition to off-road mountain bikes and cyclecross bikes, which blend road racing and off-road racing features, bicycle manufacturers are also beginning to sell bicycles specifically for mixed-surface touring to satisfy a growing market.

The Thumb region can own the mixed-surface bicycle touring experience. Its generally flat landscape already encourages experienced cyclists to set personal bests in distance and speed in events like the Lexington Triathlon, and invites all levels of cyclists to ride. The variety of the Thumb region's coastal and inland features, impressive windfarms, unique and well-spaced small towns, acres of pasture land for large scale dairy farming, giant bean and sugar beet operations and even some rolling landscape, are a natural draw for cyclists. And with a little marketing and some significant efforts, such as a signature ride, the Thumb alone in the Midwest could claim the gravel road cycling experience as unique to its region.

Invite the bicycling and travel press on guided, exclusive tours

The Issue
To introduce members of the regional travel press and state and national bicycling press to the Thumb's mixed-surface bicycle touring experience.

Why it Works
The Thumb's invitation to the cycling and travel press to experience mixed-surface bicycle touring would be unique in the Midwest. The natural amenities of the area, including the generally flat terrain, the low levels of traffic on the roadways, bed and breakfasts and the combination of shoreline and rural landscapes would provide compelling features to share with their audiences.

How it Works
A tour for journalists and bicycling organization editors should coincide with a release of the Thumb's bicycle touring map to capitalize on the map's availability. The three counties should coordinate the tour with one of the region's cyclists experienced with crossing the region. The counties should also solicit participation from the region's restaurants and tourism-dependent shops and bed and breakfasts to showcase the region's amenities.

The idea works as a small group ride, or as individual tours; our recommendation is to invite the journalists and editors to ride on a specific date, or to make arrangements individually. If the journalist prefers to tour without a guide, send recommended routes and points of interest, and offer to make lodging arrangements.

Organize Signature Large Scale Ride

The Issue
Generate regional excitement and notoriety for the Thumb as a healthy, challenging, and rewarding region to explore by bicycle

The Idea
Huron, Sanilac and Tuscola counties produce a signature annual event that is unique, compelling, challenging, and can bring benefits across the Thumb region, inland and coastline.

The following are examples of two rides that could be promoted:

> Dairy Roubaix—a mixed-surface ride (pavement and gravel) from Caseville, MI. to Lexington, MI the day before the Lexington Triathlon.
>
> The Cheeseburger Chase—a mixed-surface ride from Lexington, MI to Caseville, MI, during the Cheeseburger Festival.

Why They Work
The flat fields, the extensive gravel road network, the length of the route—which could easily be mapped at century length, or 100 miles—bookended by the beautiful coasts of Lake Huron and Saginaw Bay make for an epic day of memorable riding. The ride will showcase the quiet farm roads, friendly small towns and rural scenery of the Thumb's interior. It would be the longest mixed-surface ride in Michigan.

Organized, challenging, and fast gravel road rides have long been a favorite of the mountain biking community. Last year, more than 1,000 riders competed in Barry-Roubaix (http://www.barry-roubaix.com) a mixed-surface bicycle race in the Grand Rapids area.

Both rides leverage other existing events—the Lexington Triathlon, typically held in late July, and the Caseville Cheeseburger Festival, typically held in late August. Tying the ride to existing events boosts ride marketing and ultimately ridership while adding an additional attraction to the Triathlon and the Festival.

While the ride length and changing road surfaces will challenge participants, overall the events are family friendly, and will encourage visiting along the coast as non-riding family members can follow the coast to the finishing communities, sight-seeing, eating and shopping along the way.

How it Works
A large scale ride will engage the road crews and police forces of the counties and the communities along the route, plus a team of volunteers besides. The Thumb should partner with an expert in large scale ride production and management such as KissCross, who produces the Barry-Roubaix, the Michigan Mountain Biking Association, League of Michigan Bicyclists, and/or Michigan Trails & Greenways Alliance. Involving these organizations also invites their partnership in event promotion to their constituencies.

The counties should expect its partner to get the lion's share of registration and sponsorship revenue while covering their own costs for marketing, increased traffic enforcement, etc. Additional revenue should flow to the counties and its businesses from the increased tourism that the event generates that weekend and from follow-on visits resulting from the event's promotion and coverage.

Expand Cycle Touring Support Infrastructure

The Issue
Expand the cycling support infrastructure important to encourage and extende bicycling trips in the region

Why it Works
Amenities that support cycling – safe bike parking, ready access to repairs and supplies, bathrooms, water fountains, food providers – make bicycling an easier, less stressful choice, which encourages more bicycle travel and more visits by bicycle travelers.

How it Works
Currently, cyclists are underserved in the Thumb; only two bicycle shops exist, one in Port Huron and the other in Cass City. Towns often lack bike repair supplies. Local businesses and points of interest rarely offer secure bicycle parking. All of these shortcomings work against encouraging bicycle tourism. But all can be improved for relatively little capital investment.

A "bike box" from www.24hrBikeShop.com is stocked with supplies such as tubes, patch kits, C02 cartridges, energy supplements, etc. They offer retailers a readymade kit.

Example Programs
Spread bicyclists' common needs beyond the bike shop – Encourage local merchants to stock a range of inner tube and tire choices, bicycle lube, and tire patch kits and pumps. As an incentive, mark their locations on the Thumb's bicycle map. For example, the tire company Continental has converted used cigarette vending machines all over Germany to instead vend the company's line of inner tubes and patch kits, and now offers to bicycle shops a purpose-built vending machine. The machines provide 24/7/365 service. Either existing bike shop in the Thumb or another business could be invited to install the machines at locations marked on the Thumb's bike map.

Partner with St. Clair Community College's job training program to build bicycle parking racks. St. Clair offers practical course work in specialized welding and metal fabrication. This may open opportunities to supply the region with bicycle parking racks for much less cost. Racks could be stamped with the school's website or some other message to return value to the school.

A vending machine for bike supplies in Moab, Utah.

Host League of Michigan Bicyclists Shoreline Ride

The Issue
Generating tourism and economic activity by encourage existing bicycle tour groups to hold events in the region


Photo: League of Michigan Bicyclists

Why it Works
Every year, for the past 25 years the League of Michigan Bicyclists puts on a shoreline bike ride. The Shoreline Ride has never taken place in the Thumb Region before and there is some interest to have it in this region in the near future. A benefit of having the tour in the Thumb Region is that the cyclists can do a loop and return to the point that they began, while at the same time generating economic activity in the local communities and awareness of the Thumb Region as a destination for bicycle touring.

How it Works
The Thumb Region hosts a League of Michigan Bicyclists Shoreline Ride. The shoreline bike ride generally ranges from 150 to 500 miles, with 3 day, 6 day and 9 day bike tours. The tour groups generally travel 60 miles a day. Traveling through local communities and staying at campgrounds and schools.

Implement Supportive Regional Policies

Complete Streets Policy
Complete Streets are designed and built so that people of all ages and abilities can travel easily and safely along and across a roadway. States, regions, counties and cities around the county have used various complete street policies to unambiguously endorse and define their support for non-motorized transportation.

In the near-term the counties of Tuscola, Huron and Sanilac should enact a Complete Streets Resolution that includes language that directs staff to prepare a Complete Streets Ordinance over the next year. See the Appendix for more details on Complete Street Policy.

Institute Regional Evaluation System

The miles of built facilities should also be documented on a yearly bases to track the development of the regional non-motorized network. The miles of bike lanes, pathways, sidewalks, neighborhood connectors/bike routes, number of mid-block crossing improvements and number of bike parking spaces should be tracked. It is important to keep up-to-date documentation of these facilities because these measurements are used to apply for awards, such as the Bike Friendly Community Award.

2.3 Proposed Regional Improvements

The Proposed Regional Network Map highlights the recommended bike routes, key destinations and amenities across the Thumb region. The following map is an overview of the network. The Proposed Regional Network Map can be downloaded from the project website at: www.greenwaycollab.com/ThumbNoMo.htm

Fig. 2.3A. Proposed Regional Improvements Overview

Recommendation Summary
The focus of the regional plan is the M-25 corridor and the waterfront communities and destinations. The M-25 corridor has a nearly complete paved shoulder around the entire thumb area with many attractive villages and parks scattered along the shoreline. This plan recommends in-land bike routes and wayfinding signage to help guide cyclists around the shoreline and into the interior communitites.

Cost Summary for Regional Improvements
Approximately 455 miles of Inland Bike Routes are proposed. Assuming 2 bike route signs per mile, the estimated cost for implementation is $182,000.

A total of nine (9) Active Transportation Hubs are proposed in the region with an estimated cost of $275,625 for all nine. (This assumes 3 Marina Hubs and 6 Downtown Hubs.)

A total of 12 orientation kiosks are proposed throughout the region. These are 2-sided signs with a limestone base veneer and vinyl graphics. Each sign is estimated at $8,500 or a total of $102,000 for the region as a whole. Information signs are also proposed throughout the region (18). These are much simpler signs (24" x 24") on two 4x4 wood posts. Information signs are proposed to help orient visitors to the Active Transportation Hubs. Estimated at $200 each, 18 Information Signs are estimated to be $3,600.

Please refer to Figure 2.3B. on the following page for a breakdown of the costs.

Funding Strategy for Regional Improvements
The MDOT Transportation Enhancement (TE) program is a competitive grant program that funds projects such as non-motorized paths, streetscapes, and historic preservation of transportation facilities that enhance Michigan's intermodal transportation system and improve the quality of life for Michigan citizens. Packaging together several of the proposed "Regional Improvements" into a TE application may produce an attractive funding opportunity. A suggested TE application that would benefit the entire Thumb region and make a significant statement toward the establishment of a "Non-Motorized Brand" could include the following elements:

• Inland Bike Routes	$182,000
• Transportation Hubs (9)	$275,625
• Orientation Kiosks (12)	$102,000
TOTAL	$559,625

The MDOT TE program requires a minimum 20% local match. Therefore, a TE application including the elements noted above would be approximately $111,925. Additional local match (beyond the 20% required) will improve the likelihood of grant success. With a 20% local match, the TE grant request would be approximately $447,700. The TE program will not fund items such as the design of the Hubs and Kiosks (considered non-participating costs). It's anticipated design of these elements and sites as proposed for the entire region would be between $30,000 - $60,000 depending on the conditions of the various Hub sites.

MDOT TE grants may be submitted online at any time. If a conditional funding commitment is received from MDOT, the region would move forward with design of the sites and kiosks for review and approval by MDOT. The TE program is a reimbursement program.

Fig. 2.3B. Costs for Proposed Regional Improvements

	Quantity	Unit	Unit Price	Cost Estimate
Inland Bike Route Signage (2/mile)	455.1	mi	$ 400	$ 182,040

	Quantity	Unit	Unit Price	Cost Estimate
Active Transportation Hub - Downtown				
Pad/Plaza (12' x 15') concrete (4")	180	sf	$ 5	$ 900
Compressed Air	1	ea	$ 3,000	$ 3,000
Bench	1	ea	$ 1,000	$ 1,000
Hub Kiosk	1	ea	$ 14,000	$ 14,000
Bike Rack	4	ea	$ 200	$ 800
Ped Level Light Fixture	1	ea	$ 3,500	$ 3,500
Landscaping	1	ls	$ 1,500	$ 1,500
Trash/ Recycle Receptacle	1	ea	$ 1,000	$ 1,000
	Sub-Total			$ 25,700
	Contingency (15%)			$ 3,855
			TOTAL	$ 29,555
Active Transportation Hub - Marina				
Pad/Plaza (12' x 15') concrete	180	sf	$ 5	$ 900
Compressed Air	1	ea	$ 3,000	$ 3,000
Bench	1	ea	$ 1,000	$ 1,000
Hub Kiosk	1	ea	$ 14,000	$ 14,000
Canoe/Kayak Rack (6-8 boats)	1	ea	$ 1,500	$ 1,500
Equipment Locker	6	ea	$ 350	$ 2,100
Ped Level Light Fixture	1	ea	$ 3,500	$ 3,500
Landscaping	1	ls	$ 1,500	$ 1,500
Trash/ Recycle Receptacle	1	ea	$ 1,000	$ 1,000
	Sub-Total			$ 28,500
	Contingency (15%)			$ 4,275
			TOTAL	$ 32,775
Active Transportation Hub Kiosk (7' tall; 3.5' wide)			4 sided, glass and steel	
Kiosk Frame/Structure	1	ls	$ 14,000	$ 14,000
Bike Weathervane				
Limestone Base Vineer				
Vinyl Graphics				
Back Lighting				
	TOTAL			$ 14,000
Orientation Kiosk (2-sided; no backlighting)				
Kiosk Frame/Structure	1	ls	$ 8,500	$ 8,500
Limestone Base Vineer				$ -
Vinyl Graphics				$ -
	TOTAL			$ 8,500
Information Sign (24"x 24" custom metal signs on 2 4x4 wood posts)				$ 200

3. Local Strategies

Recommendations for the nine shoreline communities of, Lexington, Port Sanilac, Forestville, Harbor Beach, Port Hope, Port Austin, Caseville, Sebewaing, and Unionville are outlined in this section.

Topics:

3.1 Local Vision & Objectives

Local Vision:

Bicycle and Pedestrian Friendly Communities

Objectives:

- Safer walking and bicycling environment
- Increased awareness of walking and bicycling opportunities
- Establish supportive infrastructure
- Improve quality of life
- Reduced energy use

3.2 Key Elements for Local Strategies

The following key elements provide local recommendations that define the current best practices for non-motorized facilities and describe the support system necessary for a successful network to help achieve the vision of creating more bicycle and pedestrian friendly communities in the region. While the focus of this section has been prepared for the shoreline communities, many of these recommendations could apply to any of the other interior communities in the Thumb Region.

Key Elements:

- Active Transportation Hubs
- Bike Rental
- Produce Local Walking Maps
- Gateway Transitions
- Bicycle Parking
- Canoe/Kayak Racks
- Non-motorized Facility Improvements
- Maintenance
- Education & Enforcement Strategies
- Local Policies
- Methods of Evaluation for Local Strategies

Active Transportation Hubs

Imagine a future where visitors to each town, whether they arrive by car, bus, motor boat, camper or kayak will find a distinctive active transportation hub. These hubs will serve as orientation and resource centers for non-motorized trips. They will chart the signed bike routes of various lengths that go into the surrounding countryside and link to neighboring towns. For tourists, they will find convenient bike rentals to explore in-land areas.

The goal of these active transportation hubs will be to provide new ways for people to experience the Thumb's unique combination of resources. If done well and in a systematic way, the region can build up its brand as a close to home recreation destination. This will benefit the residents of the communities not only from an economic standpoint, but also by helping to make walking and bicycling a natural choice for many of their daily trips.

Active Transportation Hubs include the following amenities:

- Downtown information kiosk that includes a county bike map, list of downtown attractions, bulletin board that lists resources and events, and general tourist information.
- Compressed air or commercial grade fixed air pump
- Vending machine that dispenses basic bicycle supplies such as tubes and repair kits.
- Bike parking
- Bench
- Trash Receptacle
- Lighting

Fig. 3.2A. Active Transportation Hub

Active Transportation Hubs should be located in the downtown area with easy access from M-25. Information signs should be located at key locations outside of the downtown, such as at campgrounds and marina's to direct people to downtown where there is an Active Transportation Hub and Bike Rental Facilities. The information would be basic 24" x 24" metal silk screen signs that give simple direction to the downtown and Active Transportation Hub. See Fig. 3.2B below.

Fig. 3.2B Active Transportation Hub Downtown Schematic

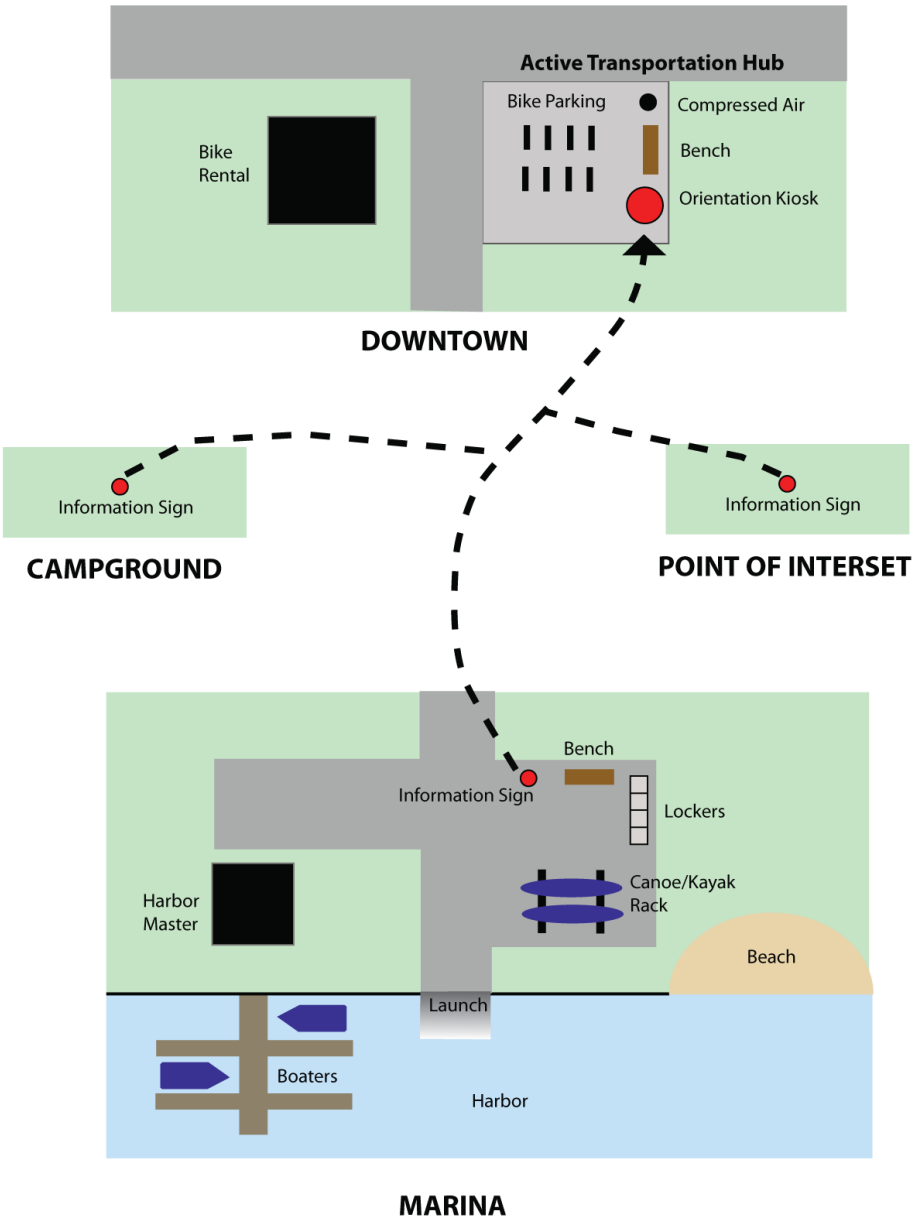


Fig. 3.2C Active Transportation Hub Location Map

Active Transportation Hub's will be located in each shoreline community. Some of the larger communities that are noted above may have potential for a bike rental program.

Bike Rental

The Issue
Encourage bicycle rental business at key shoreline communities by offering cycling and day touring as a ready, convenient, affordable option for any visitor and seasonal resident of the Thumb's coastal communities.

Why it Works
Bicycle rentals are a key indicator of great areas for bicycle travel. The availability of bicycles for rent in the larger shoreline communities – Caseville, Port Austin, Harbor Beach, and Lexington – adds sustainable, gas-saving tourism as a marketable feature to the region, raises the profile of the Thumb as an openly bike-friendly region, allows trips to be extended as people take more time to explore the region, and generates additional economic activity.

The higher density of multi-unit condominiums and RV parks, as well as thriving marinas, in these four communities, offer a built-in market to make seasonal bicycle rental viable for a managing business partner or non-profit entity.

How it Works
Bicycle rentals in key shoreline communities should be pursued as a business opportunity for private investment, with assistance from public entities to establish and promote the business. These towns already are home to many business owners who rent kayaks and charter boats, or manage rental properties such as RV sites and cottages. They have already established a base of expertise in the seasonal rental business on the Thumb's coast, and they might have facilities available near potential customers that allow easy business expansion into bike rental.

There is a role for the counties to play to ensure that the region benefits appropriately from entrepreneurial investment in bike rental. An important goal is to boost the Thumb's profile as a compelling region for bicycle travel. With that goal in mind, consistent and memorable branding of bike rental locations could become a recognizable characteristic of the Thumb and the cycling experiences available there. Similarly, branding a fleet of rental bicycles with a frame or basket-mounted plate or badge, perhaps even painting the bikes the same color, turns those bikes into rolling promotion for bike rental and Thumb cycling.

But how could a single brand be spread out over multiple business owners? The answer is licensing – sell licenses to independent operators that allow them access to the bicycles, branding and promotion of a Thumb-wide rental program. This allows centralized control over how the program serves the broader goal of increasing bicycle use and tourism in the Thumb, while still rewarding entrepreneurial energy and capital.

Example Program
The three counties collaborate on an incentive package to present in an RFP to identify a private partner who will manage a Thumb Bike program deployed in Caseville, Port Austin, Harbor Beach, and Lexington (the name "Thumb Bike" is used here only for convenience). The regional program will set the terms of licensing, source and purchase the bicycles and accessories (such as baskets and locks), set the minimum rental fee amount, identify franchise locations, and provide customer service to the licensees.

For example, Port Austin Kayak, which already rents bicycles to the public, agrees to become a Thumb Bike licensee. For an annual licensing fee paid to Thumb Bike (just used as an example), Port Austin Kayak receives a conspicuous sign that identifies the business as a Thumb Bike location, inclusion in the

Thumb Bike program's marketing program, and the right to lease Thumb Bikes which are distinctively identified and branded. Leasing bikes to the licensee allows the regional operator to extend incentives for new license startup or for annual renewal; giving a break on first month's leasing would allow a licensee to offer special rental rates to customers, for example, to grow his or her business.

The bikes are simple: single speed, coaster brakes, with baskets. The baskets are important, as they enable shopping trips, carrying the lock (which should be included), or carrying gear to the beach. Signs mount easily and conspicuously to baskets, allowing easy branding. A deposit for the bike's replacement cost protects against loss.

Because the Thumb Bikes cover the basic bicycle rental market, Port Austin Kayak can add additional, higher margin bicycle models to its fleet to service expert cyclists' needs, such as fast road riding, cross country touring, or mountain biking.

Other Options

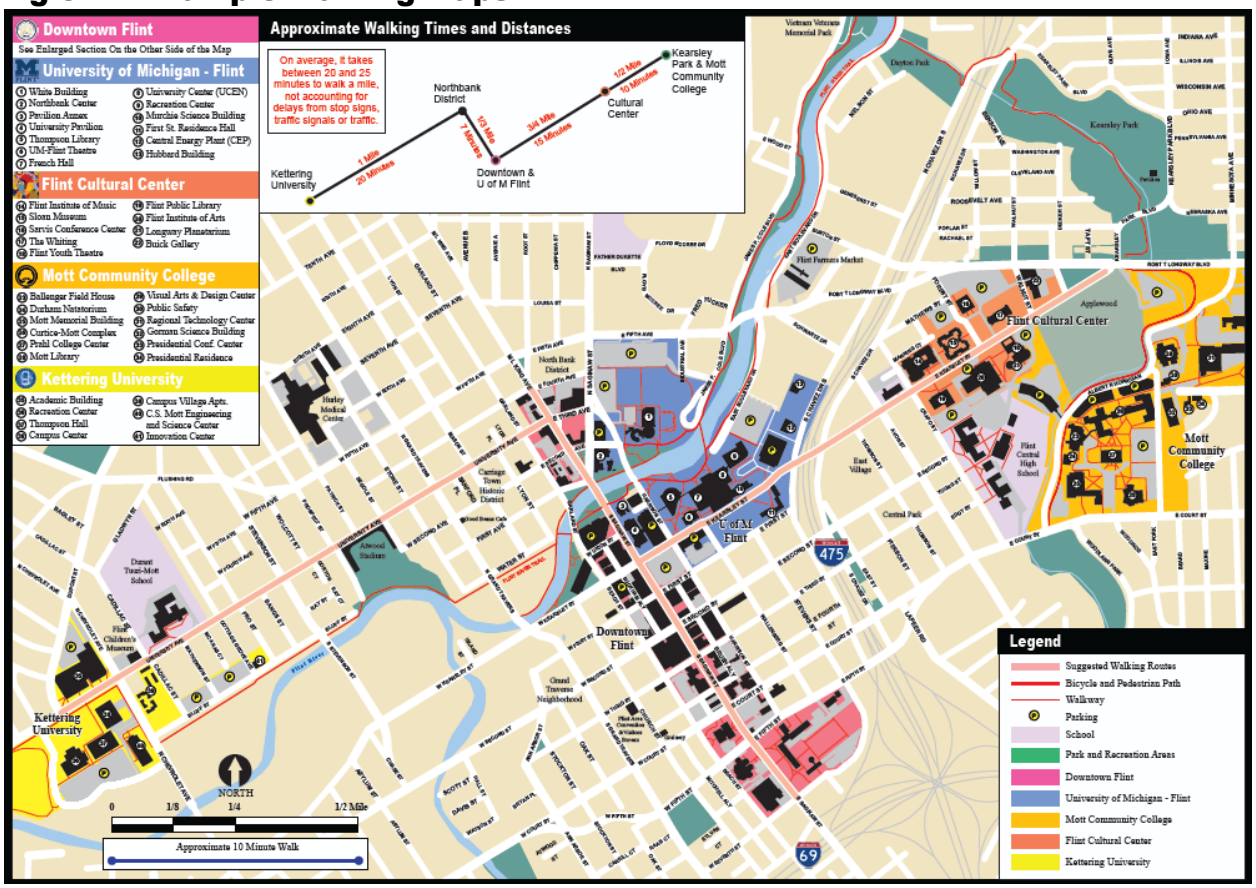
There may also be opportunities to coordinate with St. Clair Community College. St. Clair Community College's small business and job training programs could participate in Thumb Bike's corporate operations – overall management, licensing, logistics, and customer service – as a real-world classroom for class credit, job training and internship. St. Clair Community College's involvement could mean access to job training funding for the program, relieving some of the program's capital requirements. It could also boost employment and the prospects of young adults to stay in the region to explore further entrepreneurial or management opportunities.

Produce Local Walking Maps

A walking map should be developed for the downtown areas and it should highlight the different amenities and resources in the area. The noted destinations may include both publicly owned structures such as museums and libraries as well as private enterprises that are open to the public. The map may also include suggested walking routes, local walking events and safety information.

The walking map should be a stand-alone documents distributed to every household to generate excitement and awareness about walking in the community. The goal should be to distribute the map for free. Map production and print costs can be offset by selling advertising. The map can be paired with other publications already targeting residents' mailbox for efficiency and coverage as well. The map should also be located at welcome centers, local gas stations and businesses and at the proposed Active Transportation Hub locations for further distribution.

Fig 3.2D Example Walking Maps

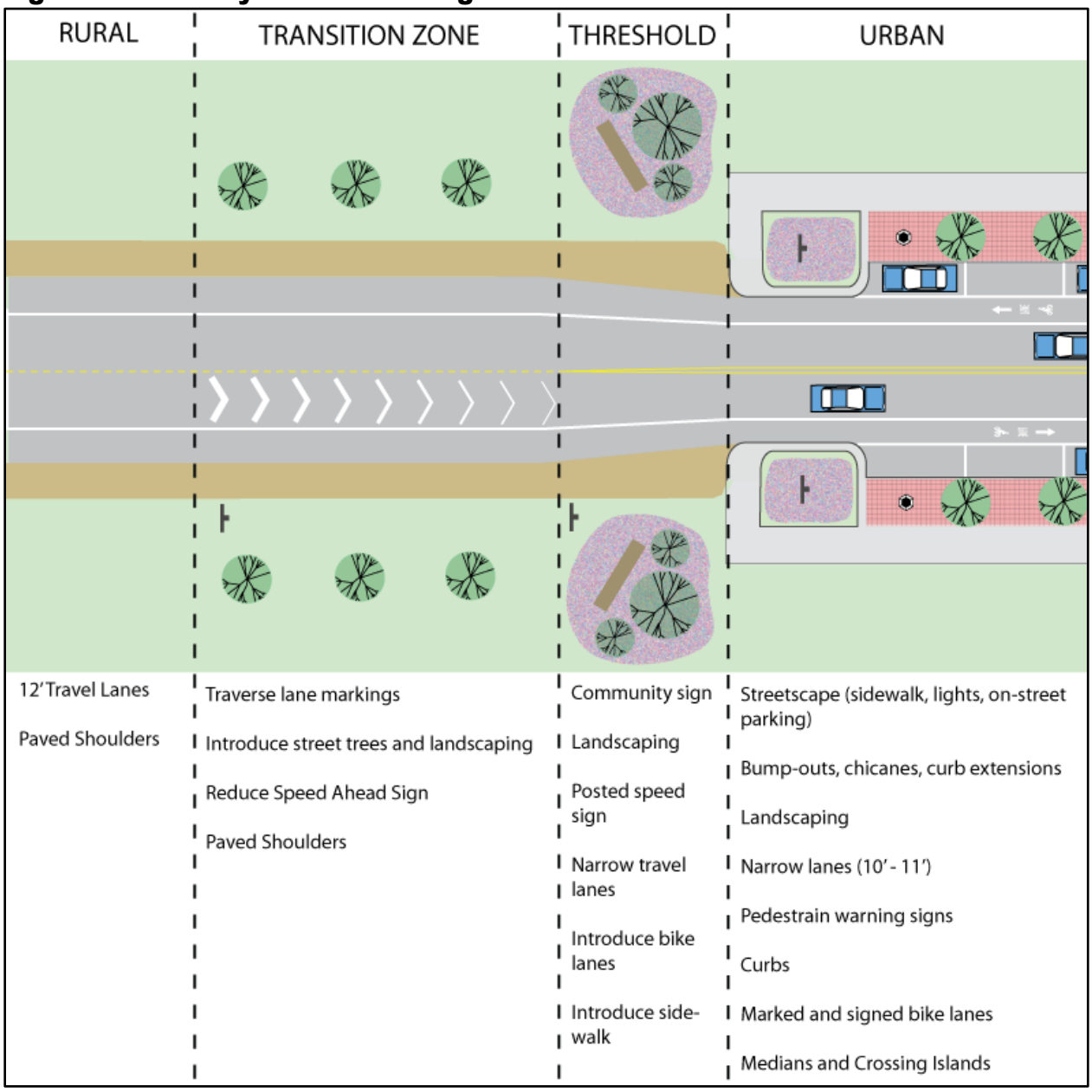


Gateway Transitions

Many times the main roadway that cuts through a small community is also a major roadway such as M-25. In these situations it is difficult for motorists to transition from 55 mph to 30 or 25 mph. When this situation occurs it is important to visually and physically establish a gateway to the community so motorists know they are entering an urban environment and should slow down their speeds. Elements such as traverse lane markings, street trees, landscaping, signage, and narrow travel lanes help to establish the gateway.

Gateway treatments should be used when a roadway changes from a rural to an urban setting and needs to provide a slower environment for non-motorized users. Figure 3.2E displays the types of elements that may be applied in each zone to encourage the appropriate motor vehicle speeds.

Fig. 3.2E Gateway Transition Diagram



Bicycle Parking

The lack of a secure parking space discourages many people from using their bikes for basic transportation. When sufficient bike parking is not provided, theft becomes a concern and it leads to bikes being locked up to sign post, benches and other street furniture. When bicycles are parked in these spaces, they often disrupt pedestrian flow because the bikes impede the walkway. Bicycles also get impounded by local enforcement when parked in these areas causing an even greater deterrent to bicycle use. Bicycle parking needs to be visible, accessible, plentiful and convenient. If any of these criteria are not met, there is a good chance cyclist will not use the facilities and will park their bike wherever they feel it will be safest.

Definition of a Bicycle Parking Space- A bicycle parking space is an area two feet by six feet or the area occupied by a bicycle when using a bicycle parking device as designed.

Short-Term Bicycle Parking - Short-term bicycle parking is defined as a rack to which the frame and at least one wheel can be secured with a user-provided U-lock or padlock and cable. This type of parking is appropriate for short term parking at locations such as shopping areas, libraries, restaurants and other places where typical parking duration is less than two hours.

Long-Term Bicycle Parking- A long-term bicycle parking space is defined as protecting the entire bicycle and its components from inclement weather and theft or vandalism. It is to be located where it will serve the needs of cyclist who need to leave their bicycles unattended for extended periods of time, such as employees, tenants or residents.

Uncovered Bicycle Racks

Description:
Uncovered Bicycle Racks are the primary bike parking approach for areas where people are expected to park their bikes for only a few hours.

Design:
Generally, bicycle racks of the inverted "U" design are considered the best models. Alternative designs may be considered for special situations, although they should function similar to the inverted "U" design, providing at least two contact points for a bicycle and be a shape and size that would permit locking of a bicycle through the frame and one wheel with a standard U-Lock or cable.

Access Control:
Bicycle racks should be located on every city block where there is retail within a commercial district. The hoops should be placed on a hard surface with ample lighting and high visibility (e.g. in front of a store window) to discourage theft and vandalism. Racks should be placed to avoid conflicts with pedestrians, usually installed near the curb and away from crosswalks. When racks are installed in public spaces there needs to be at least 5 feet of clear sidewalk space in order to allow for pedestrian flow.

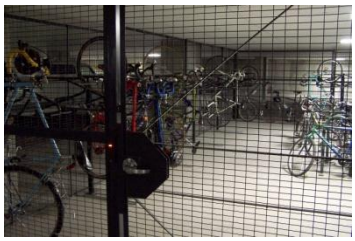
Covered Bicycle Parking

Description:
Covered Bike Parking is desirable for both long-term and short-term bicycle storage. Basic bicycle racks should be placed under an overhang whenever possible, and specific covered bicycle parking should be created when needed. Covered Bicycle Parking should be available in areas where bikes are kept for an extended period of time, such as apartment buildings or at large commercial centers where employees and customers will utilize the covered spaces.

Design:
The covering for bicycle parking will vary depending on the location. In addition to a roof, complete or partial side enclosures should be provided to minimize exposure to windblown rain and snow. The design of the racks is the same as for the basic uncovered bicycle hoops. When creating covered parking, there is also the opportunity to incorporate a green roof or solar panels into the rooftop to add to the functionality of the structure.

Location:
Covered Bike Parking should be incorporated whenever there is opportunity to do so. Long-term covered bike parking should be located within 400 feet of the building it is intended to serve. Centralized locations further than 400 feet are also acceptable.

Enclosed and Secured Bicycle Parking



Description:
Enclosed and Secured Bicycle Parking is best for areas where bikes are kept for extended periods of time, such as apartment buildings, condos and near places of employment.

Design:
Enclosed and Secured Bicycle Parking generally consists of an enclosed room or fenced off-area where access is controlled through a doorway. The configuration of the bike racks will vary based on the space, but in general they are designed to maximize the number of bicycles that may be fit in the space. Double tier bike racks and hanging bike racks are used to provide the majority of the bike storage. A few standard inverted "U' hoops should be provided and reserved for atypical bicycle designs that may not be accommodated by the other racks.

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Access Control:
Is by identification badge reader and for a specific location only. Generally $60 to $80 per year rental plus $20 account set-up fee.

Location:
Generally incorporated into an existing facility, but individual facilities may be established.

Amenities:
Will vary by site. Ideally these could include compressed air, lockers, a bench and a vending machine that dispenses basic bicycle supplies such as tubes and repair kits.

Bike Lockers

Description:
Bike Lockers are individual premium bike parking solution intended for remote and lower density areas where enclosed and secured bike parking is not available or feasible. Given the cost, appearance and space requirements of bike lockers they are only appropriate for limited locations.

Design:
There is substantial variability in the designs of the bike lockers. Typically, individual bike lockers have an interior diagonal divider and doors on either end such that they may accommodate two bicycles. Bike Lockers may be arranged in row, in a circular pattern and stacked.

Access Control:
Typically via a key.

User Costs:
Generally around $60 per year rental plus a $20 key deposit.

Seasonal On Street Bicycle Parking

Description:
Seasonal On-Street Bicycle Parking consists of movable bike racks that take the place of an on-street motor vehicle parking space. These racks are temporary and can be experimented with and moved as needed. They can also be used on a seasonal basis and can be removed during the winter.

Design:
On-Street Bicycle Parking Racks are the size of a standard vehicle parking space and hold about 12 bicycles. These Racks are bolted into the pavement and can be removed when needed.

Location:
Racks should be placed in active areas where it is difficult to accommodate sidewalk bicycle parking due to the competing demand for café tables and pedestrian walking space within the sidewalk area. Urban public spaces where there is on-street parking, such as Main Street would be a good location to test these facilities once non-motorized facilities are provided to this area.

Potential Bike Rack Programs
Parking racks lend themselves easily to public-private partnerships. The counties can purchase the racks in quantity and offer the racks to individual merchants at 50% of their cost. This would allow a relatively small grant request to cover much of the Thumb's bicycle parking needs. Communities could also trade advertising space on the kiosks for a bicycle parking rack. Bicycle racks will encourage cyclists' patronage and that added value can be used to offset bicycle parking costs.

There may also be an opportunity to partner with St. Clair Community College's job training program to build bicycle parking racks. St. Clair offers practical course work in specialized welding and metal fabrication. This may open opportunities to supply the region with bicycle parking racks for much less cost. Racks could be stamped with the school's website or some other message to return the value to the school.

Canoe/Kayak Racks

Kayak and canoe trips have become a popular recreational sport in the area. There are existing mapped water trails that follow the shoreline called the Tip of the Thumb Heritage Water Trail. The Tip of the Thumb Heritage Water Trail's mission is to develop, maintain, and promote a water trail that highlights natural, cultural, and historical attributes to drive tourism, economic development, and recreational opportunities in Huron, Sanilac and Tuscola Counties. There may be opportunities to coordinate recreational biking with kayak and canoe trips. Please visit www.thumbtrails.com for more information about the Tip of the Thumb Heritage Water Trail.

Just like bicyclists, paddlers are looking for places to stop and get a bite to eat and walk around. Canoe/Kayak Racks should be placed in cities and village along the shoreline to provide a place for paddlers to stop and visit the local attractions and downtowns. Please refer to the Active Transportation Hub section for a schematic illustration of how the Canoe/Kayak racks relate to the Active Transportation Hubs and Downtown.

Canoe/Kayak Rack

Description:
Secure short-term storage space for a canoe or kayak.

Design:
Provide canoe/kayak storage rack near landing/launch where paddlers can store there kayak or canoe. The rack should provide a place where a cable can secure the boat to the rack and be locked. Users should be able to use their own locks or rent a lock from the Harbor Master for a nominal fee.

This facility should also include a large locker for storage of personal items, such as lifejackets, paddles and bags. An information sign should be located near the rack to provide orientation to the downtown and to the active transportation hub where bike rental is available.

Location:
Generally located in city/villages harbors where there is a boat launch or landing. They should be located near the Harbor Master so they can oversee and provide assistance to the facility.

Non-motorized Facility Improvements

The physical improvements to the non-motorized network are key to providing a more bicycle and pedestrian friendly community. For some people the biggest barrier to choosing non-motorized transportation over a motorized vehicle is convenience, and if the facilities are not easily accessible people are not going to use them.

The following non-motorized improvements should be made in each community. Please refer to *Section 5. Design Guidelines* for more details on the facilities listed on the following pages.

Sidewalks

Description:

Sidewalks are the unsung heroes of a non-motorized system. They are usually the first facilities to be constructed and provide a backbone to a complete non-motorized network. They are one of the key components to a walkable community and should be completed on both sides of all major roads in an urban area.

Key Elements:

- Recommended 6'-8' wide along arterial and collector roads in urban areas and wider in downtowns with outdoor seating
- Recommended 5' wide along local roads in neighborhoods
- Buffers should be a minimum of 5' to accommodate street plantings
- Trees should be planted between the sidewalk and roadway to improve pedestrian comfort (approx. 30' on center)

Applications:

- Should be built on both sides of the roadway along arterial and collector roads in urban areas
- At least one side of the roadway should have a sidewalk in suburban fringe areas when trying to connect to a destination
- Where there are gaps in the sidewalk system

Bike Lanes

Description:

A designated space in the roadway for bicyclist to travel with the flow of traffic. Pavement striping and markings sometimes accompanied with signage are used to delineate the lane. A striped bicycle lane or designated paved shoulder within the roadway is usually the safety place for a cyclist to ride.

Key Elements:

- 5' minimum width as measured from face of curb to edge line with a minimum 3' wide ridable surface outside of the gutter pan
- The width of the bike lane should be increased on busier roads, and high speed roadways

Applications:

- Bike Lanes should be added to all arterial and collector roadways and significant local roadways
- Generally roads with ADT's below 3,500 vehicle per day do not require bike lanes
- Generally paired with a sidewalk because some cyclists may choose to ride on the sidewalk based upon their comfort level

Shared Lane Markings

Description:

Shared Lane Markings are used for on-road bicycle facilities where the right-of-way is too narrow for designated bike lanes. The shared lane marking alerts cars to take caution and allows cyclist to safely travel in these lanes when striping is not possible. They are often used in conjunction with a Share the Road Sign.

Key Elements:

- Pavement markings direct bicyclists to move with traffic and outside of the reach of opening car doors
- Markings indicate to motor vehicles to expect bicycles in the roadway
- If used on a street with on-street parking, shared lane markings should be placed so that the centers of the markings are at least 11 feet from the face of the curb, or from the edge of the pavement where there is no curb

Applications:

- Typically used in downtown streets where there is not room for a bike lanes, there is on-street parallel parking and bicycles are discouraged from using sidewalks
- Used on primary roads with speeds 35 mph or lower

Edge Stripe

Description:

Edge Stripes are recommended for roadways that do not have enough room for a designated bike lane or on local roads where the travel lanes are very wide and traffic calming is desired.

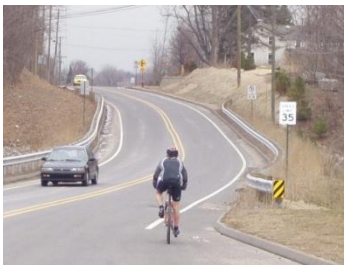
Key Elements:

- Provide marked off area to be shared by parked cars and bicycles
- If used on a street with on-street parking, the edge strip is placed 7’ to 8’ from the curb
- The striped off area also creates a traffic calming effect because it visually narrows the roadway

Applications:

- Typically used on streets that have on-street parking that is rarely used, or only during certain events.
- Used on local streets that have very wide travel lanes to help with traffic calming

Paved Shoulder



Description:

A designated space in the roadway to accommodate bicycle and pedestrian use in rural areas.

Key Elements:

- In order to be usable for bicyclists they need to be a minimum of 4’ as measured from the edge of pavement to the edge line when no curb is present
- Generally do not have bike lanes signs and/or pavement markings except at intersections where a designated right turn lane is present, then a paved shoulder should be transitioned to standard bike lane pavement markings to avoid conflicts with right turning vehicles
- May be signed as a bike route or with a Share the Road sign

Applications:

- Paved shoulders are generally added to arterial and collector roadways in rural areas

Off-Road Trails

Description:

Off-road trails are non-motorized facilities that are independent from the roadway by an open unpaved space, barrier, or located completely away from the roadway. The most common off-road trail is a Shared Use Pathway. It is generally a wide, paved pathway that is shared by bicyclists and pedestrians.

Key Elements:

- 10’ to 14’ wide with a minimum of a 2’ shoulder on either side of the trail
- A variety of trail surfaces are used with crushed aggregate fines and asphalt being the most common
- Safe road crossings need to be provided where the trail intersection a driveway or roadway

Applications:

- Generally used for recreational purposes and some transportation trips depending on location
- Generally located along abandoned rail corridors, active rail corridors, transmission corridors, and in major parks and waterfronts
- Best used in suburban and rural areas
- Surfacing choice influences user type

Neighborhood Connectors

Description:

A route that utilizes residential streets and short connecting pathways that links destinations such as parks, schools and off-road trails. They are generally located on low-volume and low-speed roads that have been optimized for bicycle and pedestrian travel.

Key Elements:

- Signs provide wayfinding by noting direction and distance to key destinations
- Safe road crossings need to be provided where the route intersection a major roadway
- Stop signs and yield signs are oriented to provide unimpeded flow of bicycle traffic
- Motor vehicle speeds reduced through traffic calming measures
- May contain rain gardens, permeable pavements and elements that reflect the surrounding community

Applications:

- Located on urban and suburban local and residential roads
- Utilizes connecting pathways through neighborhood parks and schools
- Provides an alternative route to busy primary roadways
- Connects to key destinations such as schools, parks, regional trails and downtowns

Mid-block Crossing Improvements

Description:

Provide safe ways to cross a road between intersections where there is demand to cross a road mid-block.

Key Elements:

- Ladder crosswalk markings
- MUTCD warning signs
- Crossing island should be utilized when possible
- Evaluate if additional warnings are warranted, such as Rectangular Rapid Flash Beacons, or Hybrid Pedestrian Beacons
- Provide lighting at all marked crosswalks

Applications:

- When there are destinations on both sides of the street and spacing between adjacent intersections exceeds 1/8 mile
- The land use is such that pedestrians are highly unlikely to cross the street at the next intersection
- Adequate sight distance is available for both pedestrians and motorists

Curb Extensions

Description:

Curb extensions are primarily used to extend the sidewalk and narrow the roadway. They reduce the distance and amount of time it take a pedestrian to cross the roadway and provide traffic calming. They also improve the visibility of pedestrians at road crossings where parked vehicles may block their view.

Key Elements:

- Still provide space for bike lanes
- Enhancements such as landscaping and rain gardens may be incorporated

Applications:

- At intersections where road crossing are present
- At mid-block crossings where on-street parking in present
- At bus stop locations where on-street parking is present
- Along roadways where traffic calming is desired

Streetscape Features

Description:

Streets are one of the most utilized public spaces and generally the first thing visitor's experience. Enhancing the character of a street and adding amenities can beautify the streetscape and improve the pedestrian experience.

Key Elements:

- Pedestrian scaled lighting
- Amenities such as benches, drinking fountains and trash receptacles
- Landscaped buffer between the street and sidewalk
- Street Trees
- Wayfinding signs and maps
- Local art and historic information

Applications:

- In areas with high pedestrian activity, such as downtown

"Green Street" Enhancements

Description:

Design elements that may be integrated into the streetscape that work to improve water quality issues, storm water issues, head island issues as well create inviting streets.

Key Elements:

- Permeable pavement
- Rain gardens

Applications:

- New road construction
- Retro-fit existing roadways

Maintenance

The success of the community's non-motorized transportation system ultimately depends on thorough and timely maintenance of all its facilities. Typical problems that can occur on pedestrian and bike facilities include cracked pavement, standing water, obstructions in the clear zone such as sidewalk furniture, overgrown trees and shrubs, construction equipment and signs, and road debris. Without proper maintenance and removal of these problems, people are not encouraged or able to use non-motorized modes of transportation.

General Maintenance of Sidewalks

Regular and consistent maintenance of sidewalks, particularly along arterials and collectors, is important for non-motorized modes of travel. Conditions such as cracks, heaving from tree roots, icy surfaces and surface spalling create trip hazards for pedestrians. Inadequate maintenance of sidewalks is not only dangerous, but can complicate any travel by pedestrians who are elderly or have mobility impairments.

It is recommended that the local communities update their ordinance to require property owners to maintain the sidewalk adjacent to their property. It is also recommended that the local communities develop a community-wide inspection program to identify and cite hazardous sidewalks. The program should evaluate different areas of the community each year and property owners should be notified if their sidewalk is not in compliance with regulations. If a property owner does not make the required repairs, the local agency should make the repairs and assess the property for cost. This may be integrated into a comprehensive citywide asset management system that also addresses ADA issues.

For asphalt shared use paths, an asset management system should be created to track condition and repairs. The surface should be inspected every other year to make sure the surface is appropriate for all users and to determine what repairs and preventative maintenance operations should be scheduled.

In addition to the sidewalk and path surface evaluation programs, a systematic tree and brush trimming program for sidewalks along major streets and shared use paths should be undertaken. Overhanging vegetation can greatly reduce the usable width of a walkway, cause injury to users and obstruct views. There should be a 2 foot clear zone on each side of the walkway and a vertical clearance of 8 feet above the walkway. Routine trimming should be done at least twice a year to keep the sidewalk clear of vegetation.

Snow Removal

People who rely on non-motorized transportation as a means of travel are often at the mercy of the weather, especially in the winter. The current practices of snow removal on sidewalks, curb cuts and crossing islands can make large portions of the community impassable to many mobility impaired pedestrians or those pushing strollers or grocery carts.

Many northern cities around the globe maintain excellent facilities for non-motorized travel in the winter. For example, Boulder, Colorado and Madison, Wisconsin, cities that both have comparable amounts of annual snow to the communities in the Thumb Region, (Boulder-60", Madison-42"), have significantly higher bicycle mode-shares. Both Minneapolis and Madison have higher bicycle commuting rates than San Diego[1].

Just as it is important for roads to be cleared for automobile, it is important for sidewalks to be cleared for pedestrians. If the sidewalks are not cleared, many times pedestrians will use the cleared roadway, presenting a dangerous situation for both cars and pedestrians. Areas of special concern are curb ramps at

[1] Federal Highway Administration. Publication FHWA-PD-041. Case Study No.1:Reasons Why Bicycling and Walking Are Not Being Used More Extensively as Travel Modes.

intersections and pedestrian crossing islands. Crossing islands usually are not the responsibility of an adjacent property owner, so they generally require clearing by the appropriate agency staff. Additional attention may be needed to identify "orphan" areas, such as over bridges or along other public rights-of-way to ensure that these areas are cleared by the appropriate agency. Shared-use trails should also be included in snow removal because they provide a non-motorized route of travel.

Crosswalks
While motorists can tolerate bumpy roads, uneven pavement surfaces at intersection crosswalks can be hazardous for pedestrians. The local community should develop criteria to identify those pedestrian crossings that are in need of resurfacing. In addition to a smooth pavement surface, crosswalks need markings that provide good contrast for motorists and a non-slip surface for pedestrians.

Bicycle Lanes and Paved Shoulders
Motor vehicles tend to sweep debris into bicycle lanes and paved shoulders filling them with debris quicker than the motor vehicle lanes. If debris is left in place it becomes a hazard for cyclists and some cyclists will no longer ride in the bicycle lanes. To avoid this problem, bicycle lanes should receive more frequent sweeping. This has the added benefit of reducing the amount of sediment washed into the storm sewer system and some communities have increased the frequency of street cleaning solely for that purpose.

Maintaining visibility and reflectivity of bicycle lane pavement markings and symbols are important to nighttime cycling safety, especially when raining or snowing. It is recommended that the local communities repaint their pavement markings on all roadways, including bike lanes and crosswalks on a yearly basis. This type of maintenance is important to retain high contrast and visibility. Multiple layers of thermoplastic should be avoided because it results in rough surfaces for bikers. Materials used for bicycle markings should be non-slip.

When snow is removed, it is critical that the entire bicycle lane be cleared since many cyclists use their bicycle year round. Any loss of bicycle lane width means cyclists are more likely to use the motor vehicle lanes.

It is recommended that local communities also undertake a public awareness campaign on the value of keeping bicycle lanes and curbs in general free of debris to promote bicycle safety and water quality. It is recommended that individual communities evaluate if more frequent street sweeping is necessary to keep the bicycle lanes and curb areas cleared.

Signalized Intersections
Bicyclists and Pedestrians in many cases, cross the road in very different fashions. Bicyclists in the roadway most likely will treat the intersection the same as a vehicle, merging across lanes and making a left turn from the center turn lane. Their restrictions to crossing the road are primarily based on their comfort level of riding with traffic and the volumes, speed and gaps that exist. Since many bicycles function similar to vehicles at intersections it is important that signals are able to detect bicycles even when no motor vehicles are present. Local communities should develop a system to identify and replace the signals that do not identify bicycles at an intersection.

Problem Identification and Prioritization
Encouraging the community to identify non-motorized facility problems and maintenance issues can save communities both time and resources. Public participation also allows citizens to feel that the community is responding to their needs and concerns. The City of Portland, Oregon uses a phone hotline, web pages and postcard/comment cards to aid citizens in reporting maintenance issues. Problems may include malfunctioning pedestrian signals, gaps in the sidewalk system, maintenance of crosswalk or bicycle lane

markings, or debris in bicycle lanes. In addition to providing comment cards at locations such as bicycle stores and public buildings, the local communities should set up web-based forms that allow tracking of service requests and direct the request to the appropriate person.

One area that demands particular attention is pedestrian-activated crosswalk signals that are not functioning properly. By the time pedestrians have completed their trip, they may not remember or do not know how to report the problem. Posting a phone number on the post, along with the fixture number, could allow those with cell phones to call in a report.

Local Education and Enforcement Strategies

Public Education Programs for New Facilities
On-going community education and awareness programs are an important component of a successful non-motorized transportation plan. Coupling public education campaigns with the development of new facilities is a timely and effective way to raise awareness of the new facilities and non-motorized transportation issues in general. Effective public awareness campaigns should include transitional signage at the new facility location as well as posters, flyers and newspaper articles. Especially important are changes to existing facilities that may not be readily perceptible to users such as the change in curb cut locations.

Resources
For Public Services, Planning, Police and Parks and Recreation Staff involved in the planning, design and implementation of non-motorized transportation, there are a number of on-line resources and standards texts that are exceptionally helpful.

FHWA Course on Bicycle and Pedestrian Transportation
http://safety.fhwa.dot.gov/ped_bike/univcourse/instrtoc.cfm#toc

The following is the outline of the online course.
Lesson 1: The Need for Bicycle and Pedestrian Mobility
Lesson 2: Bicycling and Walking in the United States Today

Planning Section
Lesson 3: Bicycle and Pedestrian Planning Overview
Lesson 4: Pedestrian and Bicycle Crash Types
Lesson 5: Adapting Suburban Communities for Bicycle and Pedestrian Travel
Lesson 6: Neo-Traditional Neighborhood Design
Lesson 7: Using Land-Use Regulations to Encourage Non-Motorized Travel
Lesson 8: Tort Liability and Risk Management
Lesson 9: Bicycle and Pedestrian Connections to Transit
Lesson 10: Off-Road Trials
Lesson 11: Traffic Calming
Lesson 12: Pedestrian and Bicycle Facilities in Work Zones

Pedestrian Facility Design
Lesson 13: Walkways, Sidewalks and Public Spaces
Lesson 14: Pedestrian Signing and Pavement Markings
Lesson 15: Pedestrian Accommodations at Intersections
Lesson 16: Mid-Block Crossings
Lesson 17: Pedestrians with Disabilities

Bicycle Facility Design
Lesson 18: Shared Roadways
Lesson 19: Bike Lanes
Lesson 20: Restriping Existing Roads with Bike Lanes
Lesson 21: Bicycle Facility Maintenance
Lesson 22: Bicycle Parking and Storage
Lesson 23: European Approaches to Bicycle and Pedestrian Facility Design
Lesson 24: Education, Encouragement, and Enforcement

Association of Pedestrian and Bicycle Professionals (APBP)
http://www.apbp.org
This organization is the only organization that focuses specifically on bicycle and pedestrian issues. Some of the benefits of membership include a newsletter with the latest resources and studies, members only list serve (best source for peer review) and in-depth training seminars.

Pro-Walk/Pro-Bike Biannual Conference
This conference is a large gathering of bicycle and pedestrian advocated and professionals from around the US and Canada. It is an excellent way to learn a great deal in a short period of time. There are presentations and workshops on the latest issues and technologies and networking with others involved in non-motorized facilities.

League of Michigan Bicyclists
www.lmb.org
This organization promotes bicycling and the safety of bicyclists in Michigan. Their website includes news, events, resources and educational information regarding bicycling in Michigan.

ITE Transportation Planning Handbook, Chapter 16 Bicycle and Pedestrian Facilities
Chapter 16 is a good introduction to the bicycle and pedestrian planning and design issues.

AASHTO Guide for the Development of Bicycle Facilities
Incorporated by reference into AASHTO's A policy on Geometric Design of Highways and Streets. Most public and private funding sources require projects to be in compliance with this guide.

AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
Incorporated by reference into AASHTO's A policy on Geometric Design of Highways and Streets. Most public and private funding sources require projects to be in compliance with this guide.

What Every Michigan Bicyclist Must Know – A Guide for Bicyclists
Created through a partnership between the League of Michigan Bicyclists, the Governor's Council on Physical Fitness, MDOT and the Michigan Department of Community Health, this brief pocket size booklet is an excellent resource for anyone riding a bicycle in Michigan. This document can be found on the League of Michigan Bicyclists website at www.lmb.org.

Develop Partnerships
There are many opportunities for the region to partner with other groups to promote non-motorized transportation and collaborate on programming educational opportunities and events.

Safe Routes to School (SRTS): It is a national program funded by the National Highway Traffic Safety Administration devoted to identifying the best routes for children to walk to school based on safe facilities and street crossings. The local community should be a key partner in any SRTS

Programs. SRTS teams typically include a local law enforcement official or officer and a representative from the local road authority. These officials provide the technical expertise to help the team implement some of the programs and physical improvements.

Many of the proposed improvements in this plan may be helpful and could be considered as part of a SRTS program as they would provide access to schools. For more information on SRTS please visit their website at, www.saferoutesinfo.org.

Local Hospitals: Collaborating with medical centers may be a powerful partner in programs and events that promote healthy, active lifestyles, reduce traffic-related crashes, and reduce the incidences and severity of injuries through traffic safety campaigns and classes, such as youth and adult cycling education.

Environmental Organizations: There are many groups interested in promoting "Green Living". Promoting non-motorized transportation might fit well with this cause.

Media Sources: There are a number of different media sources locally and regionally in the Thumb area that may be friendly to promoting non-motorized transportation. These sources include the Port Huron Times Herald, Bay City Times, Saginaw News, Harbor Beach Times, Huron County Press, Huron Daily Tribune, The News Weekly, The Lakeshore Guardian, Thumb Blanket, Brown City Banner, Camden Publications, Deckerville Recorder, Marlette Leader, Sandusky Tribune, Sanilac County News, Tuscola County Advertiser, Cass City Chronicle, Cass River Trader, Reese Reporter, Vassar Pioneer Times and Local T.V. and Radio Stations.

The Merchant Community: Merchant developments and downtown business districts are generally developed with the pedestrian and bicycling environment in mind. Merchants may be enthusiastic participants in programs and events that encourage residents to bike and walk to their businesses.

League of Michigan Bicyclists: The League of Michigan Bicyclists (LMB) provides advocacy, events, and resources for cycling in Michigan. Their website, www.lmb.com, contains information on bike rides, Smart Commute events through the state, and ways to get involved in advocacy efforts around cycling. LMB has regional representatives for each part of the state. Vic Lukasavitz is the current representative for the Thumb Region.

Neighborhood Groups: Active neighborhood groups represent a good avenue for promoting non-motorized transportation by connecting to residents.

Marinas and Campgrounds: Many people who visit these locations are looking for way to get around and experience the local community. These venues represent a good avenue for promoting non-motorized transportation to tourists. Bike rental information and walking and biking maps should be provided to Marinas and Campgrounds for distribution.

Local Policies

Complete Streets Policy
States, regions, counties and cities around the county have used various complete street policies to unambiguously endorse and define their support for non-motorized transportation.

In the near-term a Complete Streets Resolution should be completed that includes language that directs staff to prepare a Complete Streets Ordinance over the next year and report back to the county board of commissioners or township. See the Appendix for more details on Complete Street Policy.

ADA and Transition Plans
Title II of the Americans with Disabilities Act of 1990 (ADA) requires local governments to make their activities, programs and services accessible to persons with disabilities. In the area of non-motorized transportation, public entities with 50 or more employees are required to use accessible design standards for newly constructed and reconstructed sidewalks and shared use paths to the maximum extent feasible and make altered facilities through the City as part of a transition plan.

Even if a community is not required to do an ADA transition plan it is still recommended that it be done as a best practice to prevent any incidents. See the Appendix for more details on ADA and Transition Plans.

Methods of Evaluation for Local Strategies

Complete application for Bike Friendly Community Award with community and partner input
The League of American Bicyclists promotes communities throughout the country with its Bike Friendly Community Award. The process of applying for the award is a great way to determine what is being done in the community as well as where improvements might need to be made. The community can be engaged in the process of applying for the award through public meetings. In addition, if a city or village receives a Bike Friendly Community Award, this becomes a great promotional tool not only for the program but for the community as a whole. Currently, Ann Arbor (Silver Award), Traverse City (Bronze Award), Grand Rapids (Bronze Award), Houghton (Bronze Award), Lansing (Bronze Award), Marquette (Bronze Award), and Portage (Bronze Award) are the other cities in Michigan with Bike Friendly Community designations.

Complete application for the Promoting Active Communities Award with community
The Promoting Active Communities Award is a Michigan-Based award for communities that show a strong commitment to supporting physical activity. Just like the Bike Friendly Community Award, this award is a great way to engage the community in non-motorized transportation issues as well as a good promotional tool, should a community receive a designation.

Encourage local businesses to complete application for the Bicycle Friendly Business Award
The Bicycle Friendly Business award, put on by the League of American Bicyclists, recognizes employers' efforts to encourage a more bicycle friendly atmosphere for employees and customers. The program honors innovative bike friendly efforts and provides technical assistance and information to help companies and organizations become even better for bicyclists.

Recommended data collection and performance evaluation criteria
A bicycle and Pedestrian Count should be conducted as part of the National Bicycle and Pedestrian Documentation Project to document the uses and demand of non-motorized facilities in the cities and villages. The National Bicycle and Pedestrian Documentation Project is a nationwide effort to provide a consistent model of data collection and ongoing data for use by planners, governments, and bicycle and pedestrian professionals. The counts should be done on yearly bases, with consistent locations used each year. Please visit, www.bikepeddocumentation.org for more information on conducting a bicycle and pedestrian count and on ways the local communities can participate in national count.

In addition to counting the number of users, the miles of built facilities should also be documented on a yearly bases to track the development of the non-motorized network. The miles of bike lanes, pathways, sidewalks, neighborhood connectors/bike routes, number of mid-block crossing improvements and number of bike parking spaces should be tracked. It is important to keep up-to-date documentation of these facilities because these measurements are used to apply for awards, such as the Bike Friendly Community Award.

3.3 Proposed Local Improvements

Detailed recommendations are provided for each of the following nine shoreline communities. Each community plan describes the existing conditions and the proposed recommendations for that community. Recommendations for each community can be downloaded from the project website at: www.greenwaycollab.com/ThumbNoMo.htm

- Lexington
- Port Sanilac
- Forestville
- Harbor Beach
- Port Hope
- Port Austin
- Caseville
- Sebewaing
- Unionville

The proposed improvements that are noted for each local community fall into three general categories, near-term, mid-term and long-term. Near-term opportunities include improvements that may be accomplished by relatively modest changes to the existing road system. Mid-term opportunities include improvements that may be accomplished in the near future; however they may require some additional construction. Long-term improvements are projects that will be implemented with new development or reconstruction of existing structures.

Near-term and Mid-term Opportunities
The near-term and mid-term recommendations were designed to be cost-effective and easily implemented with minor changes such as re-striping the exiting road surface. These simple solutions will enhance bicycle and pedestrian conditions quickly and easily until the road is expanded or major reconstruction is undertaken. Mid-term improvements may require some construction, such as crossing islands or sidewalk extensions. In general, near-term and mid-term recommendations:

- May generally be done within the existing infrastructure, for the most part curbs and drainage structures are not changed.
- May be implemented as soon as funding is available and design work completed.
- Includes relatively inexpensive road modifications such as 4 to 3 lane conversions, and moderately expensive improvements such as crossing island.
- Are in some cases design compromises, where the widths of bike lanes, motor vehicle lanes, buffers and sidewalks are less than the ideal desired widths to fit within the existing curb lines and right-of-ways.
- May in many cases be the same as the ultimate long-term solution as existing development and right-of-way restrictions limit the design options.
- May be done independently or as part of operations, resurfacing, restoration, rehabilitation or minor widening project. In general, if a road is to be resurfaced within the next few years, any road restriping should be incorporated in the resurfacing project.

Long Term Improvements
The costs to undertake these non-motorized projects independently of a road reconstruction project would be significant. Thus, in order to maximize the impact of finite resources, the long-term improvements are expected to be implemented as a road is completely reconstructed (not just resurfaced). In general, long-term improvements:

- Are generally implemented when a new road is built or an existing road is completely reconstructed. Reconstruction projects typically include new curb and gutter as well as storm water systems.
- Generally require that a road be widened to accommodate the minimal lane width requirements for all users and may require additional rights-of-way.
- Strive to meet the minimum desired widths for bike lanes, motor vehicle lanes, buffers, and sidewalks to the extent that it is practical given the project's context.

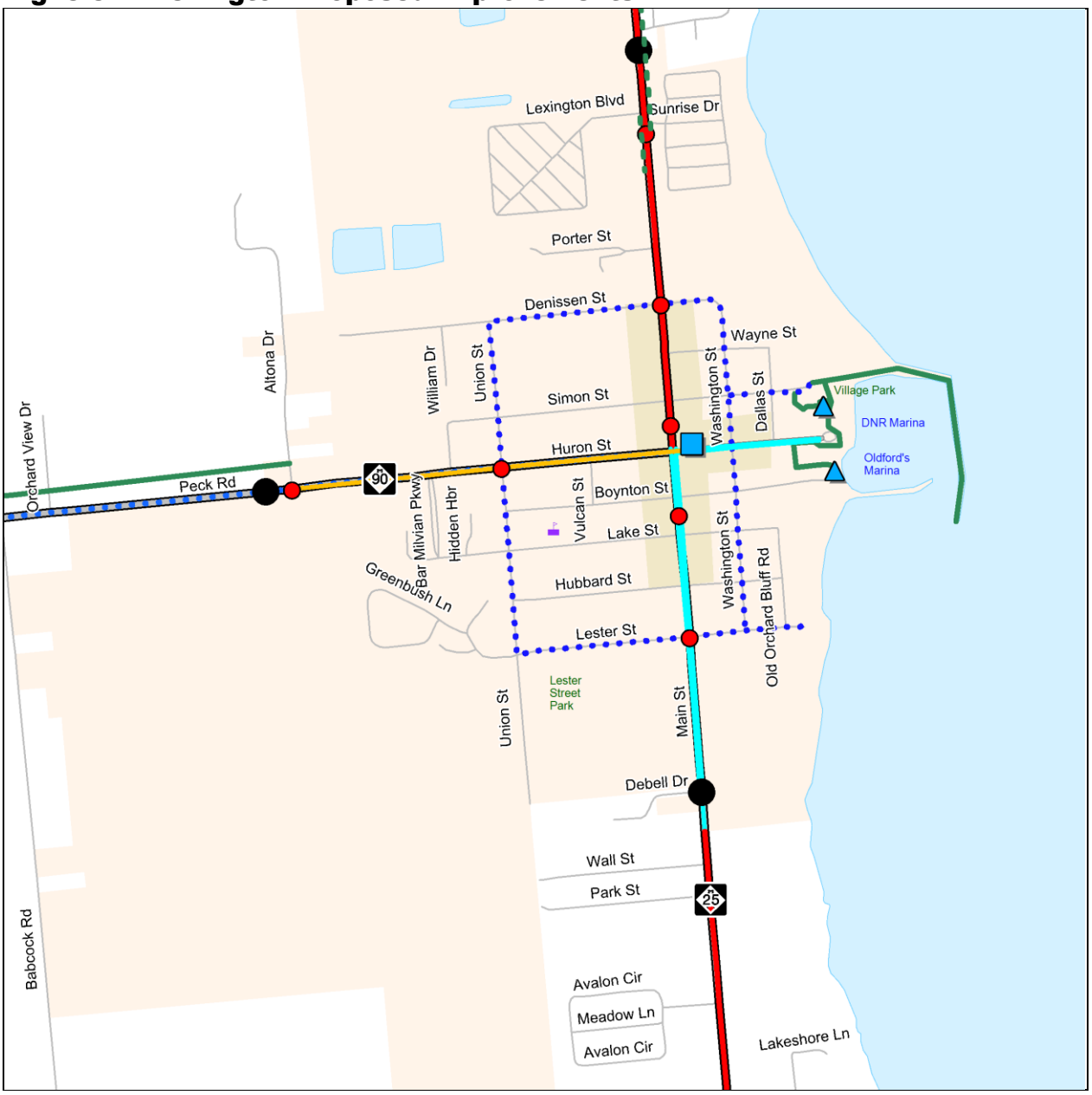
Overview of Recommendations for Lexington

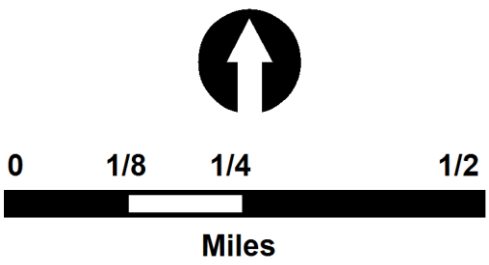
Existing Conditions
Lexington is located in the southeast corner of the region in Sanilac County. It has a year-round population of 1,178, but this number increases dramatically in the summer. There are 459 seasonal homes which represent 41% of the total housing units in the village. This translates to approximatly 900 additional residents who spend a considerable portion of the summer in the area. In addition to the seasonal housing, there are a number of bed and breakfasts, a DNR maria, DNR boat lunch and a private marina that attact numerous short-term visitors. About 4 miles south of Lexington are a number of subdivisions where most of the housing is seasonal and Lexington is the closest village. It is also the closest of the Thumb's shoreline communities to the Detroit metropolitain area. Most of the Marina traffic is reported to be from the Port Huron and St. Clair River areas. For Michigan Communities between 1,000 and 2,000 people, Lexington was in the middle of the pack regarding the total number of people who walk (4.3%), bike (0%) and take transit (0%) to work.

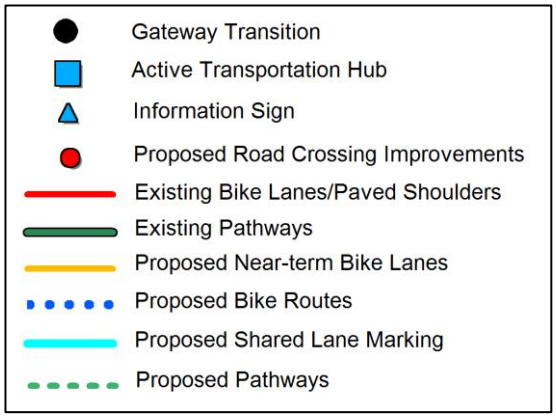
The exising non-motorized facilities include bike lanes on Main Street (north of Huron Street). There is also an existing roadside pathway to the west of the city that connects Lexington to Crosswell. Currently there is a local initiative to construct a pathway along M-25 between Lexington and Port Sanilac. While there has been federal transportation funds alocated to this project, there are a number of issues that still need to be addressed. The most challanging of these are the number of deep and wide ravines along the M-25. Bridging these ravines may prove to be cost prohibitive.

Looking east on Huron Street (M-46) in the Downtown

Fig. 3.3A. Lexington Proposed Improvements







Recommendation Summary

Bike lanes can be added to Huron Street between west Main Street and the start of the trail to Crosswell. This may be accomplished by removing a few on-street parking spaces by the public library where an off-street parking lot exists and removing the center turn lane west of the Library (the turn lanes would be kept at Main Street). Due to the existing road width, bike lanes cannot be added to Main Street (M-25) south of Huron Street in the near term. It is recommended that shared lane markings be placed along this road until the road is reconstructed and bike lanes can implemented.

Curb extensions should be added in the downtown area along Main Street and Huron Street to provide better visibility and shorten the crossing distance at road intersections. Four crossing islands are proposed on Main Street where there is demand to cross the road and the left turn lane is not used. Pavement markings are also proposed to be added to the unmarked crosswalk at Lester Street and the crosswalk at Dennisen Street be enhanced with higher visibility crosswalk markings and signage.

Neighborhood connector routes are recommended to provide an alternative route for M-25 in the downtown and to provide connections to local parks and schools in the community. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

It is recommended that the proposed Lexington – Port Sanilac trail should focus initially on the two and half mile link north to Lexington Park near the intersection of County Farm Road and M-25. This link should be geared more towards pedestrians and be considered a wide sidewalk that has occasional bike traffic as many adult cyclists will continue to use the wide paved shoulder. The path should come up to the roadway and use the paved shoulder at the ravines. Appropriate pedestrian warning signs should be added on M-25 at these locations.

Looking north on Main Street (M-25) in the Downtown

Fig. 3.3B. Lexington Cost Summary

Lexington Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Sharrows on Main Street (Wall to Huron St) (2980 ft)	24	ea	$ 225.00	$ 5,400.00	every 250 +/- ft
Sharrows on Huron St (east of Main) (1170 ft)	10	ea	$ 225.00	$ 2,250.00	
Bike Lanes on Huron Street (Altona to Main St)	0.57	mi	$ 6,000.00	$ 3,420.00	
Repair Bricks Along Walkway (east of Main)	1,200	sft	$ 12.00	$ 14,400.00	Assumes 400' x 3' area
Bike Routes (signage only)	1.89	mi	$ 1,200.00	$ 2,268.00	
		TOTAL		**$ 27,738.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	7	ea	$10,000.00	$ 70,000.00	
Curb Extensions (per corner)	6	ea	$13,000.00	$ 78,000.00	
Gateway Transition	3	ea	$ 8,625.00	$ 25,875.00	
		TOTAL		**$ 173,875.00**	

Upgrade Breakwater Walkway

Mention and describe desired improvements in report per Lexington Corps, Coast Guard and MDNR will be involved with Section 404 Clean Water Act, Section 10 River and Harbors Act and Section 401 Water Quality Permits anticipated.

Incorporating in-water habitat improvements may assist in attracting federal funding assistance.

Overview of Recommendations for Port Sanilac

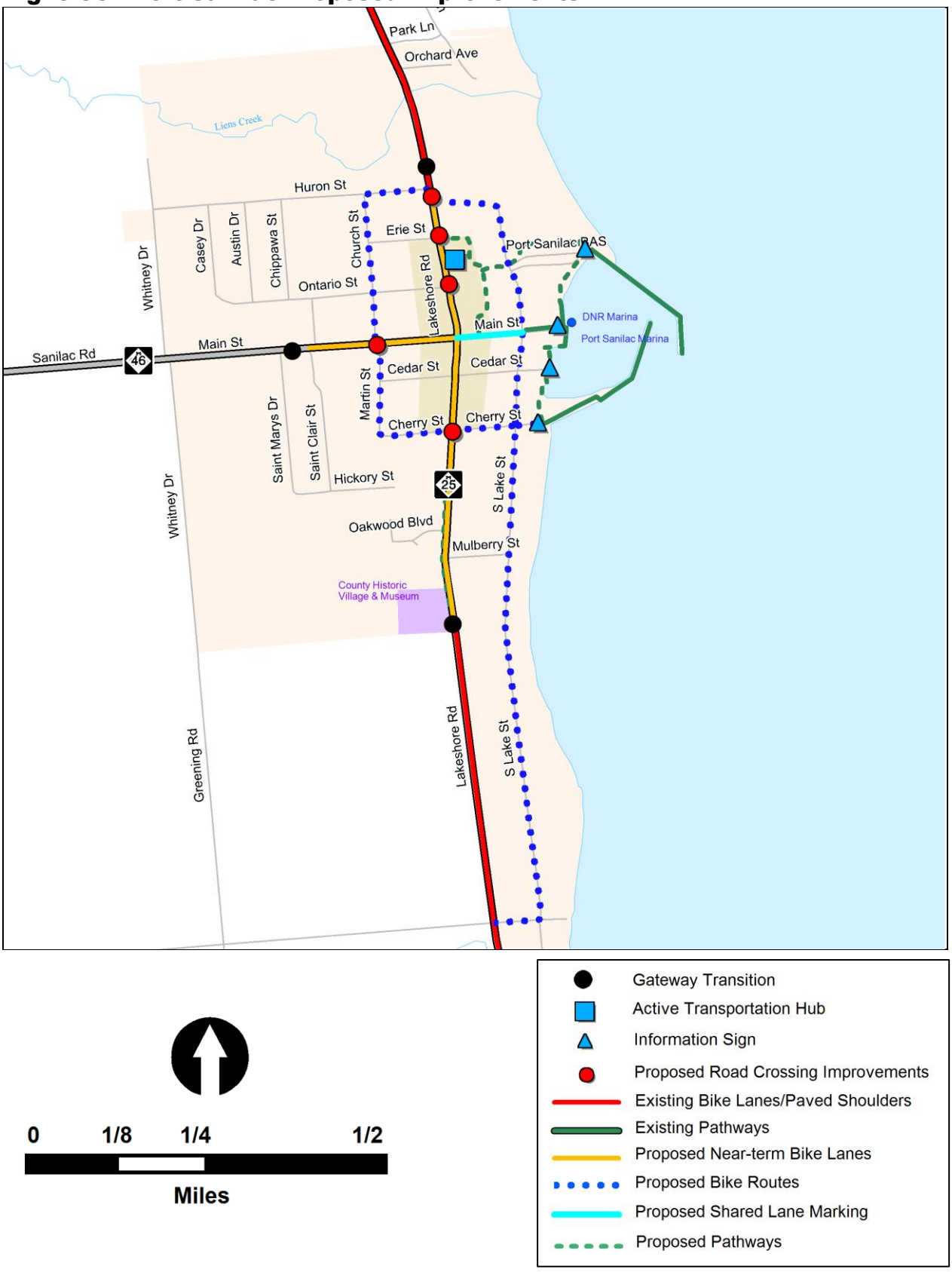
Existing Conditions
Port Sanilac is located on the west side of the region in Sanilac County. It is a small town with a population of 623, but this number increases dramatically in the summer. There are 102 seasonal housing units representing 23% of the total housing units in the village. This translates to about 200 additional residents who spend a considerable portion of the summer in the area. In addition to the seasonal housing, there is a small inn and both a DNR and a private marina that attact additional short-term visitors.

There are no existing bike lanes, bike routes or shared-use pathways in the village. For Michigan Communities between the population of 500 and 1,000, Port Sanilac ranks 9th out of 93 communities in terms of the total number of people who walk (7.8%), bike (0%) and take transit (2.2%) to work. The absence of bike commuters can be explained the very compact nature of the village.

Currently there is a local initiative to construct a pathway along M-25 between Port Sanilac and Lexington. While federal transportaoitn funds have been alocated for this project, there are a number of issues that still need to be addressed. The most challanging of these are the number of deep and wide ravines along the M-25. Bridging these ravines may prove to be cost prohibitive.

Looking east on Main Street (M-46) in the Downtown

Fig. 3.3C. Port Sanilac Proposed Improvements



Recommendation Summary
Bike lanes can be added to Ridge Street (M-25) in the near-term through 4 to 3 lane conversions and the elimination of one of the south-bound lanes just south of the Main Street intersection. This would provide a continuous bike facility through town linking the paved shoulders on M-25. Given the low traffic volumes there should be no negative effect on the automobile level of service. Bike lanes may also be added to Main Street by narrowing the lanes and consolidating the lightly used on-street parking on one side of the roadway.

Curb extensions should be added in the downtown area along Lakeshore Street and Main Street to provide better visibility and shorter crossing distance at road crossings.

Neighborhood connector routes are recommended to provide an alternative route for M-25 in the downtown and to provide connections to local parks and schools in the community. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

It is recommended that the proposed Port Sanilac – Lexington trail should focus initially on the two mile link south to the MDOT Roadside Park near the M-25 Washington Road intersection. This link should be geared more towards pedestrians and considered a wide sidewalk that has occasional bike traffic as many adult cyclists will continue to use the wide paved shoulder. The path should come up to the roadway and use the paved shoulder at the ravines. Appropriate pedestrian warning signs should be added on M-25 at these locations.

Looking north on Lakeshore Road (M-25) in the Downtown

Fig. 3.3D. Port Sanilac Cost Summary

Port Sanilac Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on Lakeshore Dr (4 to 3 lanes)	0.73	mi	$ 6,000.00	$ 4,380.00	Museum to Huron St
Sharrows on Main Street (Lakeshore Rd to Marina) (590ft)	6	ea	$ 225.00	$ 1,350.00	every 250 +/- ft
Bike Lanes on Main Street (M-25 to Saint Clair St)	0.25	mi	$ 6,000.00	$ 1,500.00	
Bike Routes (signage only)	2.21	mi	$ 1,200.00	$ 2,652.00	
		TOTAL		**$ 9,882.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	5	ea	$10,000.00	$ 50,000.00	
Curb Extensions (per corner)	10	ea	$13,000.00	$ 130,000.00	
Gateway Transition	3	ea	$ 8,625.00	$ 25,875.00	
Pathway (10' wide asphalt)	4,680	ft	$ 45.00	$ 210,600.00	
		TOTAL		**$ 416,475.00**	

Overview of Recommendations for Harbor Beach

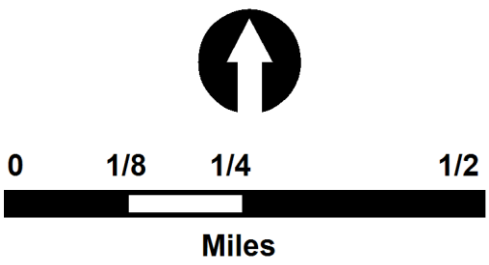
Existing Conditions
Harbor Beach is located on the west side of the region in Huron County. It has a population of 1,703 people with a modest increase in size in the summer months. There are 91 seasonal housing units representing about 9% of the total housing units in the city. This translates into about 180 additional residents who spend a considerable portion of the summer in the area. In addition to the seasonal homes there is North Park campground which has 184 sites of which a number are rented out on a seasonal or montly bases. There is also a 114 slip marina, the Maritime Festival and other events that bring in visitors for shorter stays. Five miles south of town is Wagener County park with 96 campsites and a boat launch.

There is an existing paved trail that currently connects North Park with the Murphy Museum downtown. There are plans to extend the trail in three directions. First, to the north on the abandoned railroad grade through the wooded area of North Beach Park. Second, to the northeast through Waterworks park to the City Marina. Third, east along Pack Street to the former coast guard facilty. Fourth to the south doing a loop through Bathing Beach Park. There are no existing bike lanes or bike routes.

Harbor Beach ranks 2nd out of 127 Michigan communities with a population between 1,000 and 2,000 in the total number of people who walk (15.8%), bike (0.4%), and take transit (1%) to work. Thus Harbor Beach is already has a large number of people walking on a daily basis.

Looking north on S Huron Ave (M-25) in the Downtown

Fig. 3.3E. Harbor Beach Proposed Improvements



- Gateway Transition
- Active Transportation Hub
- Information Sign
- Proposed Road Crossing Improvements
- Existing Bike Lanes/Paved Shoulders
- Existing Pathways
- Proposed Near-term Bike Lanes
- Proposed Bike Routes
- Proposed Shared Lane Marking
- Proposed Pathways

Recommendation Summary
Bike lanes can be added to S. Huron Avenue (M-25) just south of Broad Street via a 3 to 2 lane conversion. Bike lanes may also be added to State Street west of 1st street via lane narrowing. Due to the existing road width, bike lanes are not feasible on Huron Ave north of Broad Street and the first block of State Street. It is recommended that shared lane markings be placed along these routes until the roads are reconstructed and bike lanes can be implemented.

Curb extensions should be added in the downtown area along Huron Avenue and State Street to provide better visibility and shorter crossing distance at road crossings. Crossing islands are proposed by the Murphy Museum, Garden Street and Buell Street.

Neighborhood connector routes are recommended to provide an alternative route for M-25 in the Downtown area and to provide connection to local parks and schools in the community. Wayfinding signage, traffic calming and safe road crossings should be incorporated into the routes.

Beginning of the existing trail next to the Murphy Museum

Fig. 3.3F. Harbor Beach Cost Summary

Harbor Beach Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on S Huron (3 to 2 lanes)	0.5	mi	$ 6,000.00	$ 3,000.00	
Bike Lanes on State St	0.58	mi	$ 6,000.00	$ 3,480.00	
Sharrows on Huron and State Sts (3880 ft)	32	ea	$ 225.00	$ 7,200.00	every 250 +/- ft
Bike Routes (signage only)	1.07	mi	$ 1,200.00	$ 1,284.00	
Pathway (Phase III)				$ 712,350.00	Estimate details provided to Harbor Beach
Pathway (Phase IV)				$ 271,700.00	Estimate details provided to Harbor Beach
		TOTAL		**$ 999,014.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	9	ea	$10,000.00	$ 90,000.00	
Curb Extensions (per corner)	18	ea	$13,000.00	$ 234,000.00	
Gateway Transition	2	ea	$ 8,625.00	$ 17,250.00	
Pathway (10' asphalt) (Pack Street)	1,510	ft	$ 45.00	$ 67,950.00	
		TOTAL		**$ 409,200.00**	

Overview of Recommendations for Port Hope

Existing Conditions
Port Hope is located on the east side of the region in Huron County. It has a population of 267 people, but has a noticible increase in the number of people in the summer. There are 51 seasonal housing units representing about 25% of the total housing units in the village. This translates into about 100 additional residents who spend a considerable portion of the summer in the area. In addition to the seasonal housing there is Stafford County Park which has 73 campsites, six camper cabins and a boat launch. There is also a small marina.

The downtown area is currently pedestrian friendly with exisitng curb extensions at crosswalks and pedestrian scale lighting. Port Hope ranks 2nd out of 92 Michigan communities with a population between 100 and 500 in the total number of people who walk (13.6%), bike (0%) and take transit (6.8%) to work. This can likely be attributed to its compact size and pedestrian friendly character. There are no existing bike lanes in the downtown area.

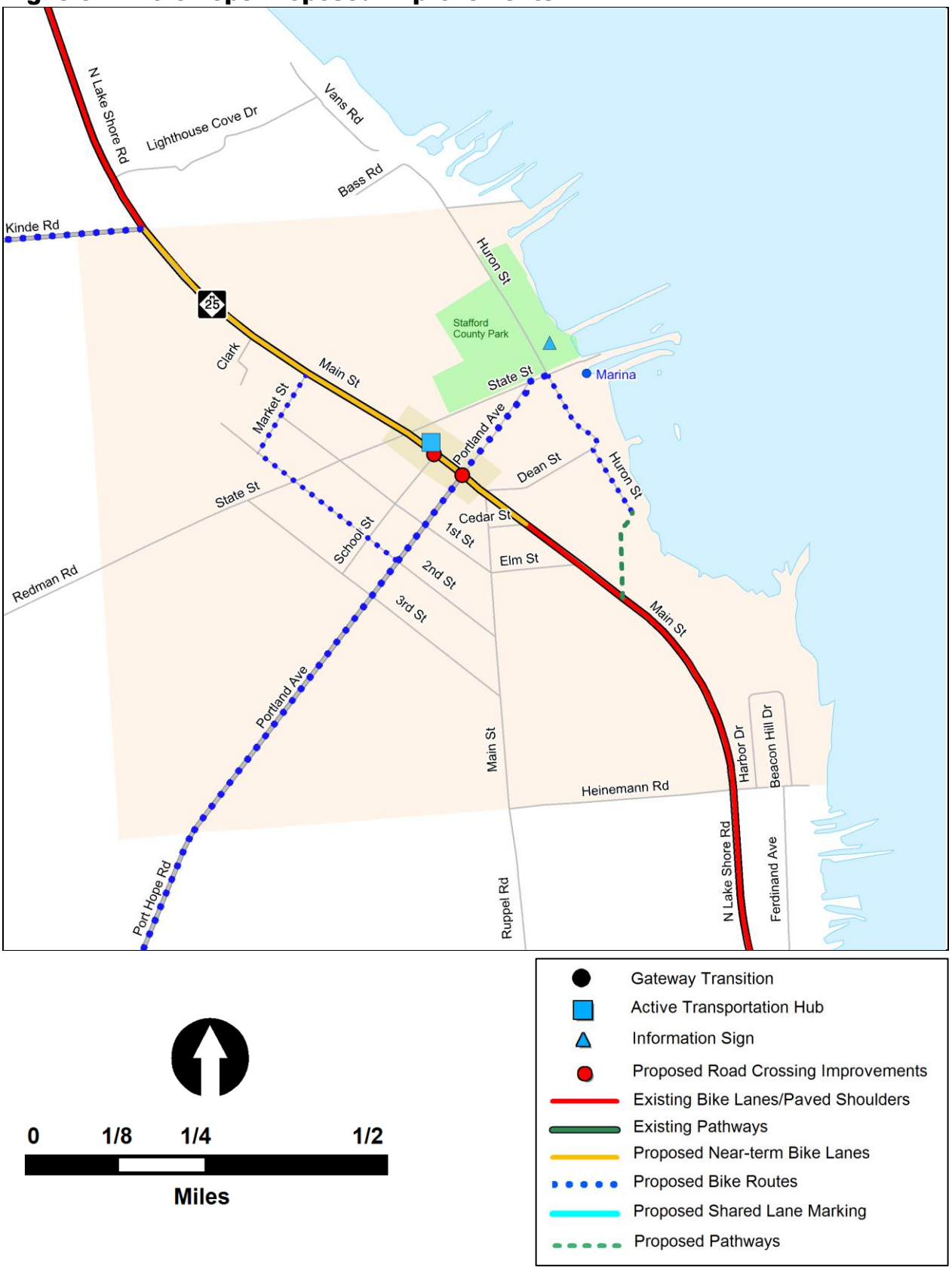
Recommendation Summary
Bike lanes can be added to Main Street (M-25) in the near-term through lane narrowing. Neighborhood connector routes are recommended to provide an alternative route to M-25 and provide connections to local parks, schools and other destinations in the village. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

Fig. 3.3G. Port Hope Cost Summary

Port Hope Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate
Near Term Improvements				
Bike Lanes on Main Street (Cedar to Kinde)	0.83	mi	$ 6,000.00	$ 4,980.00
Bike Routes (signage only)	1.13	mi	$ 1,200.00	$ 1,356.00
		TOTAL		**$ 6,336.00**
Mid-Term Improvements				
Crossing Improvements/Islands	2	ea	$10,000.00	$ 20,000.00
Sidewalk (Village Hall to Village Center)	4,300	sft	$ 3.00	$ 12,900.00
		TOTAL		**$ 32,900.00**

Fig. 3.3H. Port Hope Proposed Improvements



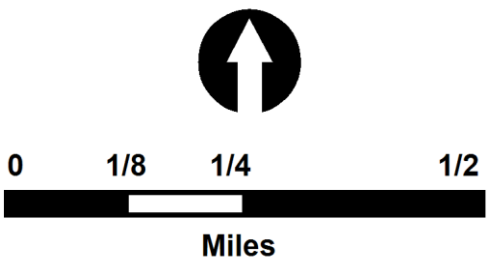
Overview of Recommendations for Port Austin

Existing Conditions
Port Austin is located at the northern tip of the region. It has a population of only 664 but its population increases dramatically in the summer months. There are 299 seasonal housing units, representing about 41% of the total housing units. This translates to about a 600 additional residents who spend a considerable portion of the sumer in the area. In addition to the seasonal residents there are a number of cottages, campgrounds, motels and bed and breakfasts as well as the Port Austin State Harbor and boat launch that attract visitors for shorter stays. Port Austin is the primary commerical center for a large number of homes, cottages and campgrounds located ten miles in either direction along the coast includiing Port Creascent State Park, Pointe Aux Barques and Grind Stone City. Port Austin also hosts a number of events including a Sea Kayak Symposium in mid-June.

There are currently no designated bike faciliites in Port Austin but is does have the only bike rental facility in the entire thumb area. Port Austin ranks 9th out of 93 of Michigan communities with a population between 500 and 1,000 in terms of the total number of people who walk (9.5%), bike (0.7%) and use transit (0%) to work.

Looking west on E Spring Street in the Downtown

Fig. 3.3I. Port Austin Proposed Improvements



- Gateway Transition
- Active Transportation Hub
- Information Sign
- Proposed Road Crossing Improvements
- Existing Bike Lanes/Paved Shoulders
- Existing Pathways
- Proposed Near-term Bike Lanes
- Proposed Bike Routes
- Proposed Shared Lane Marking
- Proposed Pathways

Recommendation Summary

Bike lanes can be added to Lake Street in the near-term through lane narrowing. Bike lanes can be added to E. Spring Street in the near-term by removing on-street parking from one side of the street. Due to the existing road width, bike lanes cannot be added to W. Spring Street in the near-term. It is recommended that shared lane markings be placed along these routes until the roads are reconstructed and bike lanes can be implemented.

Curb extensions should be added in the downtown area along Lake Street and Spring Street to provide better visibility and shorter crossing distance at road crossings. Neighborhood connector routes are recommended to provide an alternative route for M-25 and M-39. These routes also provide connections to local parks and schools in the community. Wayfinding signage, traffic calming and safe road crossings should be incorporated into the routes.

Looking south on Lake Street (M-25/M-53) in the Downtown

Fig. 3.3J. Port Austin Cost Summary

Port Austin Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on Spring Street (Lake Dr to Lake St)	0.49	mi	$ 6,000.00	$ 2,940.00	
Bike Lanes on Lake Street (Grindstone to Spring)	0.39	mi	$ 6,000.00	$ 2,340.00	
Sharrows on Spring St (Sand Rd to Lake St)(1170ft)	10	ea	$ 225.00	$ 2,250.00	every 250 +/- ft
Bike Routes (signage only)	1.79	mi	$ 1,200.00	$ 2,148.00	
		TOTAL		**$ 9,678.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	7	ea	$10,000.00	$ 70,000.00	
Curb Extensions (per corner)	21	ea	$13,000.00	$ 273,000.00	
Gateway Transition	3	ea	$ 8,625.00	$ 25,875.00	
		TOTAL		**$ 368,875.00**	

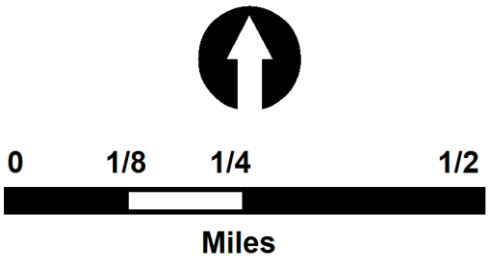
Overview of Recommendations for Caseville

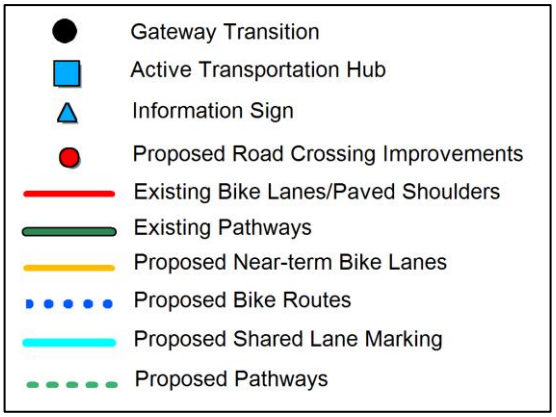
Existing Conditions
Caseville is located in the northwest side of the region in Huron County. It has a population of 777 but its popuation increases dramatically in the summer months. There are 271 seasonal housing units representing 44% of the total housing units. This translates into about about 740 additional residents who spend a considerable portion of the summer in the area. In addition to the seasonal residents there are a number of cottages, campgrounds, motels and bed and breakfasts as well as the State Harbor and boat launch that attract visitors for shorter stays. Caseville also hosts a number of events including the extreemly popular Cheeseburger Festival in mid-August. There are also almost an additonl 2,000 people who live in the township surrounding the city.

The downton area is pedestrian friendly, with exisitng curb extensions at crosswalks, pedetrian scale lighting and benches. There are no existing bike lanes in the downtown area. Caseville ranks 56th out of 93 Michigan communities with a population between 500 and 1,000 in terms of the total number of people who walk (2.9%), bike (0.0%) and use transit (1.3%) to work.

Looking north on Main Street (M-25) the along the county park

Fig. 3.3K. Caseville Proposed Improvements





Recommendation Summary
Bike lanes can be added to Main Street (M-25) in the downtown area in the near-term through lane narrowing. Due to the existing road width, bike lanes cannot be added to M-25 south of Michigan Street in the near-term. However, until bike lanes can be added, the road should be redesigned to lower the speed limit to 35 mph so shared lane markings can be added in the midterm. Measures that would help lower the speed through this commercial area include the proposed crossing island, a planted median where the left-turn in not necessary and street trees between the sidewalk and the curb. As this segment of road was recently constructed it will be quite some time before the road is reconstructed and bike added.

Neighborhood connector routes are recommended to provide an alternative route for M-25 in the city. There is a proposed pathway connection between West Street and Pine Street across the Pigeon River and through undeveloped land. Neighborhood connector routes also provide connections to local parks and schools in the community. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

Looking south on Main Street (M-25) in the Downtown

Fig. 3.3L. Caseville Cost Summary

Caseville Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on Main Street (Michigan to County Harbor Dr)	0.58	mi	$ 6,000.00	$ 3,480.00	
Sharrows on Main St (Caseville Rd to Michigan St)	0.63	mi	$ 6,000.00	$ 3,780.00	every 250 +/- ft
Add Median and Street Trees to Main St (s of Michigan)	1	ls	$ 50,000.00	$ 50,000.00	
Bike Routes (signage only)	0.85	mi	$ 1,200.00	$ 1,020.00	
		TOTAL		**$ 58,280.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	6	ea	$ 10,000.00	$ 60,000.00	
Gateway Transition	2	ea	$ 8,625.00	$ 17,250.00	
Pathway (10' asphalt) (Pine St to Woodbine St)	1,670	ft	$ 45.00	$ 75,150.00	
Bridge (120')	1	ls	$ 325,000.00	$ 325,000.00	
Pathway (10' asphalt) (behind Chamber of Comm)	250	ft	$ 45.00	$ 11,250.00	
		TOTAL		**$ 488,650.00**	

Overview of Recommendations for Sebewaing

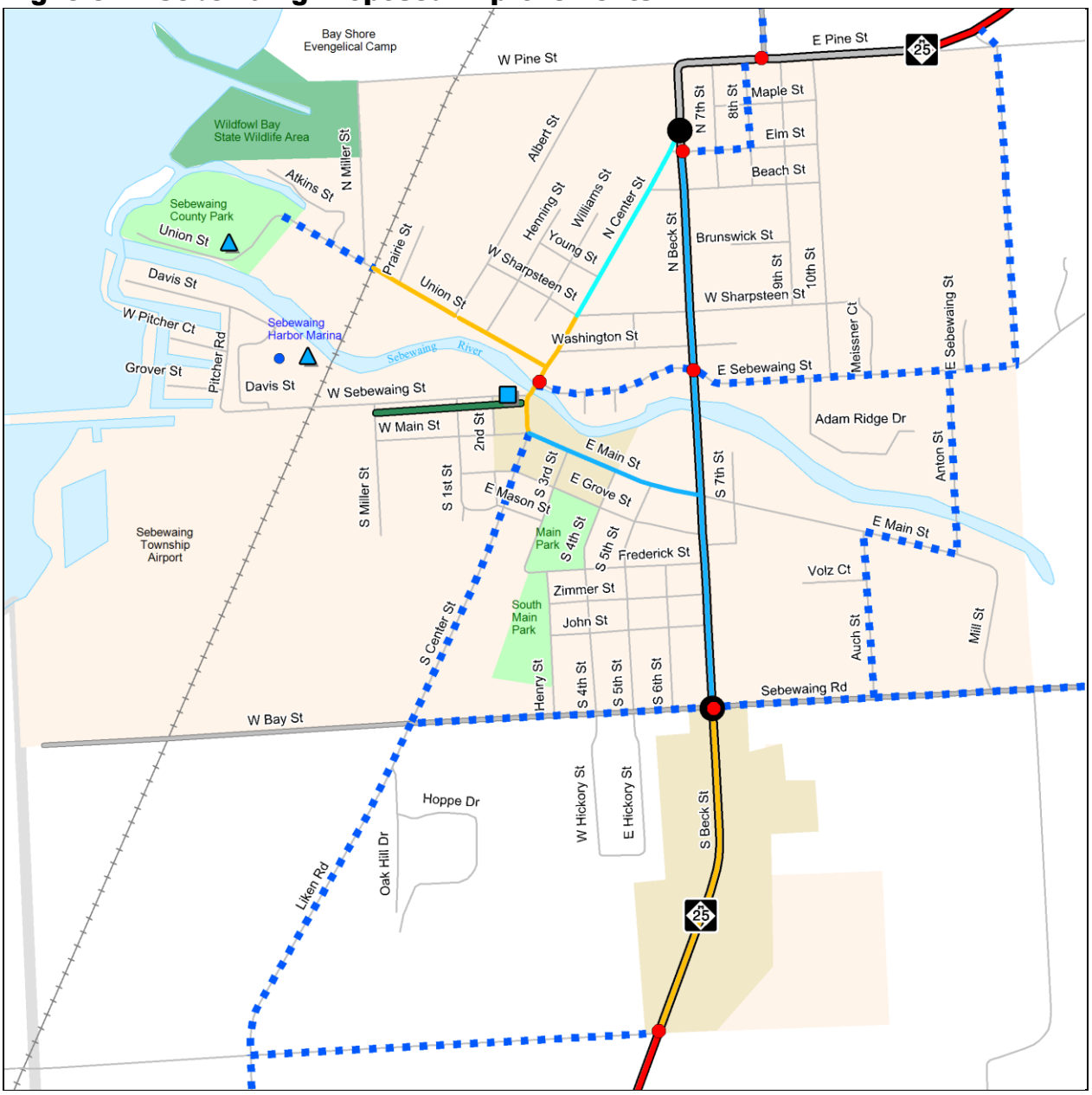
Existing Conditions
Sebewaing is located on the west side of the region in Huron County. It has a population of 1,759. There is only a handful of seasonal housing units in the city. In addition to the year-round residents, the Sebewaing Marina, Sebewaing County Park which has 64 campsites sites, the Sebewaing River Campground and the Sebewaing Sugar Festival in mid-june attract visitors to the area. Sebewaing also serves as the commerical center for the surrounding townships.

There is an existing pathway on the south side of W. Sebewaing Street between S. Center Street and S. Miller Street. There are no existing bike lanes in the village. Sebewaing ranks 44th out of 127 Michigan communities with a population between 1,000 and 2,000 in terms of the total number of people who walk (5.7%), bike (0%) and use transit (0%) to work.

One of the most challanging areas for pedestrians is the intersection of E Sebewaing and N Center Street. The combination of the vertical curve on the bridge, the bridge railing and the building make clear sightlines difficult.

Looking north on Unionville Road (M-25) toward E Bay Road

Fig. 3.3M. Sebewaing Proposed Improvements



Recommendation Summary

Bike lanes can be added to a portion of Union Street and N. Center Street in the near-term through lane narrowing. Due to the existing road width, in some areas bike lanes cannot be added to the primary roads in the near-term. It is recommended that shared lane markings be placed along these routes until the roads are reconstructed and bike lanes can be implemented.

Curb extensions should be added in the downtown area along N Center Street and E Main Street to provide better visibility and shorter crossing distance at road crossings.

Neighborhood connector routes are recommended to provide an alternative route to M-25 in the city that bypasses the sugar plant entrance. The routes also provide connections to local parks and schools in the community. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

Looking south on N Center Street in the Downtown

Fig. 3.3N. Sebewaing Cost Summary

Sebewaing Proposed Improvments

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on Beck St (Sebwaing South)	0.52	mi	$ 6,000.00	$ 3,120.00	
Bike Lanes on Center (Main to Sharpsteen)	0.2	mi	$ 6,000.00	$ 1,200.00	
Bike Lanes on Union (RR to Center)	0.3	mi	$ 6,000.00	$ 1,800.00	
Sharrows on Center Street (Sharpsteen to Beck St) (1,740 ft)	14	ea	$ 225.00	$ 3,150.00	every 250 +/- ft
Edge Stripe Parking Lane (N Beck St)	2780	ft	$ 0.10	$ 278.00	Bay to Elm St
Edge Stripe Parking Lane (E Main St)	920	ft	$ 0.10	$ 92.00	Beck to Center St.
Bike Routes (signage only)	3.85	mi	$ 1,200.00	$ 4,620.00	
		TOTAL		**$ 14,260.00**	
Mid-Term Improvements					
Crossing Improvements/Islands	5	ea	$10,000.00	$ 50,000.00	
Curb Extensions (per corner)	11	ea	$13,000.00	$ 143,000.00	
Gateway Transition	2	ea	$ 8,625.00	$ 17,250.00	
		TOTAL		**$ 210,250.00**	

Overview of Recommendations for Unionville

Existing Conditions
Unionville is located on the west side of the region in Tuscola County and known as the "Gateway to the Thumb." It has a population of 508. Unionville ranks 81st out of 93 Michigan communities with a population between 500 and 1,000 in terms of the total number of people who walk (2.1%), bike (0%), and use transit (0%) to work.

There currenly are no bike lanes in the downtown area however, a walking pathway was recently constructed in one of the local parks. One of the most challanging places for pedestrians is crossing N Unionville Road at Bay Street.

Recommendation Summary
Bike lanes can be added to a portion of Unionville Road (M-25) in the downtown area through lane narrowing and removal of extra lanes. Due to the existing road width, bike lanes cannot be added to Bay Street in the near-term. However, next time the road is reconstructed bike lanes should be added to this roadway by paving the shoulders.

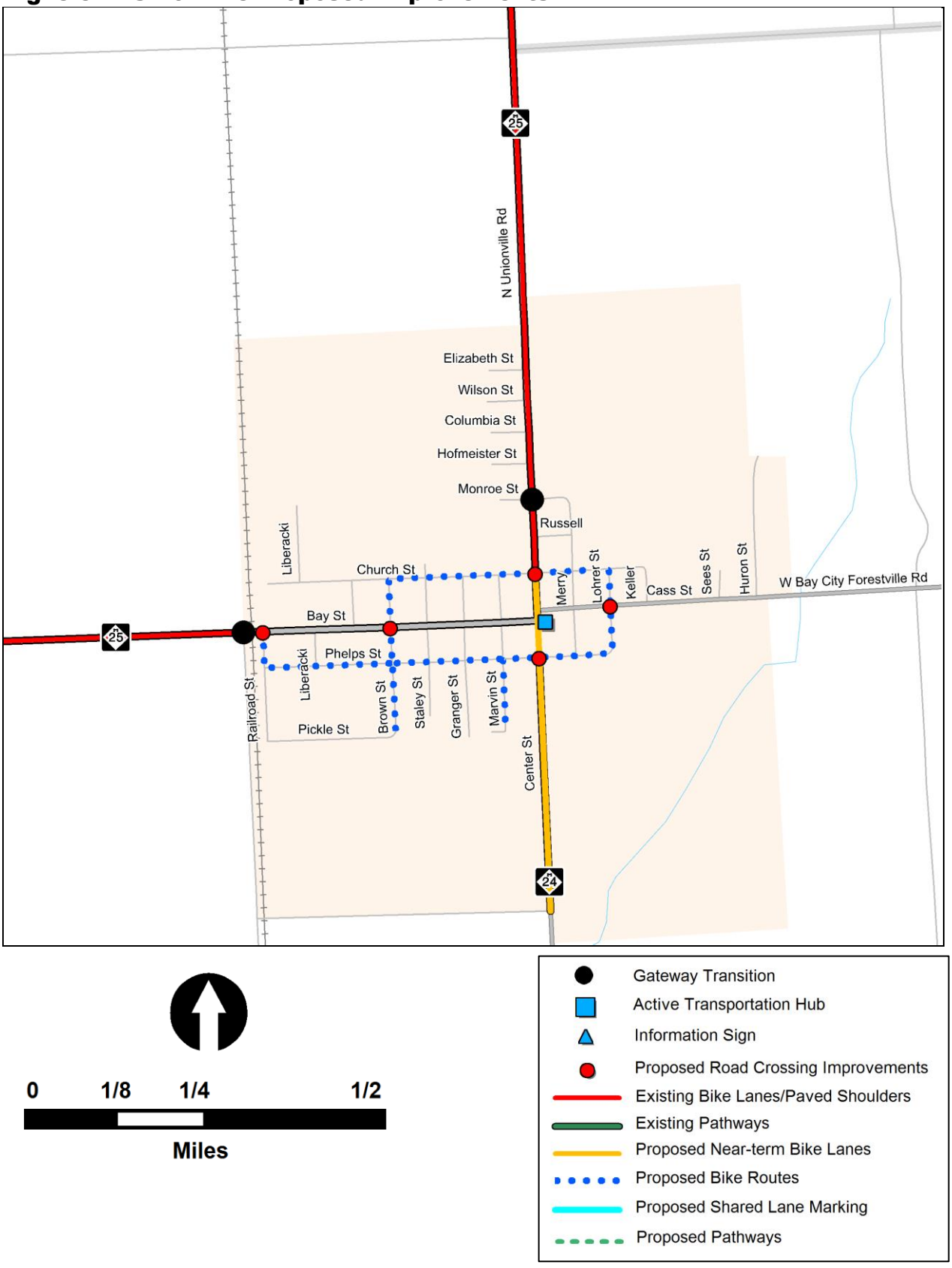
Neighborhood connector routes are recommended to provide an alternative route for M-25 in the village and to provide connections to local parks and schools in the community. Wayfinding signage, traffic calming, and safe road crossings should be incorporated into the routes.

Fig. 3.3O. Unionville Cost Summary

Unionville Proposed Improvements

	Quantity	Unit	Unit Price	Cost Estimate	
Near Term Improvements					
Bike Lanes on Center St (Limits to Church St)	0.58	mi	$ 6,000.00	$ 3,480.00	
Bike Lanes on Center St (north of Church St to City limits)	0.5	mi	$ 2,000.00	$ 2,000.00	mark/sign existing shoulder as bike lanes
Bike Routes (signage only)	1.54	mi	$ 1,200.00	$ 1,848.00	
		TOTAL		**$ 7,328.00**	
Mid-Term Improvements					
Pave Shoulders & Add Bike Lanes on Bay St (RR - Center St)	0.5	mi	$160,000.00	$ 80,000.00	
Crossing Improvements/Islands	5	ea	$ 10,000.00	$ 50,000.00	
Gateway Transition	2	ea	$ 8,625.00	$ 17,250.00	
		TOTAL		**$ 147,250.00**	

Fig. 3.3P. Unionville Proposed Improvements



4. Existing Conditions

The major influences on non-motorized travel may be distilled down to two factors: the physical environment and the social environment. The influence of the physical environment is not limited to the existence of specific facilities such as bike lanes and sidewalks. Just as important as facilities is the underlying form. The majority of bicycle and pedestrian trips are for short distances. Even with first-rate facilities, large blocks of homogeneous land uses and spread-out development will inhibit many non-motorized trips.

The Thumb Region is at a key juncture. Mainstream media has begun to cover the health and economic implications of our land use and transportation infrastructure decisions. Community leaders and citizen activists are calling for a greater emphasis on non-motorized travel. Yet, there is a tremendous physical and institutional legacy to overcome.

The Thumb Region generally consists of dispersed land uses that for the most part, are scaled towards automobile use. The region is fortunate in that it does not have any expressway which can create tremendous barriers for non-motorized travel. However, due to this the primary roads carry a lot of high speed truck traffic. Overall, the majority of primary roads have very low traffic volumes, making them a relatively comfortable environment for road cyclists.

Bicycle and pedestrian travel outside of neighborhood streets generally follows the primary road system on paved shoulders or side paths. Opportunities to cross the primary road system are limited when outside of a city or village.

Over the past number of years, the Thumb Region has added some paved shoulders along the primary road system, with a nearly complete route along the M-25 Heritage route that follows the shoreline. However, there are still numerous gaps remaining in the system which makes many trips challenging. Trips on unfamiliar routes may often result in a dead end without an obvious alternative. The artificial barriers of the railroad, rivers and large farms also tend to fragment the system from a non-motorized standpoint. The result is a non-motorized environment that is generally not favorable to walking and bicycling for everyday transportation but is capable of providing for more recreational based trips.

Many of the cities and village have short blocks in the neighborhoods providing a more bicycle and pedestrian environment for daily transportation trips.

4.1 Inventory and Analysis Maps

The following maps provide a general summary of the existing conditions in the Thumb Region:

- Fig. 4.1A. Existing Non-motorized Facilities
- Fig. 4.1B. Existing Planned and Conceptual Non-motorized Routes
- Fig. 4.1C. Population Density
- Fig. 4.1D. Average Daily Traffic Volumes
- Fig. 4.1E. Road Jurisdiction
- Fig. 4.1F. Planned Road Projects (CIP/TIP)
- Fig. 4.1G. Pedestrian Crash Locations
- Fig. 4.1H. Pedestrian Crash Data
- Fig. 4.1I. Bicycle Crash Locations
- Fig. 4.1J. Bicycle Crash Data

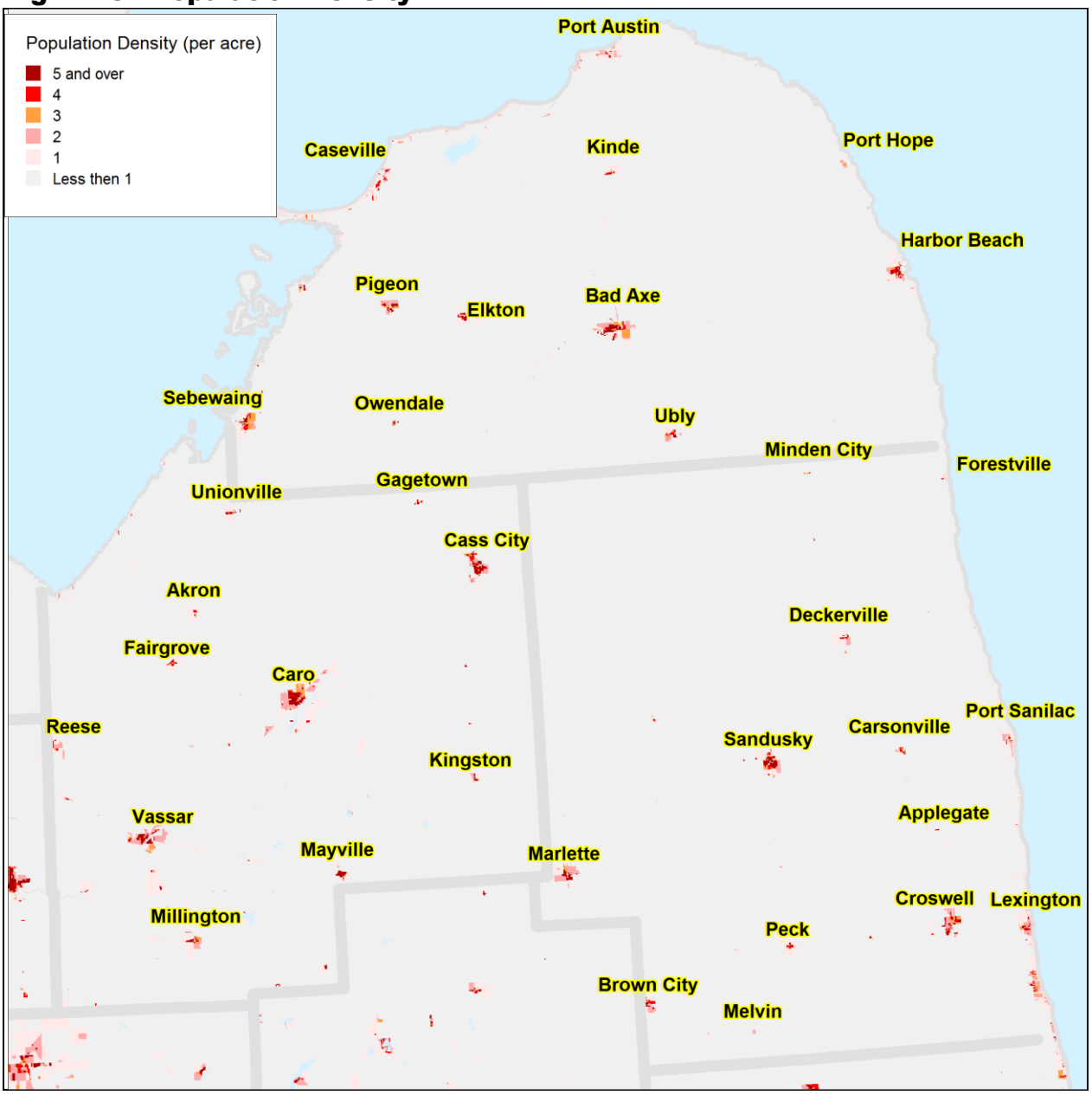
Fig. 4.1A. Existing Non-motorized Facilities

The Southern Links Trail is located on the south side of the region and connects to Millington. The M-25 Heritage Routes has paved shoulders the entire length following the shoreline. There are some portions of paved shoulders in the interior roadways, however there are only pieces and they do no link to make a cohesive system.

Fig. 4.1B. Existing Planned and Conceptual Non-motorized Routes

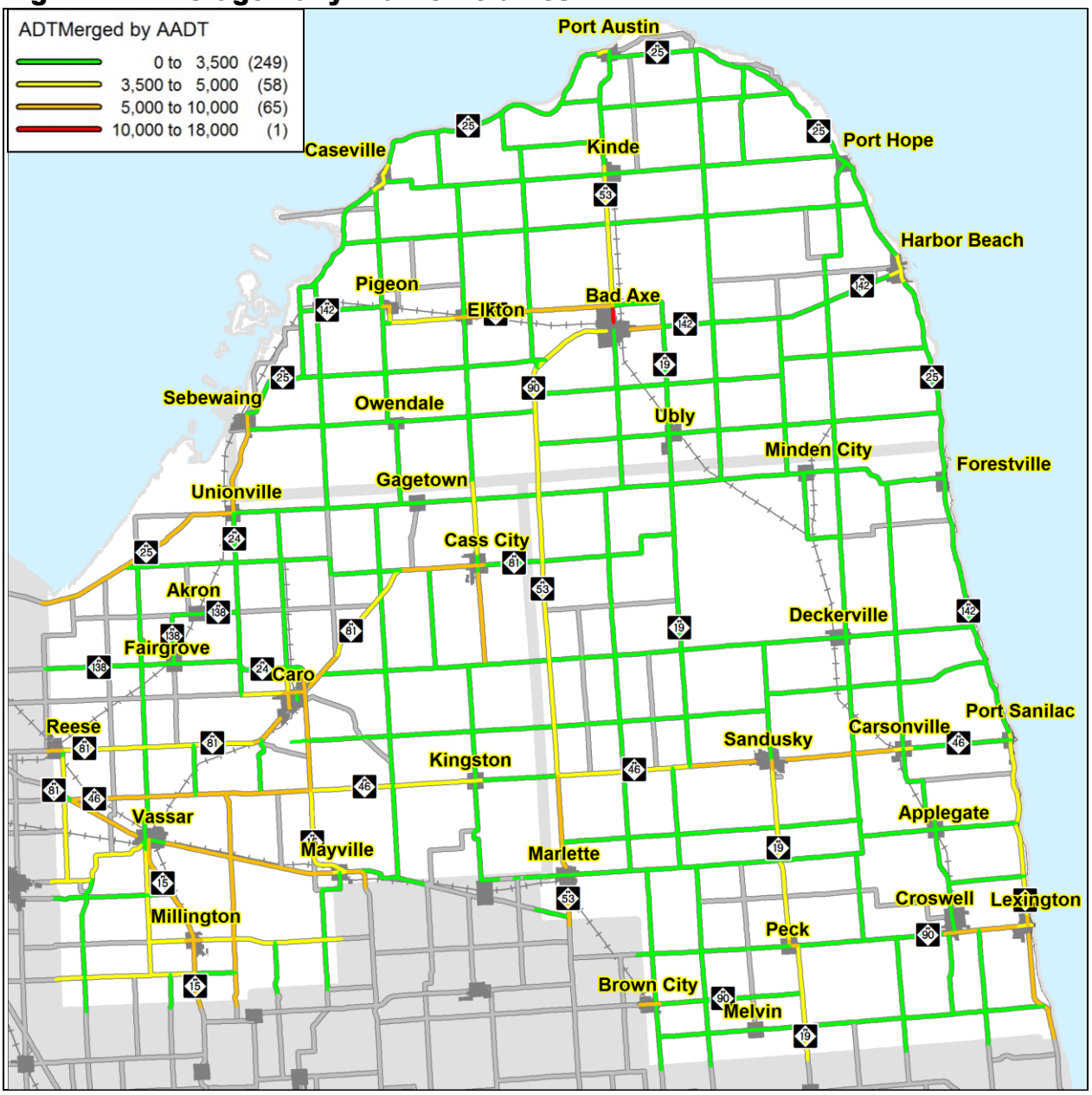
There have been previous planning efforts in the area to incorporate non-motorized routes into the region. Noted above is a overview of the different routes that have been discussed in the past.

Fig. 4.1C. Population Density



Based on the 2000 census. Most of the population is located in the cities and villages.

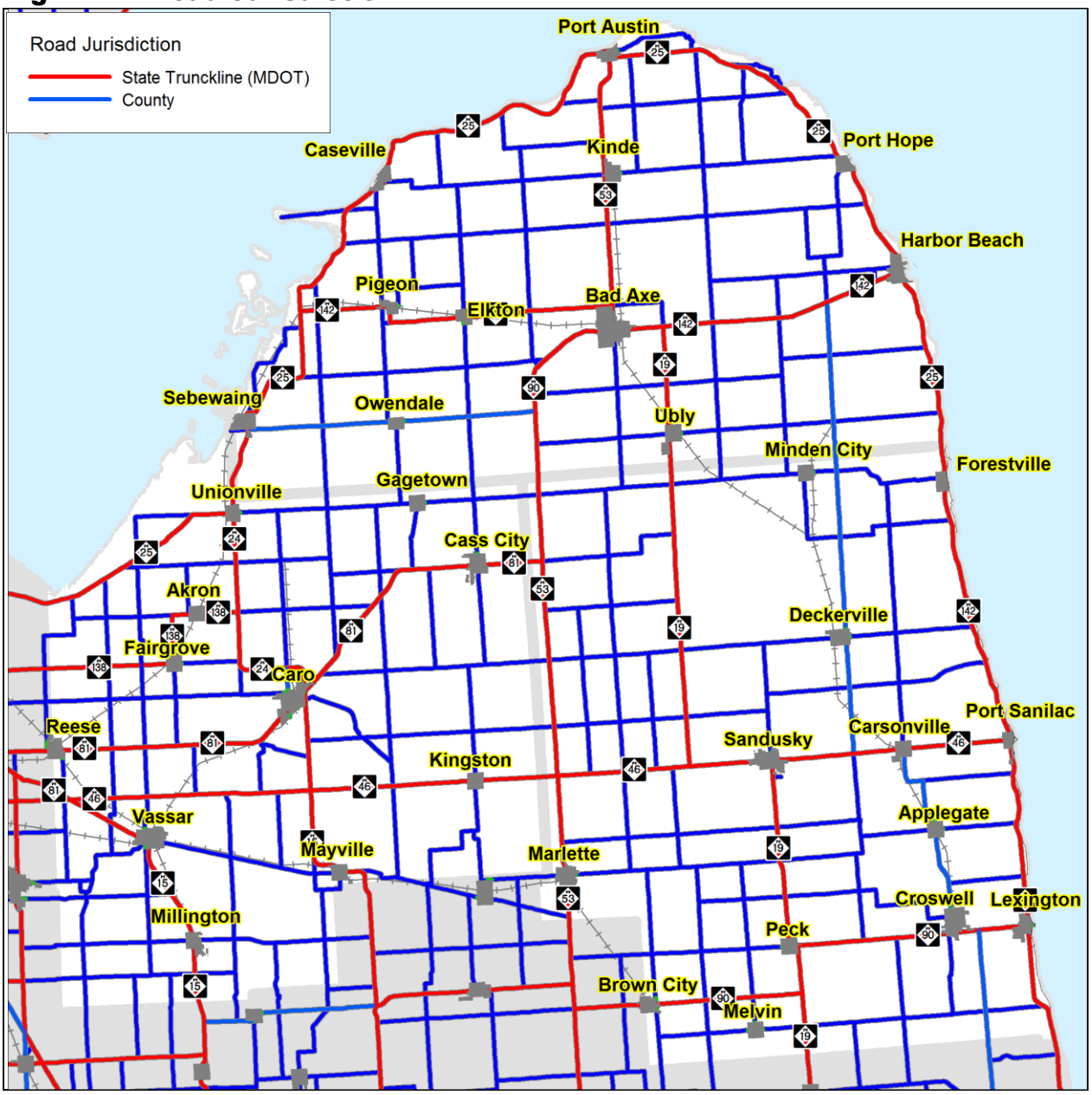
Fig. 4.1D. Average Daily Traffic Volumes



Annual Average Daily Traffic (AADT) is an estimate of traffic volumes. The volumes are based on total two-way traffic over a 24-hour period and may vary by season or day of the week. The volumes are determined from a combination of actual traffic counts and modeling. The map shows 2008 data provided by SEMCOG.

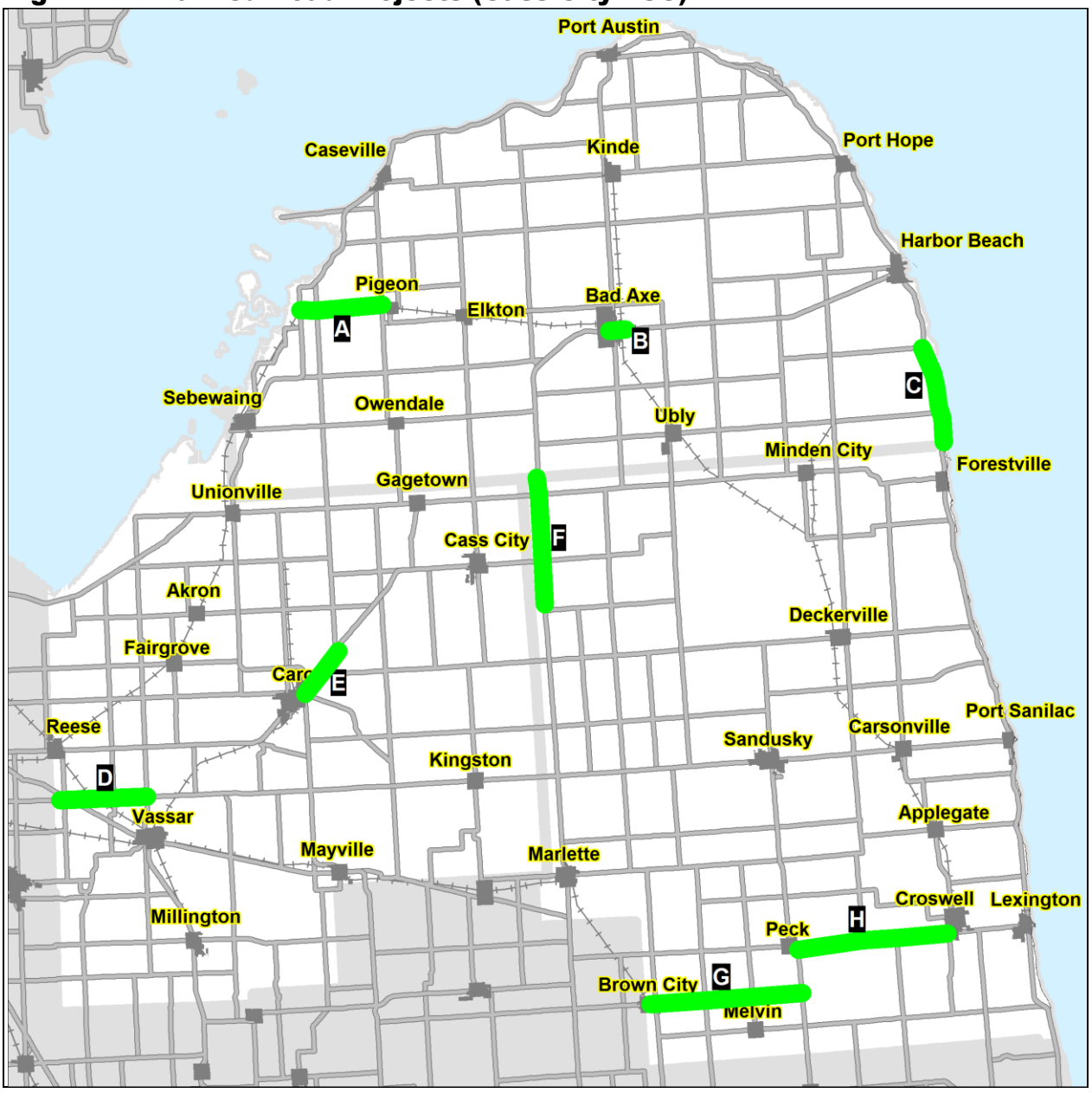
The gradations used generally reflect noticeable changes in the comfort level of bicyclists sharing a roadway with motorists, all other factors being equal. The majority of the major roadways are under 3,500 ADT.

Fig. 4.1E. Road Jurisdiction



Roads owned by the state and managed by the Michigan Department of Transportation (MDOT) are shown in red. Any modifications to these "trunkline" roads must be coordinated with and approved by MDOT. Likewise any roads shown in blue are under the jurisdiction of the county road commission and any modifications to these roads must be coordinated with and approved by the county road commission.

Fig. 4.1F. Planned Road Projects (Cass City TSC)



2011 Road Construction Map from the Cass City TSC:

A. Double Chip Seal on M-142
B. Cold Mill and HMA Resurface with Sdiewalk Ramp Upgrades on M-53
C. Double Chip Seal and Fog Seal on M-25
D. Microsurfacing on M-46
E. Widening for Center Turn Lane on M-81
F. Cold Mill and HMA Resurface on M-53
G. Double Chip Seal on M-90
H. Double Chip Seal on M-90

Fig. 4.1G. Pedestrian Crash Locations

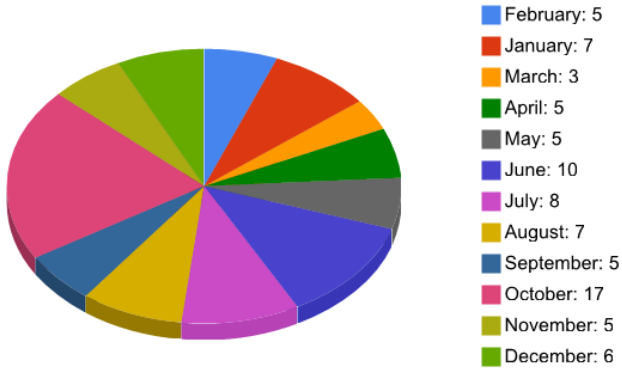
The crashes shown are from a five year period, 2004 – 2009. There were 87 pedestrian involved crashes, 12 (14%) were fatal and 20 (23%) resulted in serious injuries. Drinking or drug use was involved in 13 (15%) of the crashes. There was no traffic control at 72 (87%) of the crash locations. The Michigan Traffic Crash Fact website was the source for the data and charts.

The fatality rates for pedestrians in the Thumb Area (per 100,000 people) are: Tuscola County at 2.2, Sanilac County at 0.7 and Huron County at 1.2. Tuscola County was ranked 4th for the county with the highest pedestrian fatality rate from 2000-2009 in Michigan, based on data from the "Dangerous by Design 2011" by Transportation for America, with 11% of traffic deaths that were pedestrians.

Fig. 4.1H. Pedestrian Crash Data

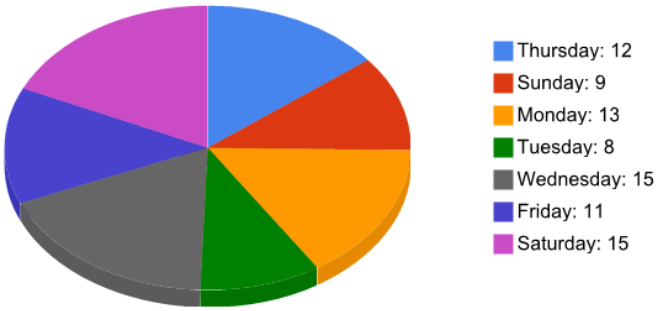
Month of Crash

Pedestrian crashes occurred in every month, with the most crashes occurring during the month of October.



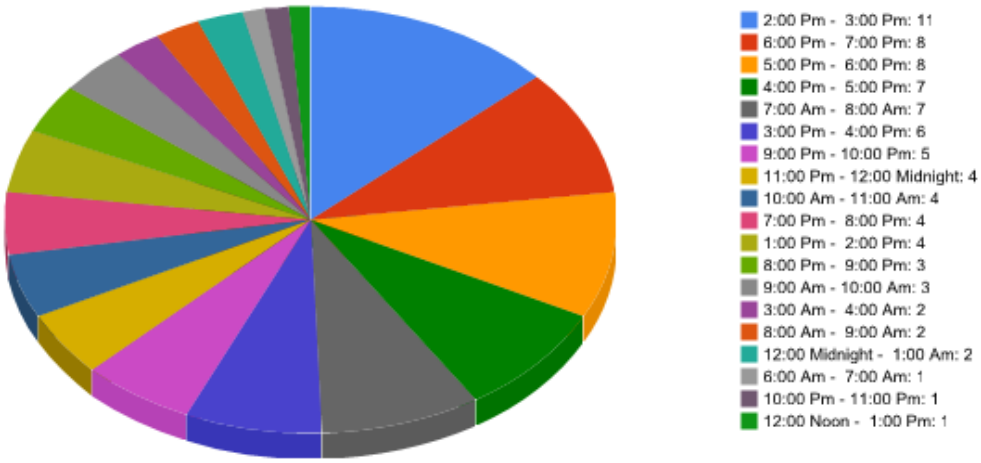
Day of Week

Crashes were evenly distributed throughout the week.



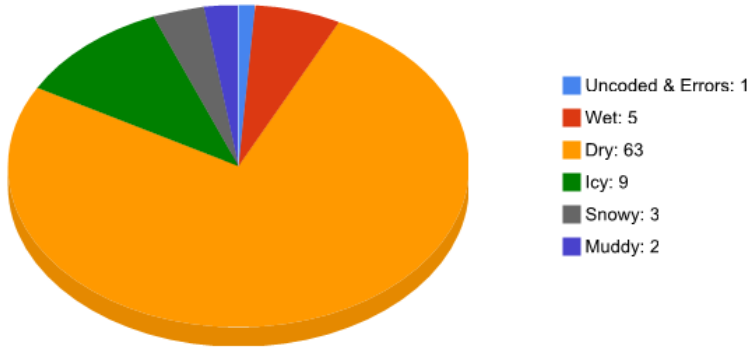
Time of Day

67% of the crashes occurred in the afternoon and evening between 2:00 PM and 10:00 PM.



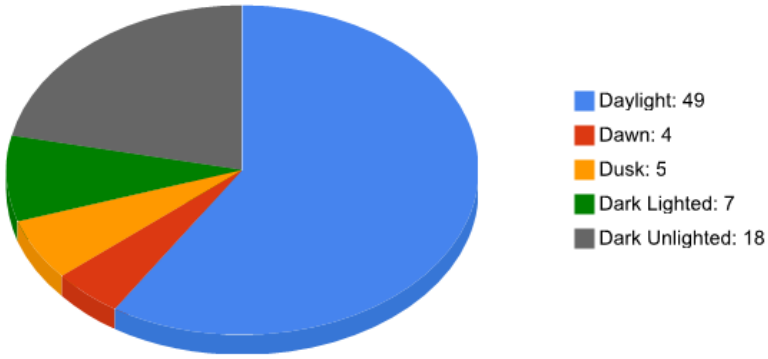
Road Conditions

Wet, Snowy or Icy roads were a factor in about 20% f the crashes.



Lighting Conditions

60% of the crashes occurred in daylight. 20% of the crashes occurred in the dark with no lighting.



Relation to the Roadway

94% of the crashes took place on the roadway.

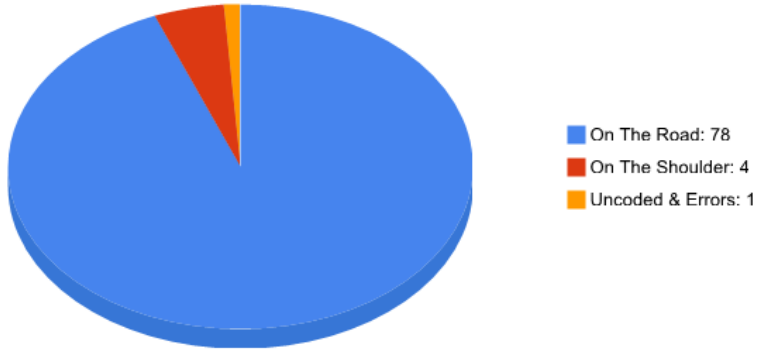


Fig. 4.1I. Bicycle Crash Locations

The crashes shown are from a five year period, 2004 – 2009.

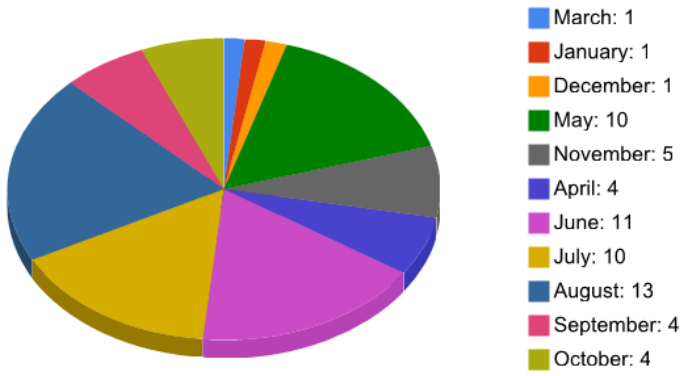
There were 64 bicycle involved crashes, none were fatal and 12 (19%) resulted in serious injury. Drinking or drug use was involved in 4 (6%) of the crashes. There was no traffic control at 56% of the crashes; a signal was present at 13% and a stop sign at 28% of the locations.

The Michigan Traffic Crash Fact website was the source of the data and charts.

Fig. 4.1J. Bicycle Crash Data

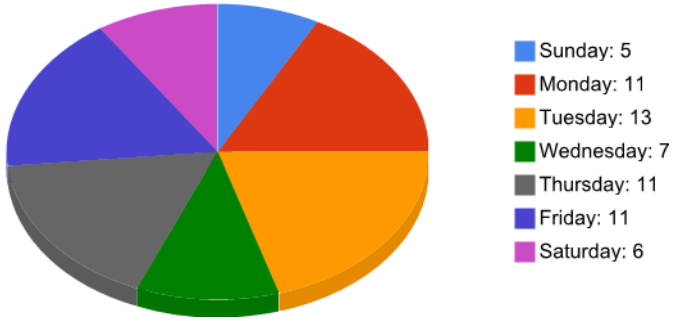
Month of Crash

There were no crashes during the month of February. This is likely due to fewer bicyclists during the winter months and that winter bicyclists are more experienced bicyclists.



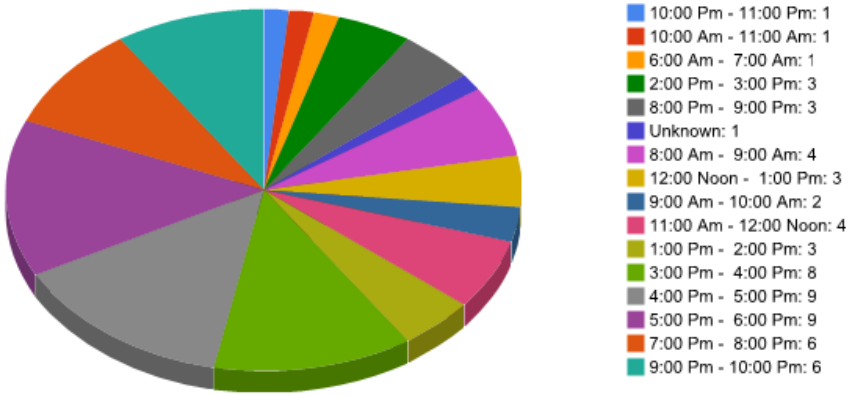
Day of Week

Crashes were evenly distributed throughout the week.



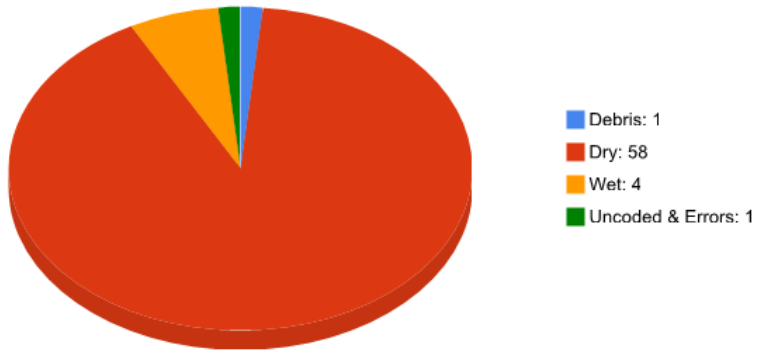
Time of Day

65% of the crashes occurred in the afternoon and evening between 3:00 PM and 10:00 PM.



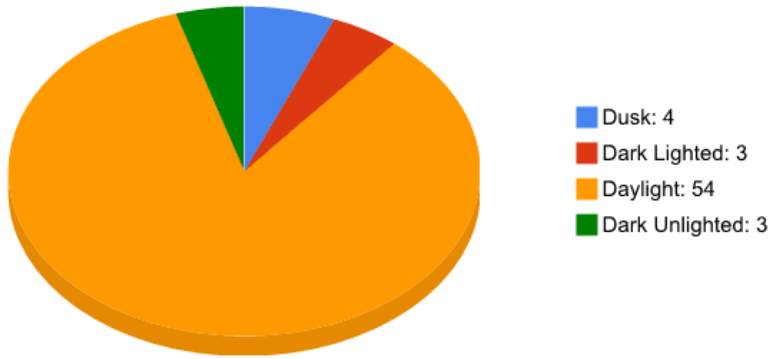
Road Conditions

The road was dry for 90% of the crashes.



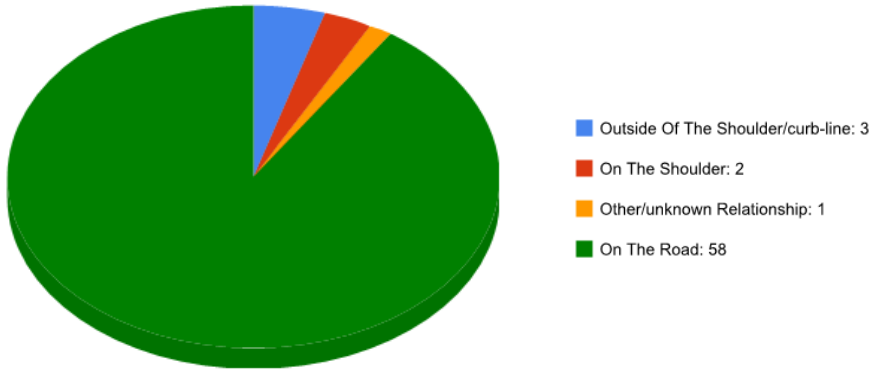
Lighting Conditions

84% of the crashes occurred in daylight.



Relation to Roadway

90% of the crashes took place in the roadway.



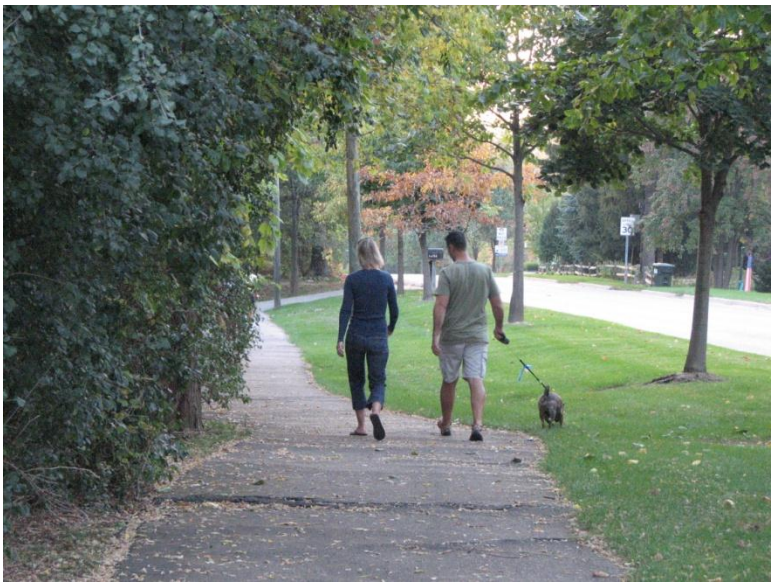
5. Design Guidelines

These design guidelines should be consulted when planning new facilities, reconstructing or modifying existing facilities, and updating city and design standards.

Topics:

5.1 Key factors for Pedestrians

Travel time and continuity of travel path are key factors that influence the likelihood of a person attempting a trip on foot, versus in the car or on a bike. The average speed for a pedestrian is 3 to 4 mph. This speed varies greatly according to age, trip purpose and fitness level. Pedestrians, like drivers, are significantly affected by the number of traffic signs and signals encountered. The number of traffic signs and signals significantly affect travel time for pedestrians, as well as motor vehicles, and can slow them down and add to the time of their trip.



The buffer between the sidewalk and the street as well as the degree of exposure in the crosswalks has a significant impact on the pedestrian's experience

Because walking is such a comparatively slow method of transportation, most trips that are taken by pedestrians are limited to short distances. Nationally 44% of trips taken by foot are for personal or family business, with social and recreational trips close behind at 35%. Earning a living only counts for 7% of pedestrian trips. The percentage of people who will choose walking as a form of transportation drops off significantly for trips of over a mile-and-a-half and is negligible for trips over 3 miles. Pedestrians generally take the shortest possible route available, and are not willing to go far out of their way. For example, many pedestrians will make a dash across a busy street if they must walk more than a typical downtown city block to a signalized intersection.

Perhaps the most important factor influencing the nature of a pedestrian trip is exposure to motor vehicles and the speed at which the motor vehicles are moving. For both safety and aesthetic reasons, the quality of a pedestrian's journey is much different when walking along a tree-lined path versus along a busy five-lane road with heavy truck traffic and no vegetation for shade. Also, it is much safer and more pleasant to walk along a street where the speed limit is 25 mph versus a street where the speed limit is 45 mph. National statistics show that a pedestrian's probability of death if hit by a motor vehicle increases from 15% when the car is going 20 mph to 85% if the car is going 40 mph.

Most likely, for a trip of any length, a pedestrian will need to cross a roadway. The availability and convenience of mid-block and signalized crossings as well as the nature of the roadway been crossed strongly influence the decision to walk, the safety of the walk and the decision to make that walk again in the future.

Pedestrian Quality/Level of Service

In order to make recommendations on appropriate for pedestrians, the pedestrian quality of service model that was developed by Sprinkle Consulting, Inc. was utilized. The model is based on data gathered from a wide cross section of users who evaluated numerous real world scenarios. A simplified version of this model has been incorporated in the 2010 Highway Capacity Manual's multi-model level of service evaluation. The following summarizes the key factors for pedestrians.

Key Factors (in order of statistical significance):

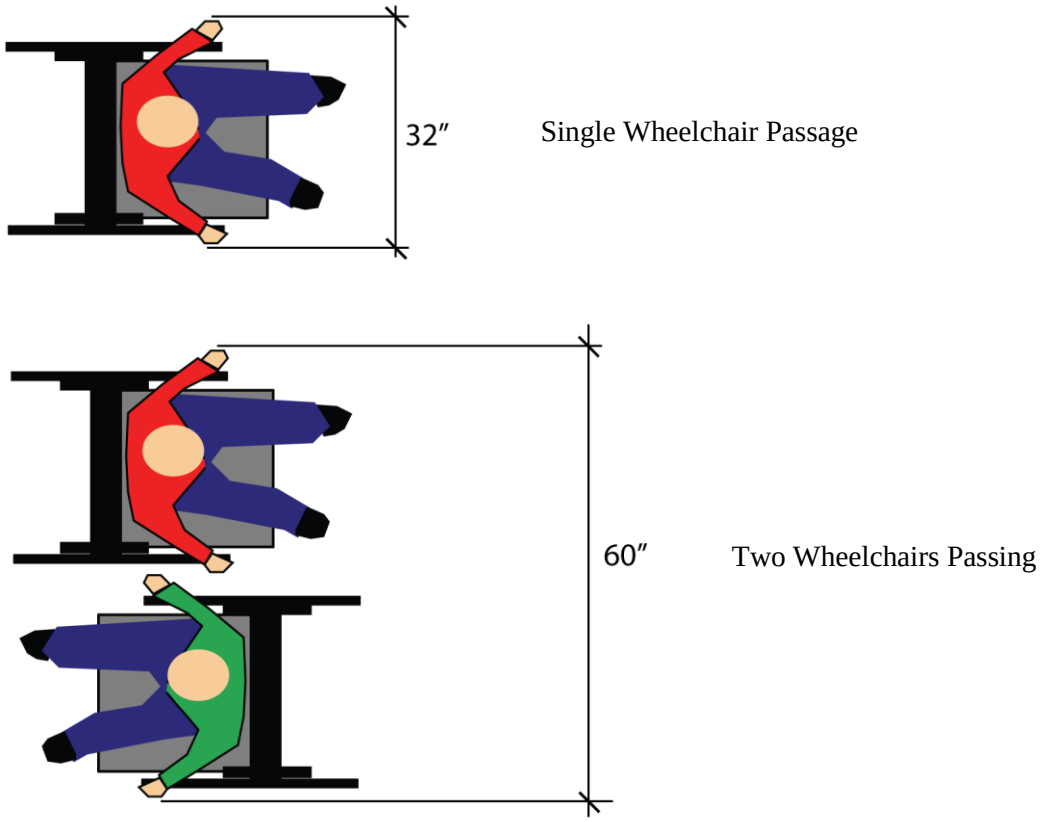
1. Presence of a sidewalk
2. Amount of lateral separation between pedestrians and motor vehicles
3. Presence of physical barriers (such as trees) and buffers (including parking) between pedestrians and motor vehicles
4. Motorized vehicle volume
5. Motorized vehicle speed

Pedestrian Spatial Requirements and Sidewalk Width

Pedestrian spatial requirements vary greatly given the variety of pedestrians. More significant than the size differential between individuals, the various mobility aids utilized have a major impact on how much space is required. Pedestrians who use crutches, walkers, wheel chairs, scooters or guide dogs require more space than pedestrian not using any of those aids. 2'-6" (30") is generally considered the bare minimum necessary for a person using a wheel chair. Thus 3' (36") is considered the narrowest a sidewalk should be at any point and only then for short distances. 4' (48") is required for a person with a guide dog.

For two pedestrians to comfortably walk side by side or pass each other, a five foot wide sidewalk is required. This is reflected in AASHTO Guidelines. With an aging population and the fact that most pedestrians will use some type of mobility aid at some time, sidewalk widths should accommodate the ability for two people to comfortably pass each other, even if they are using some type of mobility aid. Thus, a 6' wide sidewalk is considered more appropriate, especially when along collector and arterial streets where there is more pedestrian traffic. This has the added advantage of an adult walking with a child or someone walking a dog being able to pass another adult without having to do so single file. Where occasional bicycle traffic is to be encountered, an eight foot wide sidewalk is a more appropriate width and this is typically used along primary roads.

Figure 5.1A Wheelchair Spatial Requirements



Providing Seating

Providing benches and other seating options along collectors and arterials help make longer trips manageable for some pedestrians. The seating should be located in as pleasant a place as possible and shaded from the summer sun. Businesses and residents should be encouraged to provide and maintain benches for use by the general public.

5.2 Key Factors for Bicycle Travel

One of the most controversial issues with regard to accommodating bicyclists within the road right-of-way is whether they are better accommodated in the roadway itself or on a path alongside the road. Also, if bicycles are to be accommodated within the roadway, should a portion of the roadway be officially designated for bicycles? When addressing these issues, legal rights, safety, travel efficiency, nationally accepted guidelines and conflicts with pedestrians need to be considered.

Legal Rights

Bicyclists, for the most part, are granted the same rights and subject to the same regulations as motorists. There are some exceptions, such as their use being restricted from freeways, and some special rules regarding their operation.

Safety

While it may seem that bicyclists would be safer on a Sidewalk Bikeway than riding in the roadway, the inverse is actually true in most cases for experienced adult cyclists. This is due primarily to the bicycles traveling at a high rate of speed in an area where the drivers of turning vehicles are not looking. This is illustrated in Fig. 5.2A *Bicycle Lane visibility Vs. Sidewalk Visibility* illustration on the next page. The more frequent and busy the road and driveway intersections are the more chances there are for conflicts.

Travel Efficiency

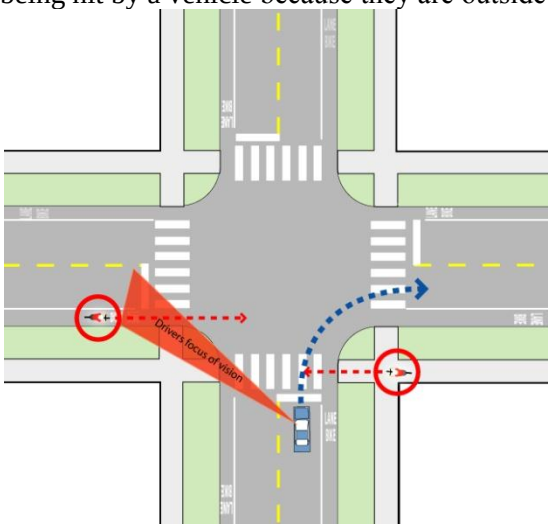
One of the most significant drawbacks to bicycling on sidewalks as opposed to bicycling in the roadway is the loss of right-of-way when traveling along collectors and arterials. When riding in the roadway of a major road, the vehicular traffic on side streets that do not have a traffic light generally yield to the bicyclists on the main road. If riding on a sidewalk, the bicyclist generally ends up yielding at those same side streets. In addition, the cyclist must approach every driveway with caution due to the visibility issues cited in the previous section and the fact that drivers rarely give right-of-way to a bicyclist on sidewalks. As well, the placement of many push-buttons used to trigger walk signals are often inconveniently placed for a cyclist.

Bicyclists are also required by law to yield to all pedestrians when riding on a sidewalk and provide an audible signal of their approach. As the number of pedestrians increase, a bicyclist's progress can be impeded.

The location of sidewalks is often such that when a vehicle on an intersecting driveway or roadway is stopped and waiting for traffic to clear on the through road, their position blocks the sidewalk. This requires difficult and often dangerous maneuvering to ride around the stopped vehicle. As a result of all of the above factors, bicyclists who are using their bike for utilitarian purposes infrequently use sidewalks because they essentially have to yield to all other users in the road corridor. Although separate facilities are appropriate in most cases, shared facilities will continue to be a preferred facility by some bicyclists in some cases.

Fig. 5.2A. Bicycle Lane Visibility Vs. Sidewalk Visibility

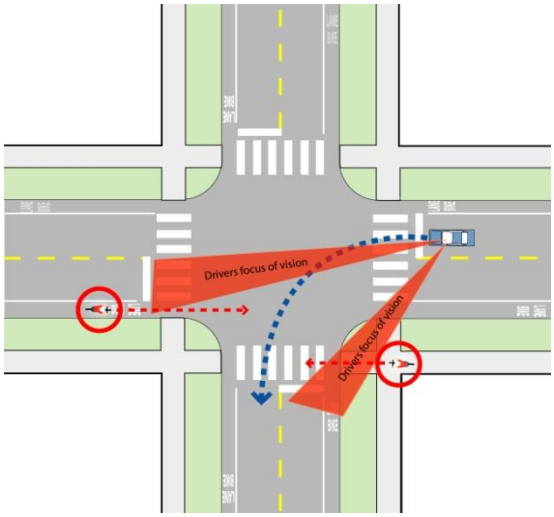
Bicycles traveling in the opposite direction of traffic on sidewalks have significantly greater chance of being hit by a vehicle because they are outside of the driver's typical field of view.



Car turning right

Bicyclist in Bike Lane is in the driver's focus of vision as they scan oncoming traffic and is easily seen.

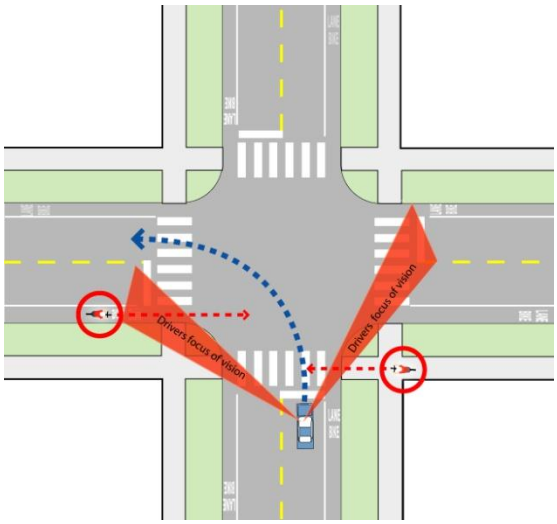
Bicyclist on Sidewalk Bikeway/Sidewalk is not in the driver's focus of vision and can't easily be seen until just before impact.



Car turning left

Bicyclist in Bike Lane is in the driver's focus of vision as he/she scans oncoming traffic and is easily seen.

Bicyclist on Sidewalk Bikeway/Sidewalk is not in the driver's focus of vision and can't easily be seen until they are in crosswalk.



Car turning left

Bicyclist in Bike Lane is in the driver's focus of vision and is easily seen.

Bicyclist on Sidewalk Bikeway/Sidewalk is not in the driver's focus until just before impact.

Graphics based on those prepared by Richard Moeur, P.E. for his Good Bicycle Facility Design Presentation available at http://www.richardcmoeur.com/docs/bikepres.pdf

Pedestrian Conflicts

As the number of bicyclists and pedestrians increase on a shared facility, the number of conflicts increase and pedestrians' comfort decreases. Pedestrians typically travel 2 to 4 miles per hour and bicyclists travel between 8 and 20 miles per hour. The speed difference is significant and the stealthy nature of a bicycle means that pedestrians generally have little to no audible warning of a bicycle approaching from behind. Pedestrians and bicyclists can both be severely injured in bicycle / pedestrian crashes.

Nationally Accepted Guidelines

The American Association of State Highway and Transportation Officials (AASHTO) publishes *A Policy on Geometric Design of Highways and Streets* that is also known as "The Green Book." This set of guidelines is the primary reference for street design used by federal, state, county and local transportation agencies. For guidance on how to accommodate bicycles, The Green Book references AASHTO's *Guide for the Development of Bicycles Facilities*. Federal and most state sources of funding require that bicycle projects conform to these guidelines. AASHTO's guidelines specifically discuss the undesirability of Sidewalks as Shared Use Paths. Sidewalk Bikeways are considered unsatisfactory for the all of the reasons listed above. Only under certain limited circumstances do the AASHTO guidelines call for Sidewalk Bikeways to be considered. On page 20 of the guidelines these circumstances are spelled out as:

a) To provide bikeway continuity along high speed or heavily traveled roadways having inadequate space for bicyclists, and uninterrupted by driveways and intersections for long distances.

b) On long, narrow bridges. In such cases, ramps should be installed at the sidewalk approaches. If approach bikeways are two-way, sidewalk facilities also should be two-way.

Bicycle Quality/Level of Service

In order to make recommendations on appropriate bike lane widths, the bicycle quality of service model that was developed by Sprinkle Consulting, Inc. was utilized. The model is based on data gathered from a wide cross section of users who evaluated numerous real world scenarios. A simplified version of this model has been incorporated in the 2010 Highway Capacity Manual's multi-model level of service evaluation. The following summarizes the key factors for bicyclists.

Key Factors (in order of statistical significance):

1. Presence of bicycle lane or paved shoulder
2. Proximity of bicyclists to motorized vehicles
3. Motorized vehicle volume
4. Motorized vehicle speed
5. Motorized vehicle type (percent truck/commercial traffic)
6. Pavement condition
7. The amount of on-street parking

Bicycle Spatial Requirements

Bicycle spatial requirements vary greatly given the variety of bicycle styles out there. Tricycles, tandems, recumbent all have different special requirement. For a typical two wheel bicycle, a stationary bicyclist is only about 2' wide. But when in motion, the bicyclist requires 5' of width to operate. The extra space is required for essential maneuvering and to provide a comfortable lateral clearance. Thus, a path that is capable of having two bicyclists comfortably pass each other needs to be 10' wide.

Additional Considerations

Children Riding on Sidewalks – Young children will most likely continue to ride bicycles on sidewalks even if on-road facilities are provided. The risks previously mentioned still hold true, but factors such as unfamiliarity with traffic and the limited depth perception typical of young children should also be considered when choosing the most appropriate facility to use. Also, young children, in general, may be riding at lower speeds than adults.

Adults Riding on Sidewalks – Even with the presence of on-road bicycle facilities, many adults will not feel comfortable riding in the roadway in some or all situations. It should be recognized that the choice to ride in the road or on a sidewalk will vary with each individual's skills, weather and roadway conditions.

Transition Points – One of the difficulties in creating a system where bicycle travel is accommodated within a patchwork of on- and off-road facilities is the transition from one facility to the other. The point where the bicyclist leaves the sidewalk to join the roadway is especially difficult at intersections.

Redundancy of Facilities – Bicyclists are not restricted from riding in most roadways, nor is it likely that bicyclists will ever be required to ride on a Sidewalk Bikeway given their known safety issues. Therefore, the presence of bicycles in the roadway should be anticipated. Any off-road facilities that are constructed should be viewed as supplemental to accommodations within the roadway.

Driver and Bicyclist Behavior – There is ample room for improvement to the behavior of bicyclists and motorists alike in the way they currently share (or don't share) the roadway. Community education programs coupled with enforcement programs are the best approach for addressing this issue.

Passing on the Right – In a shared roadway scenario, it is dangerous for a bicyclist to pass a line of cars on the right. Bike lanes have the important advantage of allowing bicyclists to safely pass a line of cars waiting at an intersection. Much like the rewards for carpoolers traveling in a high occupancy vehicle lane, a bike lane gives bicyclists preference in moving through congested areas. Bikes can move to the front of an intersection more easily, allowing for better visibility and safer integration among motor vehicles, as well faster travel.

5.3 Travel Along Road Corridors

Our roadway network has been designed primarily to move cars safely, efficiently, and with minimal disruption. This network includes major arterial streets that place cars in multiple lanes moving at high speeds for long distances. These major transportation corridors usually present tremendous challenges when we try to retrofit them with non-motorized facilities. There are two primary types of nonmotorized movements related to road corridors:

- Travel Along the Road Corridor (Axial Movements) that utilizes sidewalks, shoulders, and bikeways.
- Travel Across the Road Corridor (Cross-corridor Movements) that utilizes intersections, crosswalks, and grade-separated crossings such as bridge overpasses or tunnel underpasses.

Pedestrian travel along road corridors is accommodated by sidewalks or shared-use paths.

Bicycle travel along road corridors is accommodated by Bike Lanes, shared roadways, and shared-use paths. Restricting bicycles to a path along a roadway—while potentially a legal option—is fraught with safety concerns. This diminishes the attractiveness of using a bicycle for transportation.

Multi-Modal Corridor Width Requirements

While primary roads are classified as Principal Arterials, Minor Arterials, and Collectors, there is not always in practice a direct relationship between a road's classification and the number of lanes or lane width. Factors such as the available right-of-way, existing infrastructure and context have a significant influence in a road's design.

Multi-Modal Roadway Widths

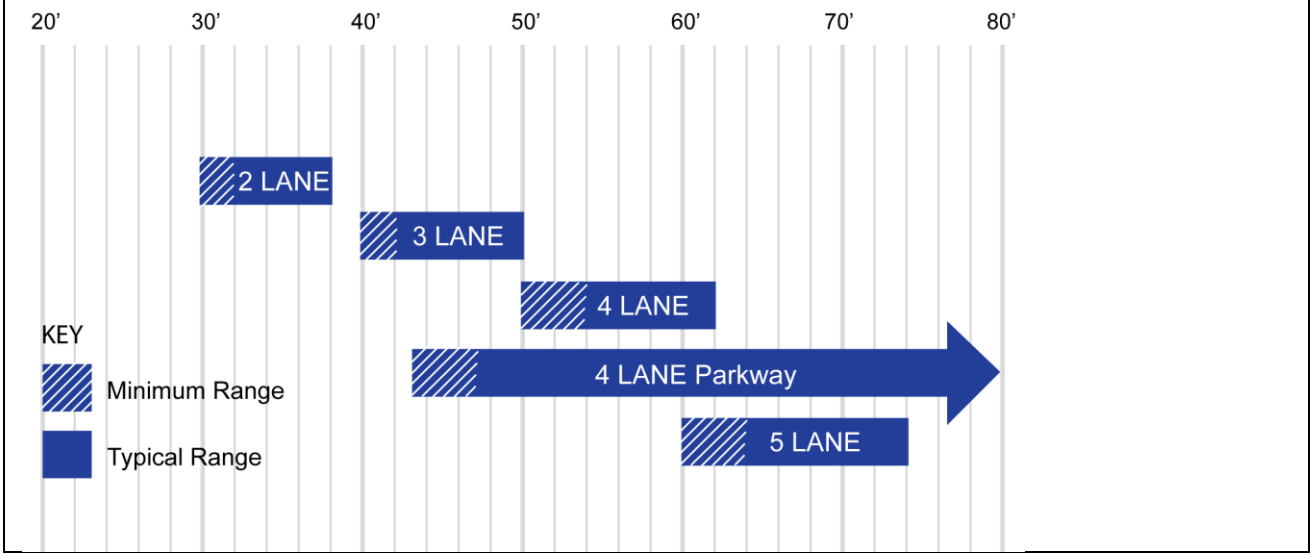
There are various configurations of overall road widths depending on individual lane widths. For instance, a road may have anywhere from ten to twelve foot travel lanes and five to eight foot Bike Lanes. Variation in any or all of these widths has an impact on overall road width.

Also affecting roadway widths are:

- Parking – adds approximately seven feet to each side of the road and increases roadway width requirements.
- Speed – wider motor vehicle lanes generally increase speed of motor vehicles. With high speed roads, wider Bike Lanes are desirable to increase the lateral separation between motor vehicles and bicycles.

Fig 5.3A, Multi-Modal Roadway Width Requirements, illustrates the range of widths for typical multi-modal road types. The Minimum Range is based on AASHTO minimum guidelines. The Typical Range begins based on generally preferred minimums. The upper range is based on the maximum dimensions that would typically be encountered for motor vehicle and Bike Lanes.

Fig 5.3A. Multi-Modal Roadway with Bike Lanes Width Requirements



Multi-modal ROW Widths

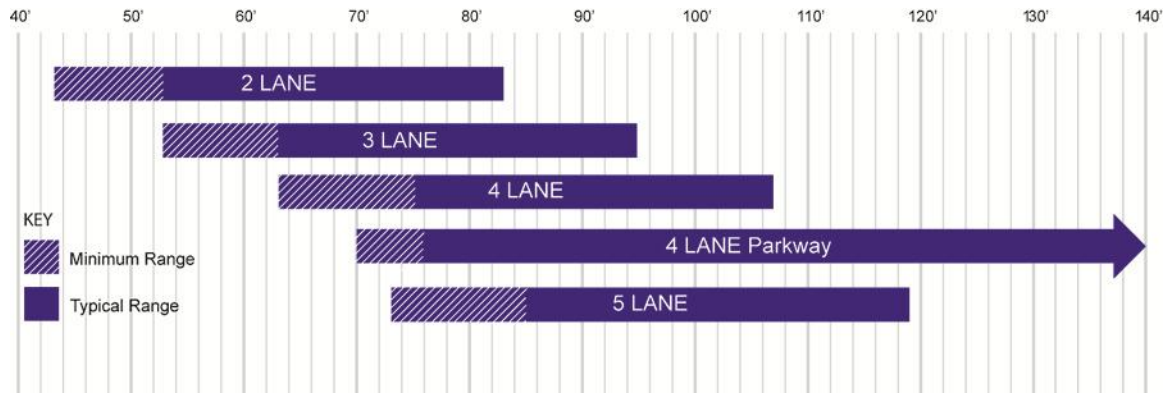
In addition to the road, the ROW contains sidewalks/path, the buffer area between the sidewalk and the road and space for a median if any. There is tremendous variation within some variables such as the buffer and the median distance.

Fig 5.3B, Multi-Modal ROW Width Requirements, illustrates the range of widths for typical multi-modal ROWs. If ROW is greater than any of the given scenarios, then all those that fall within that width are feasible. For instance, a ROW of 66' is capable of accommodating a two or three lane road. The two lane road would simply have more opportunities for flexibility than the three lanes. Note that it is not always preferable to go to the maximum allowable ROW width. Bigger is not necessarily better. The best width will depend on contextual circumstances in a given a situation. Special circumstances, however, may make it necessary to make maximum use of the ROW.

Other issues that have a bearing on ROW widths include:

- Parking – parallel on-street parking adds approximately seven feet to each side of the road and increases ROW requirements, though in some circumstances the space would be deducted from the buffer.
- Speed – as noted under Multi-Modal Roadway Widths, higher speeds generally increase the need for a wider road. Higher speeds also make a wider buffer more desirable.

Fig 5.3B. Multi-Modal Right-of-Way Width Requirements



5.4 Developing Complete Street Cross Sections

Integrating bicycle and pedestrian facilities into existing roadways takes into account the road's context, the type of road, the desired motor vehicle speeds, the anticipated amount of motor vehicle traffic and the available ROW. Roadways that are designated as having a focus on bicycle and pedestrian traffic (See Section 3.1) should be designed such that motorists naturally travel the roadway at the desired speed range of 30 to 35 MPH. This may be accomplished by the combination of narrow motor vehicle travel lanes, street trees close to the edge of the roadway and introducing elements into the roadway such as medians and crossing islands that interrupt long straight stretches of roadway.

The following is an overview of the key design of each segment of roadway. More information regarding road corridor cross sections may be found in the Appendix.

Sidewalk Guidelines

- Sidewalks should be a minimum of 5' wide as per AASHTO guidelines. 4' wide sidewalks may be used if a 5' wide passing spaces for wheelchair users are proved at reasonable intervals but this is not recommended.
- If sidewalk is placed at the back of a curb (curb-attached sidewalk) then the sidewalk should be a minimum of 6' wide, providing at least a 5' clear path taking into consideration signs and utility poles.
- It is recommended that all sidewalks along all Arterial and Collector roadways be at least 6' wide. In certain circumstances, such as completing a gap between two existing 5' sidewalks and where valuable trees and easements restrict the space, a 5' sidewalk may be used.
- It is recommended that at least one sidewalk along all Arterials and Collectors be at least 8' wide and that the location of the wider sidewalk/road side pathway be consistent from segment to segment.
- It is recommended that when a sidewalk/road side pathway is used as a link in a regional trail system, that it conform to AASHTO guidelines for Shared-Use Paths having a minimum width of 10' with 2' shoulders.

Buffer Width

- Buffers should be a minimum of 2' on Collectors and 5' on Arterials as per AASHTO Guidelines.
- A 5' wide buffer is generally considered the minimum to accommodate street tree plantings.
- A 6' wide buffer is considered the desirable minimum with along Collector roadways.
- A 9' wide buffer is considered the desirable minimum along Arterial roadways.

Buffer Plantings/Street Trees

- Tree spacing should be approximately 30' on center.
- Trees should be placed a minimum 5' back from the face of curb on Arterials and a minimum of 2' back from the face of curb on Collectors. The trees should also be placed a minimum of 2' back from the edge of sidewalk.

- Tree spacing/alignment should be varied as necessary to permit good visibility at crosswalks and intersections.

Bike Lane:

- Generally roads with ADT's below 3,500 vehicle per day do not require bike lanes as the traffic flow is such that motorists can generally pass bicyclists without waiting for oncoming traffic to clear.
- 5' minimum as measured from face of curb to edge line with a minimum of 3' ridable surface outside of the gutter plan.
- If the seam between the gutter pan and the road surface is not smooth than a minimum of 4' of ridable surface should be provided.
- 4' minimum as measured from the edge of pavement to the edge line when no curb is present.
- Bike Lanes may be located on either side of a one-way road. For consistency sake, the right hand side should be the default choice. If, however there are numerous bus stops with frequent bus service the left and side of the road may be preferable. If there is on-street parking on one side of the road, the bicycle lane should generally be located on the opposite side of the road than the on-street parking.

Sub-standard Bicycle Lanes and Edge Striping

There will be places where it will be impossible to reconfigure a roadway to accommodate even the minimum width of bicycle lane as described in AASHTO. In such cases it may be desirable to place a bike lane of a slightly narrower width in order to provide continuity of on-road facilities. At an absolute minimum, a bicycle lane next to a standard curb and gutter should have 3' of ridable surface (measured to the centerline of the lane stripe). In a case where that is not possible, a standard 4" edge stripe may be considered without the standard bicycle lane markings and signs.

On-Street Parking

When adding parking the parking lane should be set at 7' measured from face of curb and the bike lane width should be a minimum of 5' wide. Additional width for bike lanes is desirable due to opening doors of parked cars infringing on the bike lane width. Bike Lanes wider than 5' should have the door zone cross-hatched to encourage bicyclists to ride a safe distance away from the parked cars. A 4" stripe should mark the edge of the parking lane to encourage parking as close to the curb as possible. The parking lane should always remain at 7'. Any additional room should be allocated toward the Bike Lane first, then to the travel lane adjacent to the bike lane.

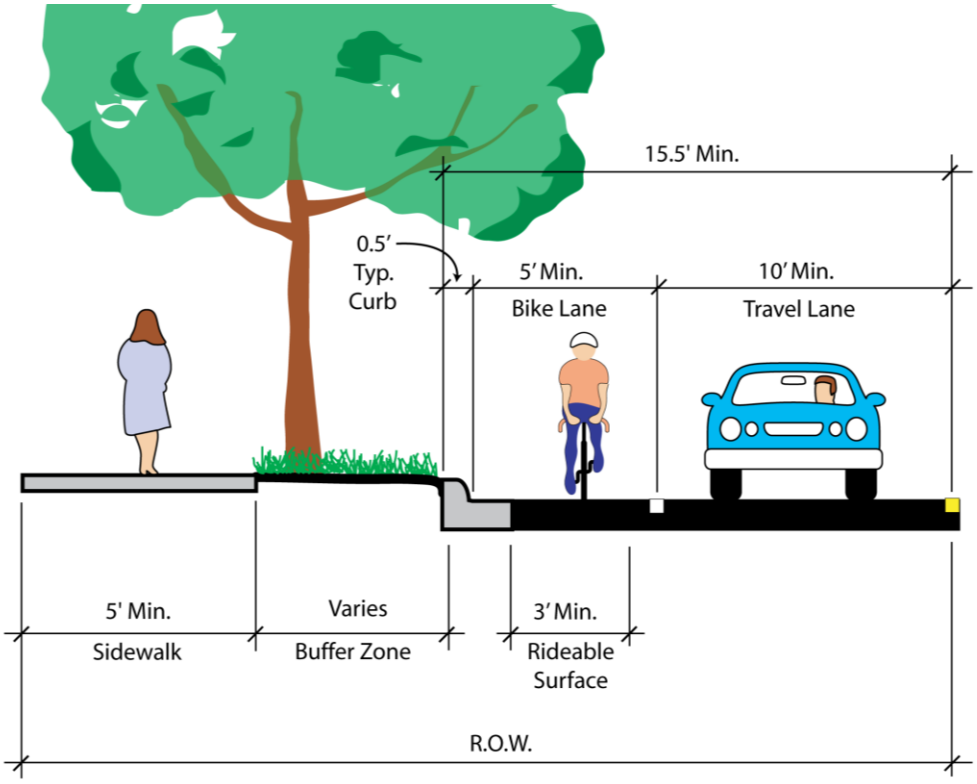
Motor Vehicle Lane Width

A 2007 Transportation Research Report, *Relationship of Lane Width to Safety for Urban and Suburban Arterials*, which included evaluation of roads in Oakland County, found that there is no discernable safety difference between roads that have lane widths of 10 and 11' when compared to a comparable road with a 12' lane width. This was especially the case for two and three lane roads. The Oakland County data indicated that there may be concerns when going below 11' lanes on 5 lane roads.

Sidewalk/Roadside Pathway Marking and Signing

In instances where existing sightlines and visibility are limited use an advanced warning sign to notify walker and bicyclist of an approaching subdivision entrance or busy drive. Only use a stop sign at the drive on extreme cases where warranted.

Fig 5.4A Urban Multi-Modal Roadway Design Guidelines



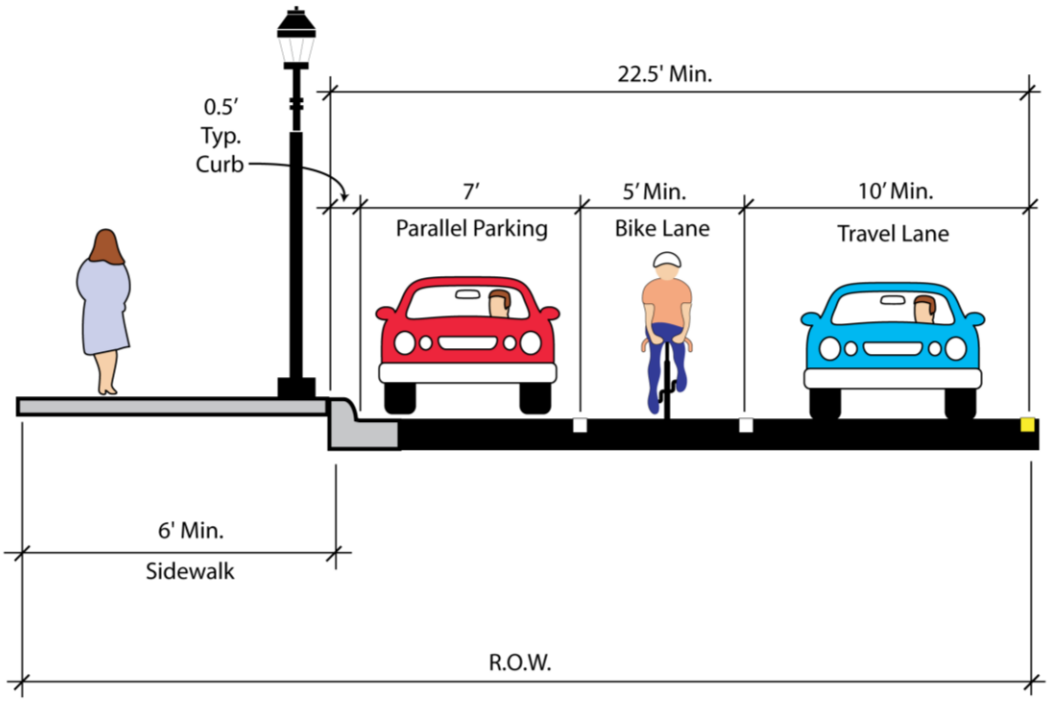


Fig 5.4B Urban Bike Lane Sizing Chart

The following chart indicates the minimum bike lane width necessary to maintain a bicycle quality/level of service of C or above.

12' Travel Lanes

	Urban 2 Lane Road:					Urban 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	5	5	5	5	5	5	5	5	5	5	5
30 mph	5	5	5	5.5	6	5	5	5.5	5.5	5.5	6
35 mph	5	5	5.5	6	6.5	5	5.5	5.5	6	6	6
40 mph	5	5	5.5	6	6.5	5.5	5.5	6	6	6.5	6.5
45 mph	5	5.5	6	6.5	6.5	5.5	6	6	6.5	6.5	6.5
50 mph	5	5.5	6	6.5	7	6	6.5	6.5	6.5	6.5	7
55 mph	5	5.5	6	6.5	7	6	6.5	7	7	7	7

11' Travel Lanes

	Urban 2 Lane Road:					Urban 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	5	5	5	5.5	5.5	5	5	5	5.5	5.5	5.5
30 mph	5	5	5.5	6	6.5	5	5.5	6	6	6	6.5
35 mph	5	5	6	6.5	6.5	5.5	6	6	6.5	6.5	6.5
40 mph	5	5	6	6.5	7	6	6	6.5	6.5	7	7
45 mph	5	5.5	6.5	7	7	6	6.5	6.5	7	7	7
50 mph	5	5.5	6.5	7	7.5	6	6.5	7	7	7	7.5
55 mph	5	6	6.5	7	7.5	6.5	6.5	7	7	7.5	7.5

10' Travel Lanes

	Urban 2 Lane Road:					Urban 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	5	5	5	6	6	5	5	5.5	6	6	6
30 mph	5	5	6	6.5	7	5.5	6	6.5	6.5	6.5	7
35 mph	5	5.5	6.5	7	7	6.5	6.5	6.5	7	7	7
40 mph	5	5.5	6.5	7	7.5	6.5	6.5	7	7	7.5	7.5
45 mph	5	6	7	7.5	7.5	6.5	7	7	7.5	7.5	7.5
50 mph	5	6	7	7.5	8	6.5	7	7.5	7.5	7.5	8
55 mph	5	6.5	7	7.5	8	7	7	7.5	7.5	8	8

Notes

1. Size is based on an 18” wide gutter pan. If the gutter is only 1’ wide or there is no gutter the width may be reduced by 0.5’.
2. Bike lane sizing is based on 3% truck traffic. For every 1% increase in heavy vehicles add approximately 8” to 9” of additional bike lane width.
3. In urban areas, where there is a demand for on-street parking and none exists, bike lanes 7’ and over may experience illegal parking.

Fig 5.4C Rural Multi-Modal Roadway Design Guidelines

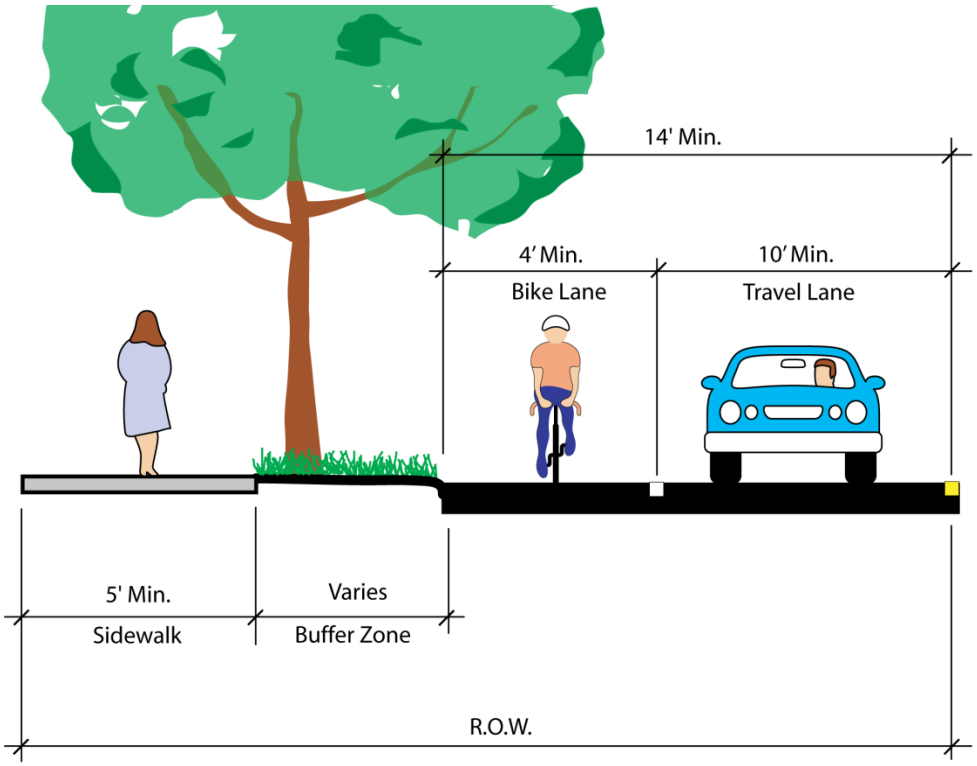


Fig 5.4D Rural Bike Lane Sizing Chart

The following chart indicated the minimum bike lane width necessary to maintain a bicycle quality/level of service of C or above.

12' Travel Lanes

	Rural 2 Lane Road:					Rural 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	4	4	4	4	4	4	4	4	4	4	4
30 mph	4	4	4	4	4.5	4	4	4	4	4	4.5
35 mph	4	4	4	4.5	5	4	4	4	4.5	4.5	4.5
40 mph	4	4	4	4.5	5	4	4	4.5	4.5	5	5
45 mph	4	4	4.5	5	5	4	4.5	4.5	5	5	5
50 mph	4	4	4.5	5	5.5	4.5	5	5	5	5	5.5
55 mph	4	4	4.5	5	5.5	4.5	5	5.5	5.5	5.5	5.5

11' Travel Lanes

	Rural 2 Lane Road:					Rural 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	4	4	4	4	4	4	4	4	4	4	4
30 mph	4	4	4	4.5	5	4	4	4.5	4.5	4.5	5
35 mph	4	4	4.5	5	5	4	4.5	4.5	5	5	5
40 mph	4	4	4.5	5	5.5	4.5	4.5	5	5	5.5	5.5
45 mph	4	4	5	5.5	5.5	4.5	5	5	5.5	5.5	5.5
50 mph	4	4	5	5.5	6	4.5	5	5.5	5.5	5.5	6
55 mph	4	4.5	5	5.5	6	5	5	5.5	5.5	6	6

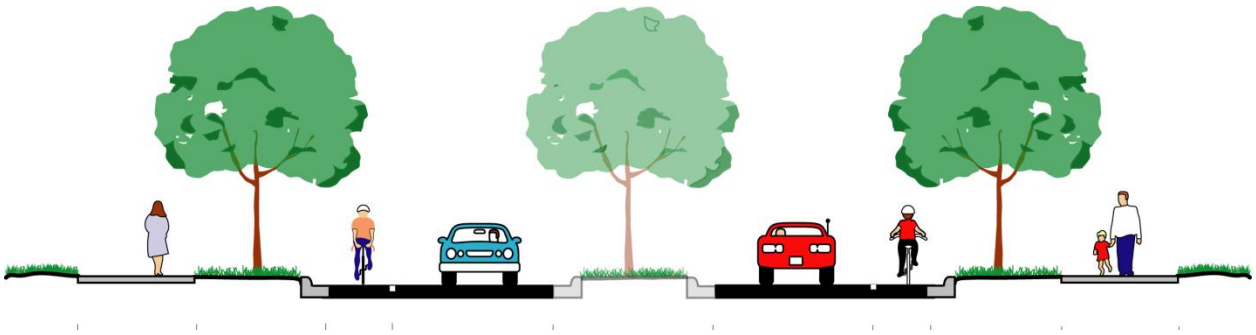
10' Travel Lanes

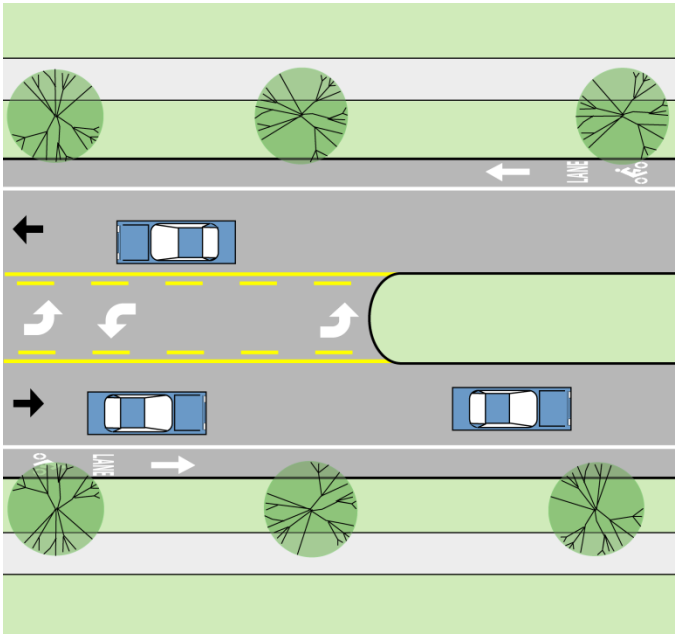
	Rural 2 Lane Road:					Rural 4 Lane Road:					
No. of Lanes	2	2	2	2	2	4	4	4	4	4	4
Design ADT	3,500	5,000	10,000	15,000	20,000	15,000	20,000	25,000	30,000	35,000	40,000
25 mph	4	4	4	4.5	4.5	4	4	4	4.5	4.5	4.5
30 mph	4	4	4.5	5	5.5	4	4.5	5	5	5	5.5
35 mph	4	4	5	5.5	5.5	5	5	5	5.5	5.5	5.5
40 mph	4	4	5	5.5	6	5	5	5.5	5.5	6	6
45 mph	4	4.5	5.5	6	6	5	5.5	5.5	6	6	6
50 mph	4	4.5	5.5	6	6.5	5	5.5	6	6	6	6.5
55 mph	4	5	5.5	6	6.5	5	5.5	6	6	6.5	6.5

Notes

1. The reduction in width in comparison to the Urban Bike Lane Sizing Chart is due to the lack of curb.

Use of Medians





A planted median should be considered whenever there is no need for a turn lane. The planted median improves the aesthetics of the roadway, reduces the impervious surfaces and can act as an informal crossing island for dispersed mid-block crossings. Medians have also been shown to be less expensive to construct and maintain than paving in the long run. The median may also be constructed in a manner that will mitigate storm water run-off.

5.5 Transitions Between On and Off-Road Bicycle Facilities

The recommended approach to accommodating bicycles along arterials and collectors is with a bicycle lane. However, there will be places, especially in the near-term, where that may not be possible. This presents a situation where some bicyclists will prefer to continue bicycling in the roadway and others will prefer to leave the roadway and use a sidewalk bikeway. Given the significant variances in bicyclist's abilities, trip purposes, and cycling speeds, forcing all cyclists into a single solution is inappropriate. The solution then is to accommodate both preferences.

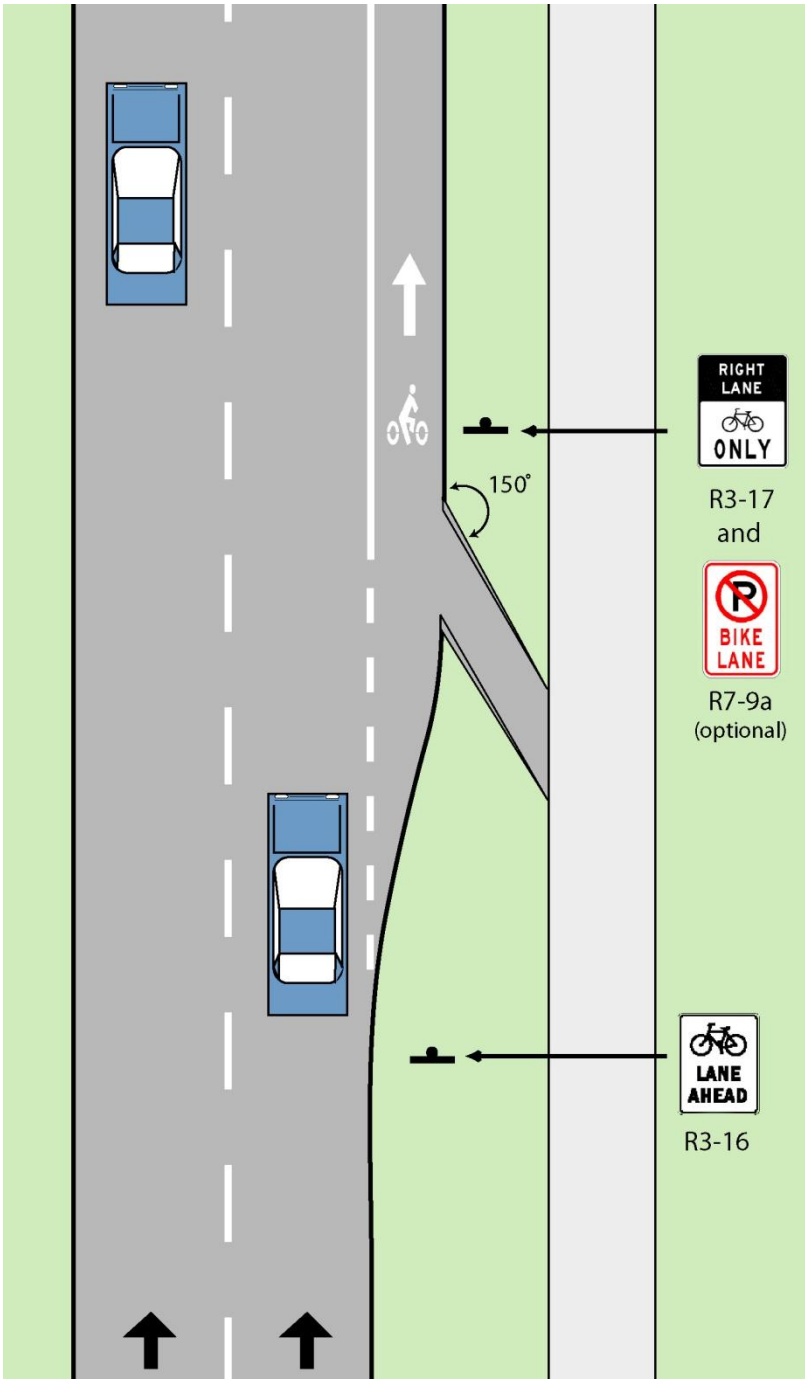
The transition points between sidewalk bikeways and bike lanes, presents a number of challenges. This underscores the importance of making the non-motorized system as consistent as possible. When bringing bicyclists into the roadway as shown in Fig 5.5A (next page), the entrance point needs to be protected. Unlike merging points between motor vehicles, the speed differential between bicyclists and motor vehicles may be significant with the potential for hit-from-behind crashes if the merging area is not protected.

When bringing bicycles onto a pathway, there is the potential for conflicts with pedestrians and bicyclists already on the pathway. Trying to segregate bicycles and pedestrians on a single 8 – 10 feet wide path is not feasible. Each direction for bicycle use requires 4 feet. Some busy shared-use paths have a dashed yellow line down the center to separate path users by direction of travel. While these tend to work to a degree in busier off-road pathways they are rarely used in sidewalk bikeway situations.

The solution does not differentiate between the sidewalk bikeways that are adjacent to a bike lane from a typical sidewalk. A sign along the pathway can instruct bicyclists to yield to pedestrians per City code. The approach is based on the assumption that the fastest bicyclists will remain in the roadway and share the lane with the motor vehicles rather than leave the roadway and have their travel impeded by pedestrians and driveway crossings.

A ramp that eases the transition from a Bike Lane to a Shared-use Path is provided where the Bike Lane ends.

Fig. 5.5A. Bicycle Entrance Ramp from Sidewalk Bikeway to Bike Lane Design Guideline



Applications

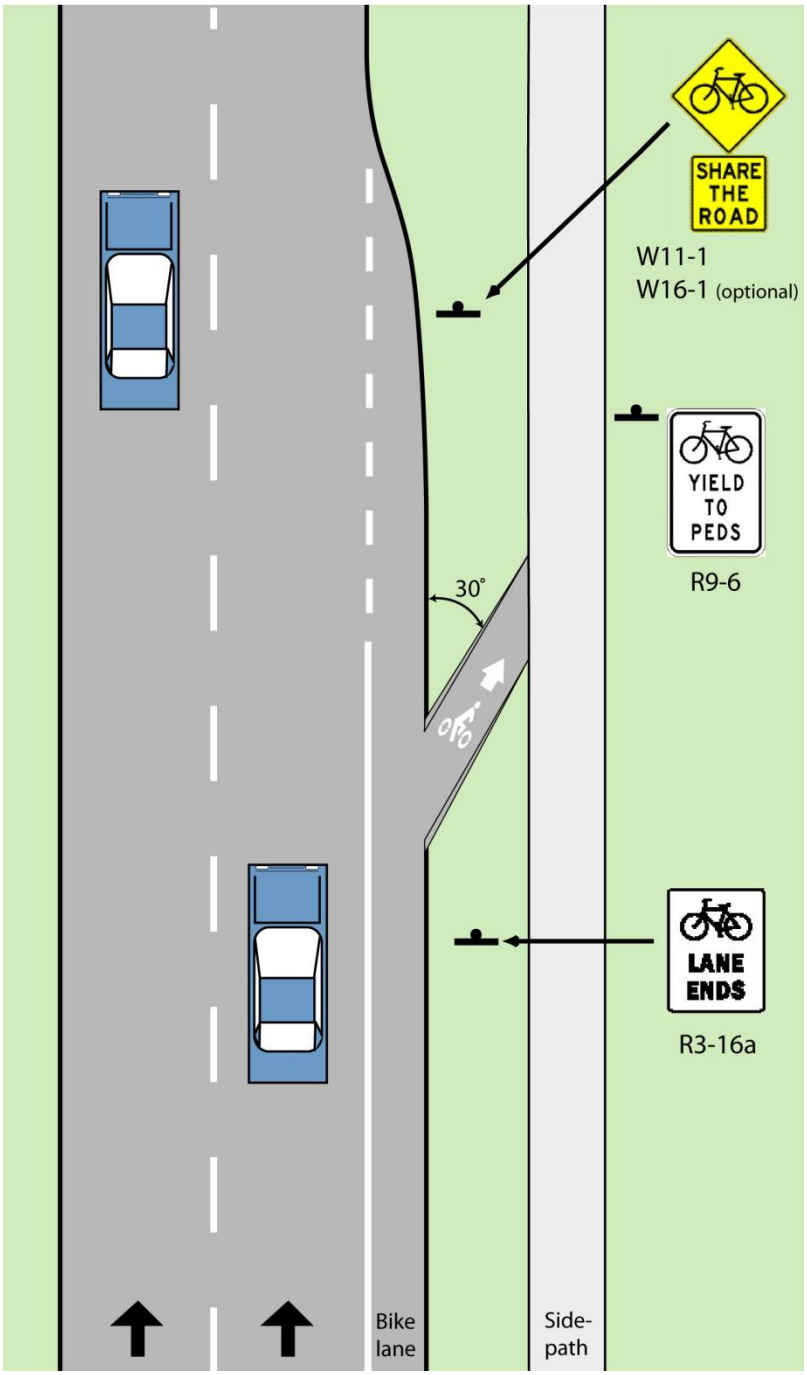
The bike entrance ramp is used to provide easy transition from a sidewalk bikeway to a bike lane or to allow a bicyclist to enter the roadway to make a turn as a vehicle.

The ramp may be used where a bike lane begins or periodically along a sidewalk bikeway that parallels a bike lane.

Key Elements:

1. Bicyclists have an option to bike either in the bike lane or along the sidewalk bikeway.
2. The ramp should resemble a curb ramp with flared sides and a flush edge with the road grade.
3. The mouth of the ramp (not including the flared sides) should be 5’ wide or sized to fit maintenance vehicles designed for sweeping and snow removal.
4. When used at the beginning of a bike lane, the road should be widened to accommodate the bike lane and protect bikers entering the roadway from the sidewalk bikeway given the sharp angle of entry. As the road is flared, dashed pavement markings should be used to indicate the beginning of the bike lane and an area where bikers in the roadway can merge into the bike lane.

Fig. 5.5B. Bicycle Exit Ramp from Bike Lane to Sidewalk Bikeway Design Guideline



Applications

The bike exit ramp is used to provide easy transition from a bike lane to a sidewalk bikeway.

The ramp may be used where a bike lane ends or periodically along a sidewalk bikeway that parallels a bike lane.

Key Elements:

1. Bicyclists have the option of bicycling in the roadway or on a sidewalk bikeway.
2. The exit ramp should resemble a curb ramp with flared sides and a flush edge with the road grade.
3. The mouth of the ramp (not including the flared sides) should be 5’ wide or sized to fit maintenance vehicles designed for sweeping and snow removal.
4. Where a bike lane ends, dashed pavement markings indicate the end of the bike lane and an area where bikers are merging back into the roadway. Dashed lines should begin well in advance of the end of the bike lane to ensure adequate warning and a large transition zone.
5. A bike symbol and arrow on the ramp to discourage bicyclists on the sidewalk bikeway to enter the roadway going the wrong way.

5.6 Modifying Existing Facilities

The existing road infrastructure must be considered when looking at how bicycle lanes may be added. Waiting for a complete road reconstruction at which time the "ideal" scenario may be applied would result in unnecessary delay in implementing a bicycle lane system. Also, in many cases, existing development, historic structures and natural features dictate that the roadway width will change little if at all even in the long run. Hence, approaches to modifying facilities that work within existing curb lines and with existing storm sewer systems need to be employed.

In some cases, existing travel lanes may need to be narrowed to accommodate bicycle lanes. In other cases there may be excess road capacity that permits eliminating a lane in order to accommodate bicycle lanes. There may be cases where an alternative road configuration that includes bicycle lanes will work equally as well if not better than the existing conditions for motorists, such as a four to three lane conversion. In most cases though, incorporating bicycle lanes is a compromise between the ideal motorized transportation facility and the ideal bicycle facility in order to establish a true multi-modal facility within existing infrastructure limitations. The following guidelines illustrate various techniques for modifying existing facilities in order to incorporate bicycle lanes.

Adding Bike Lanes to High Speed Four and Five-Lane Roads

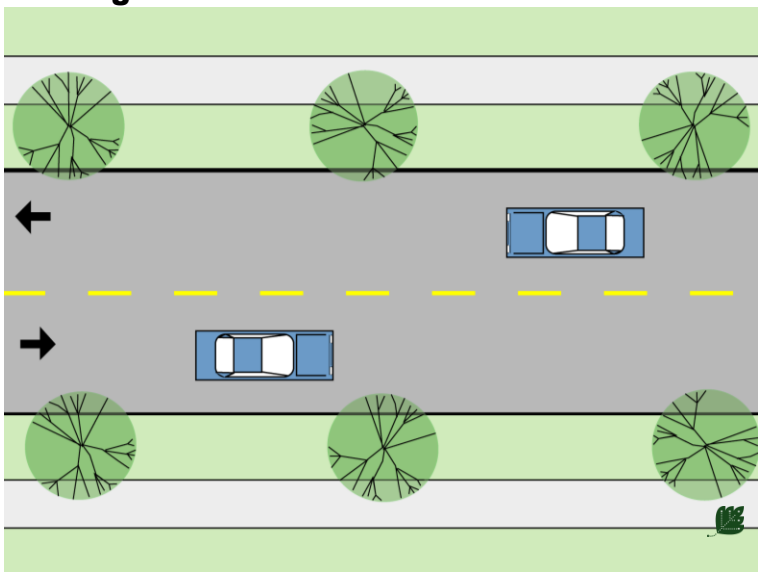
The narrowing of high speed four and five-lane roads to accommodate bike lanes has some specific conversion issues. Given the higher volumes of traffic, higher speeds and higher number of heavy vehicles on many of these roadways, it is desirable to keep the motor vehicle lane widths as close to an 11' minimum as possible.

As an interim measure for roads less than 60' wide, a bike lane on one side may be considered in conjunction with a shared lane/side path option on the other side. The bike lane should be located on the side with the most driveways and intersecting roads. The other option to consider if there are numerous intersecting roads and driveways on both sides to lower the speed of the roadway so that sub-11' lanes are more appropriate. This is best accomplished with changes to the physical roadway with such things as planted medians and/or crossing islands. These in combination with the narrow lanes will naturally slow traffic.

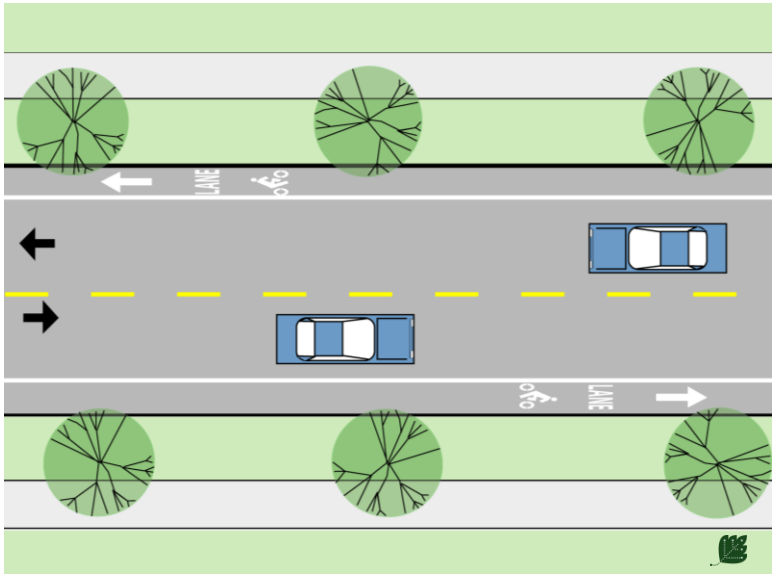
When there is not a bike lane in the road, the bicyclist should be provided the option to use a sidewalk or to bike in the road. Exit and entrance ramps should be used to ease the transition between on-road and off-road facilities.

Fig. 5.6A. Providing Bicycle Lanes Through Lane Narrowing Design Guidelines

Existing Conditions



Proposed Condition



Description

The travel lanes are narrowed allowing room for the inclusion of a bike lane. The bicycle lane has the additional advantage of providing a buffer between the travel lane and the curb.

AASHTO guidelines specifically discuss narrowing travel lanes in order to accommodate bicycle travel, although there are some situations where narrowing lanes may not be appropriate.

Application

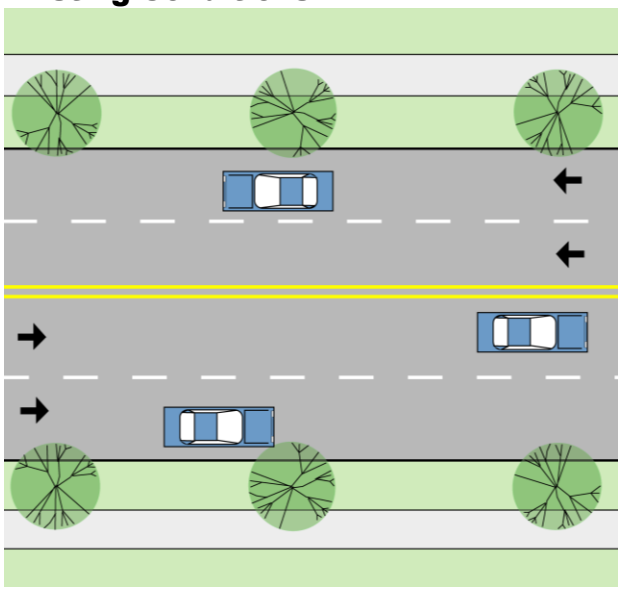
In general, lane narrowing to provide for bicycle lanes may be considered in the following situations (as measured from back of curb):

- 31’ or wider, 2 lane road
- 41’ or wider, 3 lane road (2 lane road with a center turn lane)
- 45’ or wider, 2 lane road with parking on both sides
- 51’ or wider, 4 lane road
- 55’ or wider, 3 lane road with parking on both sides
- 61’ or wider, 5 lane road

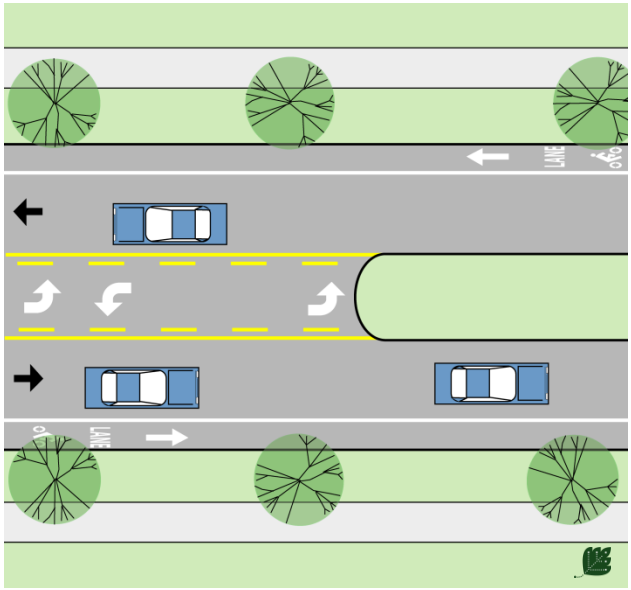
Higher speed roads may require additional width; see notes on multi-modal roadway design guidelines.

Fig. 5.6B. Four-Lane to Three-Lane Road Conversions Design Guidelines

Existing Conditions



Proposed Conditions



Application statistics are referenced from:

Guidelines for the Conversion of Urban Four-lane Undivided Roadways to Three-lane Two-way Left-turn Lane Facilities, April 2001, Sponsored by the Office of Traffic and Safety of the Iowa Department of Transportation, CTRE Management Project 99-54

Description

Four-lane roads present several operational difficulties to motorists. Traffic is often weaving from lane to lane to avoid vehicles that are stopped in the left lane while waiting for a gap in oncoming traffic to make a left turn, or those slowing down in the right lane to make a right turn. The presence of a bicycle in the curb lane also adds to the weaving of traffic if there is not sufficient lane width to pass the bicycle while staying within the lane.

This constant weaving of traffic also makes judging when to enter the road from a driveway or side street difficult as lane positions are changing frequently. This is especially the case for left turns. To address the operational difficulties of 4-lane roadway, the roadway is reconfigured to two through lanes, a center shared left turn lane and/or median and two bike lanes.

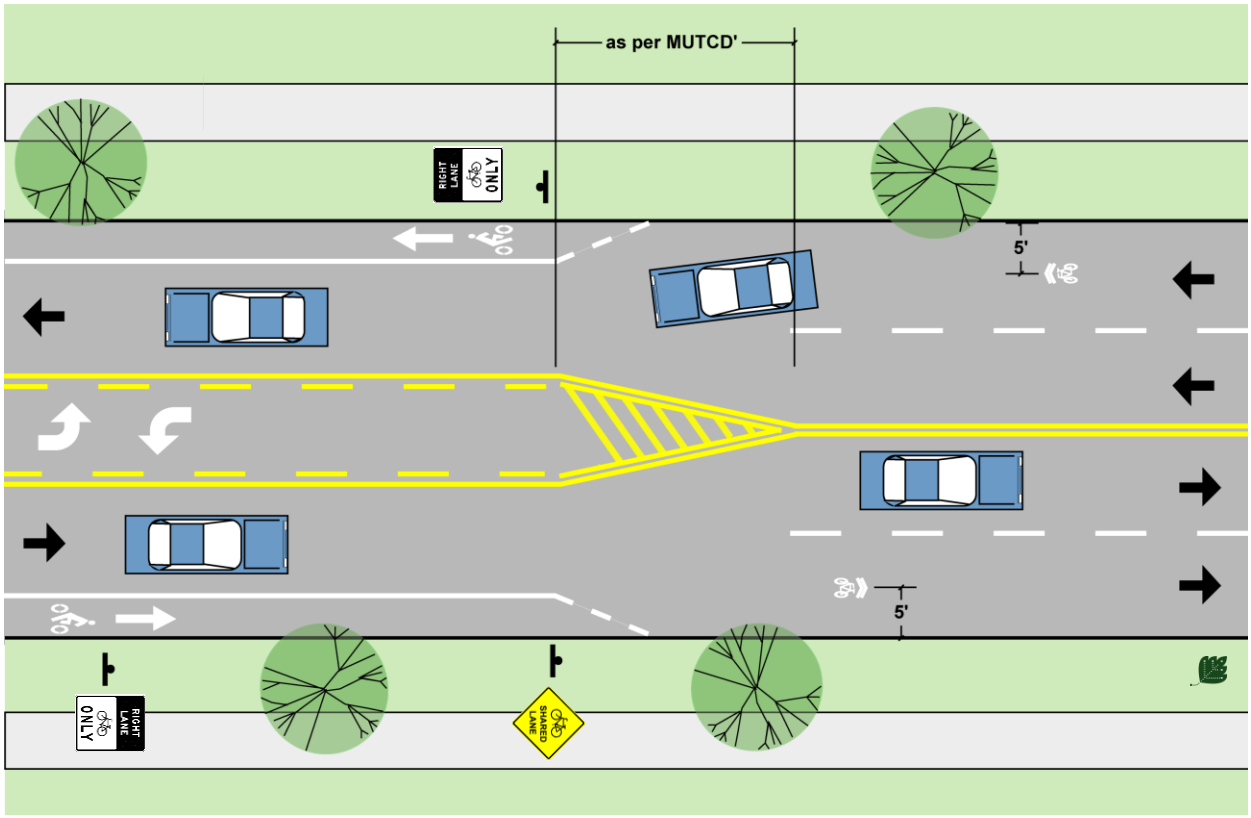
Application

This type of conversion has been used on roadways with up to 24,000 vehicles per day (VPD). Modeling research has shown that there is no loss in Vehicular Level of Service until about 1,750 vehicles per hour (approximately 17,500 VPD) compared to a four-lane configuration. In addition to a significant improvement in the Bicycle Level of Service, these conversions have been also shown to provide a:

- Reduction of the 85% speed by about 5 MPH
- Dramatic reduction in excessive speeding (60-70%) of vehicles going greater than 5 MPH over the posted speed limit.
- Dramatic reduction in the total number of crashes (17-62%).

Conversions though must be evaluated on a case-by-case basis as numerous factors influence the appropriateness of 4 to 3 lane conversion.

Fig. 5.6C. Near-term Opportunities – Transition From Three Lanes to Four Lanes at Signals



Description

Where two motor vehicle lanes are needed to accommodate motor vehicle stacking at signalized intersections the bicycle lane may be dropped and replaced with the Shared-Use Arrow.

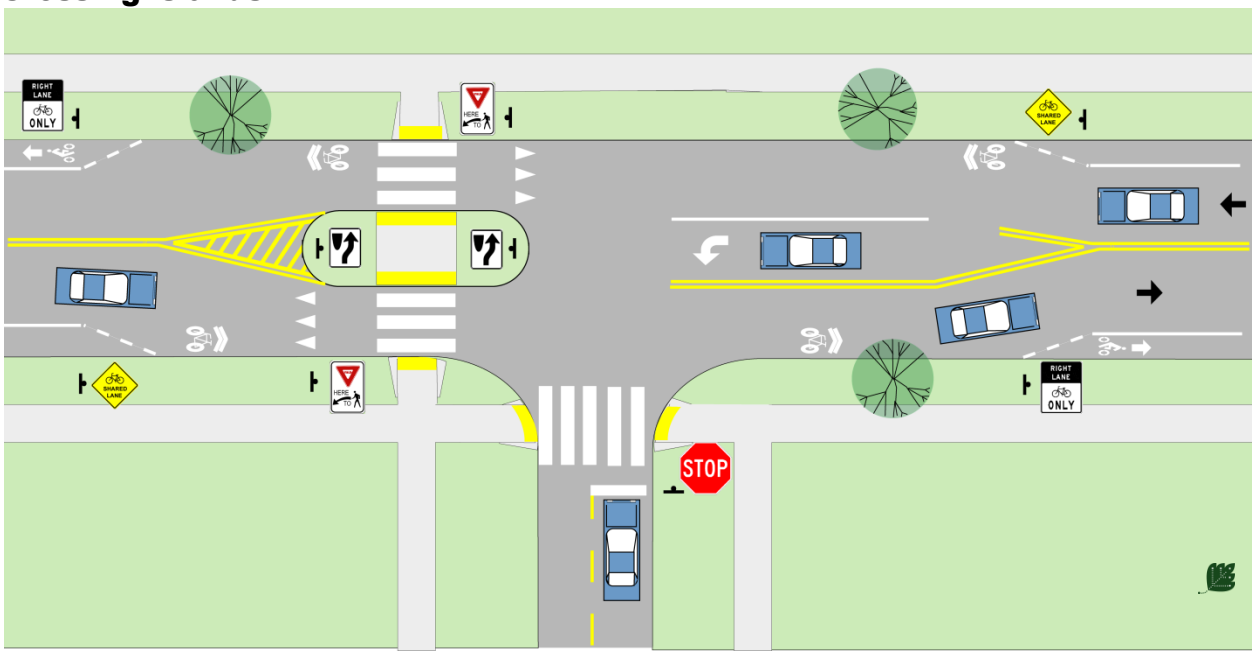
Application

This is an interim approach to accommodating vehicle stacking needs to be used where a bike lane is interrupted in the vicinity of a signal. The long-term solution would expand the intersection to accommodate bicycle lanes. The length of the four-lane segment should be minimized.

Three to Two-Lane Road Conversions

There are cases where a three-lane cross section is used consistently when the need for turn lanes is only intermittent. In these cases a bike lane may be added in places where the turn lane is not warranted. The bike lane then may be dropped when the turn lane is introduced.

Fig. 5.6D. Near-term Opportunities – Accommodation of Turn Lanes and Crossing islands



Description

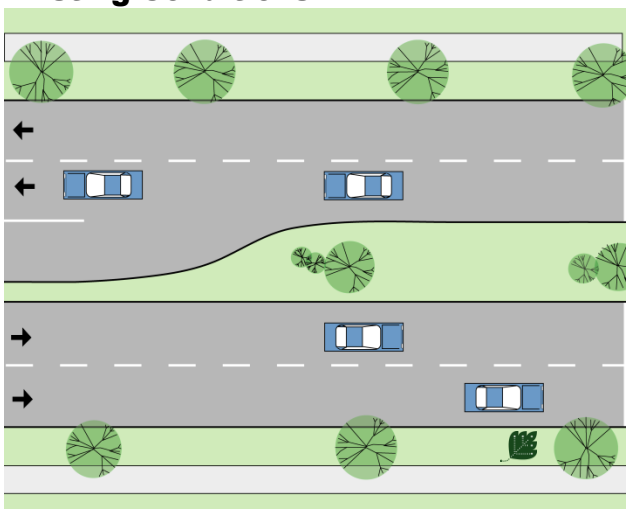
Where a designated left-turn lane is warranted and/or a pedestrian crossing island is appropriate, the bicycle lane may be dropped and replaced with the Shared-Use Arrow.

Application

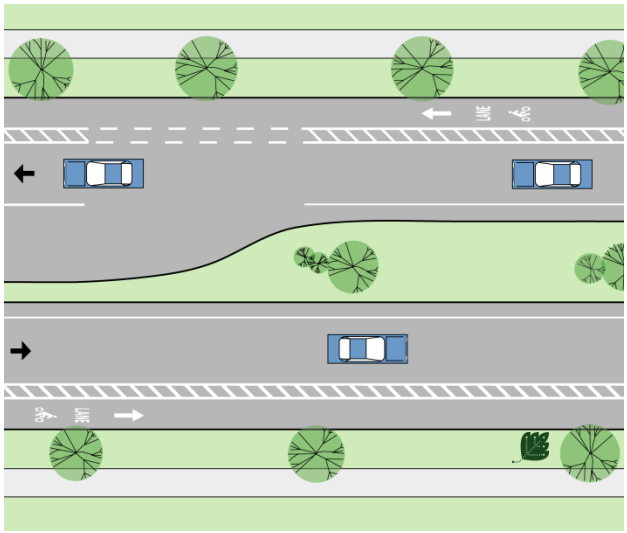
This is an interim approach to accommodating the turn lane and the crossing island. The long-term solution would expand the intersection to accommodate bicycle lanes. The length of the left-turn lane should only be as long as it needs to be to accommodate the conditions of each specific site.

Fig. 5.6E. Four to Two-Lane Boulevard Conversions Design Guidelines

Existing Conditions



Proposed Conditions



Description

The existing condition is a four-lane boulevard with designated turn lanes. These roads have tremendous traffic volume capacity. There are some situations where this road design exceeds the needs of the roadway.

In the proposed condition, two lanes of through traffic are eliminated and bicycle lanes are added. As bicycle lanes are considerably more narrow than travel lanes, a striped buffer is added between the vehicular travel lane and the bike lane and an edge line is placed a few feet from the inside curb. This allows emergency vehicles to pass.

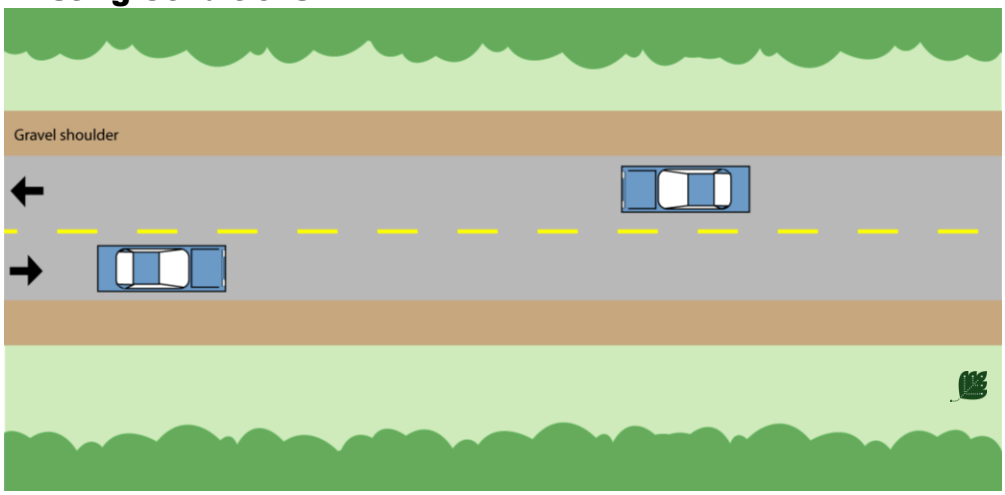
This striped buffer is replaced with a dashed line where bicycle-merging movements are expected.

Application

Where the existing and expected traffic volumes do not warrant four lanes of traffic with extended designated turn lanes.

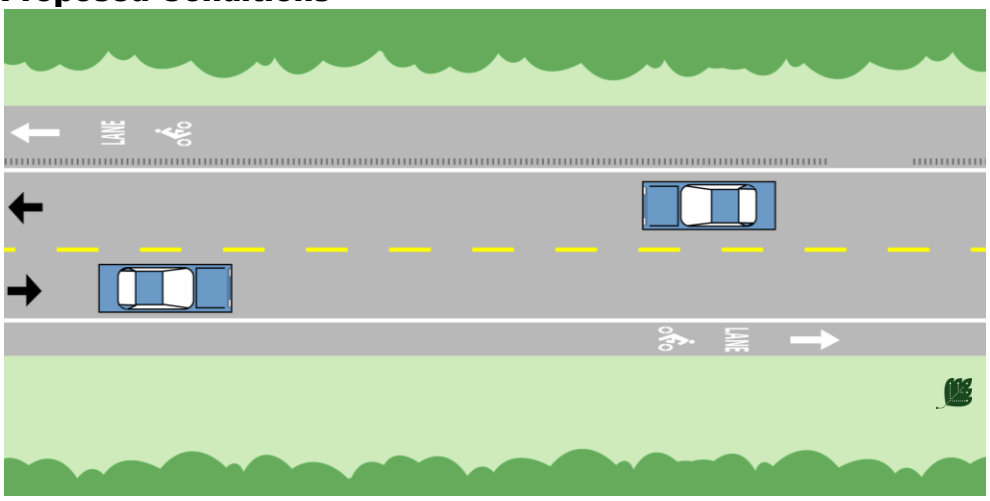
Fig. 5.6F. Paving Shoulders

Existing Conditions



A rural cross-section (no curbs) with gravel or grass shoulder. The existing roadway travel lanes are not of a sufficient width to accommodate bicycle lanes by lane narrowing.

Proposed Conditions



.

Description

Paving the shoulder provides a separate bicycle facility and improves roadway conditions from a motor vehicle and maintenance standpoint. The use of rumble strips is discouraged as they may cause a bicyclist to lose control when they leave the bicycle lane to make a turn or to avoid an obstacle. If extenuating circumstances call for the use of rumble strips, breaks should be provided where appropriate to allow for a bicycle to safely leave the bike lane.

Application

Paved shoulders should be provided on all rural cross section roadways within the City. Where appropriate, bicycle lane pavement markings may be applied.

5.7 Travel Across The Road Corridor

Despite the dangers or inconveniences that exist, at some point in a pedestrian's or bicyclist's journey they will be required to cross a road. Crossing roadways pose challenges to safe navigation for pedestrians and bicyclists on their journeys. Ways to get across a road (including railroads) include intersections, mid-block crosswalks, bridges and tunnels. All pose unique challenges to pedestrians and bicyclists.

Bicyclists and pedestrians in many cases, cross the road in very different fashions. Bicyclists in the roadway most likely will make left turns just like a vehicle, merging across lanes as necessary. Their restrictions to crossing the road are primarily based on their comfort level of riding with traffic and the volumes, speed and gaps that exist. Some bicyclists, depending on the traffic conditions, choose to make left turns as pedestrians. They leave the roadway and cross the road at a crosswalk.

For pedestrians and bicyclists who choose to cross the road as a pedestrian, crossing a road can be an intimidating experience. There are often limited safe and legal crossing options. Pedestrians are directed to cross roads at either intersections or at mid-block crosswalks. Each of those options has their own set of issues.

Intersection Issues

While generally, intersections are the safest place for pedestrians and bicyclists to cross the road, there are a number of issues to consider. Intersections are the most common places of conflict for automobiles, bikes and pedestrians. Even at a simple four way stop, there can be up to twelve different possible movements from the cars alone. Add in more lanes of traffic, and it can quickly get overwhelming. In 2009, 52% of non-motorized crashes in Southeast Michigan were intersection related[1]. However, if designed correctly, intersections can facilitate convenient and safe interactions for all users.

Signalized intersections are the hubs of activity on the roadway. It is a place with conflicting demands from many different users. For the most part, a roadway's vehicular capacity is determined at signalized intersections. From a pedestrian's standpoint, they often face a sea of left turning vehicles, right turning vehicles, and through traffic from four directions. When crosswalk signals require activation by a push button, pedestrians often ignore them because of their inconvenience. Even when pedestrians push the button, in most cases there is no feedback to the pedestrian that they have indeed activated the signal. Often when the signal phases are long, they will assume that the button is broken and cross the road at an inappropriate time.

Vehicles turning right-on-red also pose dangers to pedestrians. The driver of a vehicle is focused on the traffic to the left, looking for a gap. Frequently drivers do not look right for pedestrians beginning to cross the street before beginning their turn. Another problem occurs in situations where the view of the oncoming traffic is obstructed if the vehicle is behind the stop bar. Often times the driver of the vehicle will advance over the crosswalk to improve their sightline. If they are unable to proceed they completely block the crosswalk with their vehicle. This is a common occurrence especially in the downtown area where right-on-red is permitted even when clear sight lines do not exist from behind the stop bar.

Vehicles turning left at busy intersections with few gaps in traffic can also be problematic to pedestrians. The driver of a left turning vehicle in such cases is often focused primarily on finding a suitable gap in oncoming traffic and may commit to turning left before noticing a pedestrian in the crosswalk.

[1] Michigan Traffic Crash Facts, 2009.

Unsignalized intersections are also key points where pedestrians and bicyclists want to cross the road corridor. When the crosswalks are left unmarked, pedestrian travel is often discouraged.

The aforementioned issues are addressed throughout the following guidelines and in *Section 4 – Proposed Policies and Programs*. In addition, special attention has been paid to addressing crossings at points other than signalized intersections.

General Crosswalk Design

Marking a crosswalk serves two purposes: (1) it clarifies that a legal crosswalk exists at that location and (2) it tells the pedestrian the best place to cross .[1] Several issues should be considered when designing safe crosswalks, including visibility, communicating the pedestrian's intent, minimizing crossing distance, snow obscuring the road surface, and accommodating persons with special needs.

Visibility

Increasing the visibility of all users crossing the road is a key issue for pedestrian safety. The ability of pedestrians to see motorists is equally as important as their own visibility in the roadway. Marked crosswalks should be included only where sight distance is adequate for both pedestrians and motorists. Obstructions in sight lines should be minimized. Visibility can also be improved with the following design treatments:

- Wide white ladder crosswalks.
- Stop lines or yield lines that are set back from the crosswalk a sufficient distance to increase visibility from all lanes of traffic.
- Signage directing motorists to yield to the pedestrians.
- Placement of signage that does not obstruct the visibility of the pedestrians.
- Curb extensions (bulb outs), extending the curb out at intersections, also minimizes the pedestrian crossing distance.
- Removal of low hanging branches and minimal planting between the oncoming vehicles and the sidewalk approaches to the crosswalk such that sight distances are in accordance with AASHTO guidelines.
- Lighting of the crosswalk and the sidewalk approaches.

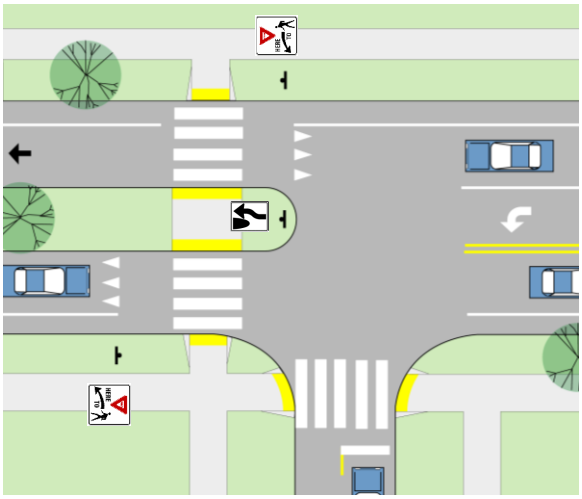
[1] AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities (Draft).* August 2001.

Understanding the Pedestrian's Intent

Road users should be able to discern if a pedestrian is planning to cross the road so that they may take appropriate measures. If a crosswalk is located where a sidewalk directly abuts the roadway, the road users cannot tell if someone is simply going to walk by the crosswalk or abruptly turn and attempt to cross the street. Also, places where pedestrians may typically congregate, such as bus stops, may cause road users to needlessly stop. To help clarify the pedestrian's intent to cross the road, intersections should incorporate the following features:

- A short stretch of sidewalk perpendicular to the roadway where only pedestrians planning to cross the street would typically stand.
- Placing bus stops past the crosswalk to avoid blocking the crosswalk.
- Distancing the crosswalk from places where pedestrians may congregate adjacent to the roadway without the intent to cross the road.
- Installing curb extensions to reduce the crossing distance for pedestrians and to slow traffic, (see Fig. 5.4B)

Figure 5.7A. Pedestrian Crossing Island



Crossing islands

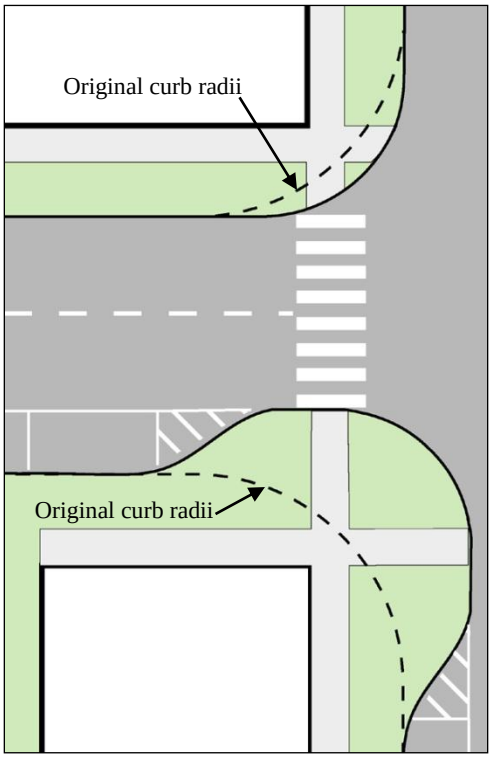
Crossing islands are raised areas that separate lanes of opposing traffic and eliminate the need for pedestrians to cross more than one direction of traffic at a time (see Figure 5.7A to the left).

Crossing islands allow the pedestrian to undertake the crossing in two separate stages. This increases their comfort level and opens up many more opportunities to safely cross the road.

Crossing islands increase the visibility of the crosswalk to motorists and reduce pedestrian crossing distances.

Crossing islands should be considered for all unsignalized marked crosswalks that traverse three or more lanes.

Fig. 5.7B. Effect of curb extensions and smaller curb radii on pedestrian crossing distances



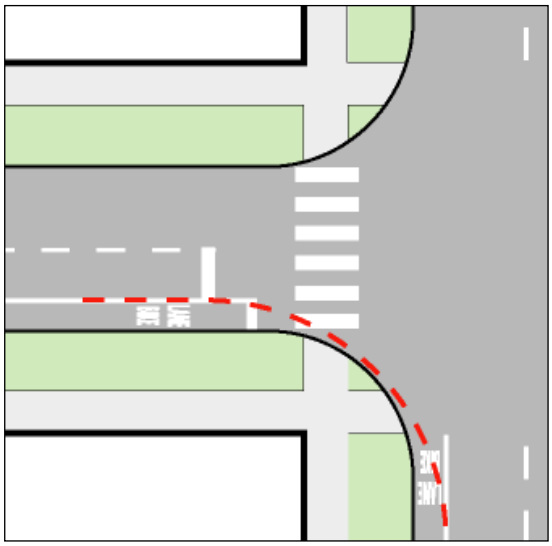
Minimizing Crossing Distances

Minimizing the distance that pedestrians need to cross the street is another critical safety solution. As crossing distances increase, the comfort and safety of a pedestrian decreases. Simple design solutions such as reducing curb radii, and adding curb extensions, shorten crosswalk distances. As well, they reduce the potential for pedestrian-vehicle conflict. Larger corner radii promote higher turning speeds and increase pedestrian crossing distances. See the figure to the left.

In addition to increasing visibility and shortening crossing distances for pedestrians, curb extensions increase the space available for directional curb ramps and prevent parked cars from encroaching on the crosswalk. Curb extensions also serve to make a pedestrian's intent to cross the road known to motorists before they have to step into the roadway.

For signalized intersections, shorter crosswalks mean more time for the pedestrian "Walk" phase and a shorter clearance interval "Flashing Don't Walk" phase.

Fig 5.7C. Effect of Bike Lanes on Turning Radius



Minimizing Turning Radius When Bike Lanes are Present

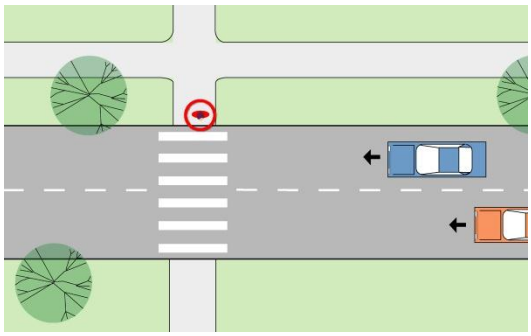
Bicycle lanes provide an added advantage of effectively increasing the turning radius for motor vehicles. This is especially the case where both intersecting roads have bike lanes as shown in the figure to the left.

This also applies to driveways. When a sidewalk is close to the road, the curb radius of an intersecting driveway is typically quite small. In these cases, a bicycle lane can significantly improve the ease of entering and exiting the driveway. For example a 5' curb radius adjacent to a 3.5' bike lane has an effective turning radius of 10' (including the gutter).

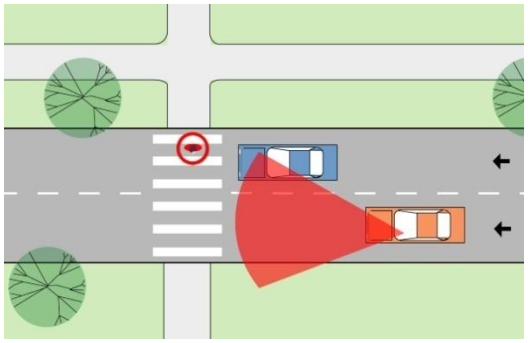
The increased effective turning radius means that motorists are less likely to encroach on adjacent motor vehicle lanes during the turning movements.

Fig. 5.7D. Multiple Threat Crashes Issues

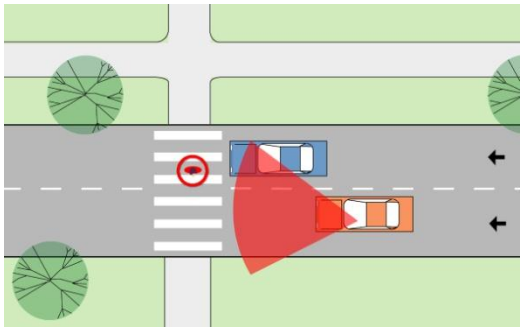
Whenever a crosswalk traverses multiple lanes of traffic traveling in the same direction, there is a potential for what is known as a multiple-threat crash. The crash unfolds as follows:



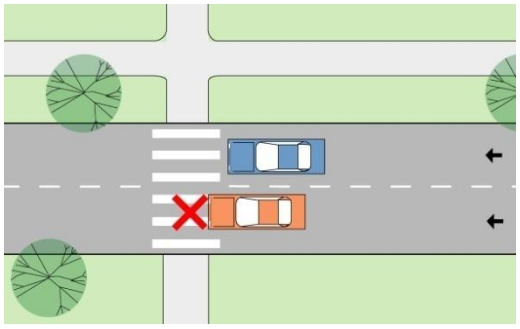
1. The driver in the lane closest to the pedestrian sees the pedestrian approaching the ramp or just entering the roadway and begins to slow down



2. The driver closest to the pedestrian lane stops, yielding the right-of-way to the pedestrian. The car is stopped immediately adjacent to the crosswalk, therefore blocking the sightlines between the pedestrian and the driver of the other car.



3. The driver of the other car fails to see the pedestrian and continues towards the crosswalks without slowing down.



4. The driver of the second car does not see the pedestrian until it is too late to come to a complete stop and hits the pedestrian.

A combination of high visibility crosswalks, yield lines set back from the crosswalk, and crosswalk signage on both sides of the street can help provide better visibility of pedestrians in the crosswalk. See Fig. 5.7Q for recommended countermeasures.

Fig. 5.7E. Countdown Signals

"Walk" Phase

Clearance Interval

"Don't Walk" Phase

Description

These operate in the same manner as typical pedestrian signals, with one addition. At the onset of the Clearance Interval (flashing "Don't walk" or red hand), the signal counts down the remaining time until the "Don't Walk" phase (solid "Don't Walk" or red hand).

Pedestrians find these very intuitive to use and they can help clear up many misunderstandings as to the purpose of the Clearance Interval. Studies have shown that fewer pedestrians remain in the street at the end of the Clearance Interval with countdown signals than with standard pedestrian signals. These signals have been very well received by pedestrians and have reduced complaints in some communities regarding pedestrian signal timing.

Application

The community should consider using the pedestrian signals with an integrated countdown clock for all new and replacement pedestrian signals. The City should consider adding countdown clocks to existing signals at high pedestrian volume signalized crosswalks and locations where the crosswalk is longer than 50'.

Fig. 5.7F. Portable Speed and Traffic Detectors

Description

These portable detectors have the ability to perform traffic counts, speed studies and indicate a driver's speed on a LED display. Some models have a strobe light that may be activated when the speed limit is exceeded. They have been shown to reduce speed in before and after studies.

Application

These may be moved into an area where speeding is of concern to residents. The device may be used without displaying the speed to get a baseline speed study and traffic count in an unobtrusive manner. It may then be set to display the speed. Numerous inexpensive mounting plates may be put in place around the community and the detector can be easily and economically moved from place to place. These would be ideal for school zones where speed is a concern.

Fig. 5.7G. Active Crosswalk Warning Systems

Description

A flashing beacon and/or in-pavement flashing LEDs are activated when a pedestrian is present. The signals may be passively activated through a number of methods or activated via a standard push button. The pedestrian approach can also be set to flash a red light with a sign indicating to cross after traffic clears. Various manufacturers have solar powered models with radio controls to activate flashers on advance warning signs and on signs on the opposite side of the street. This significantly reduces the cost of installation and operation.

Application

These systems are best located at pathway and major road intersections, or mid-block crosswalks on major roadways where pedestrian traffic is sporadic. Passive activation works best when there is a long pedestrian approach such as a pathway.

Fig. 5.7H. Rectangular Rapid Flash Beacon

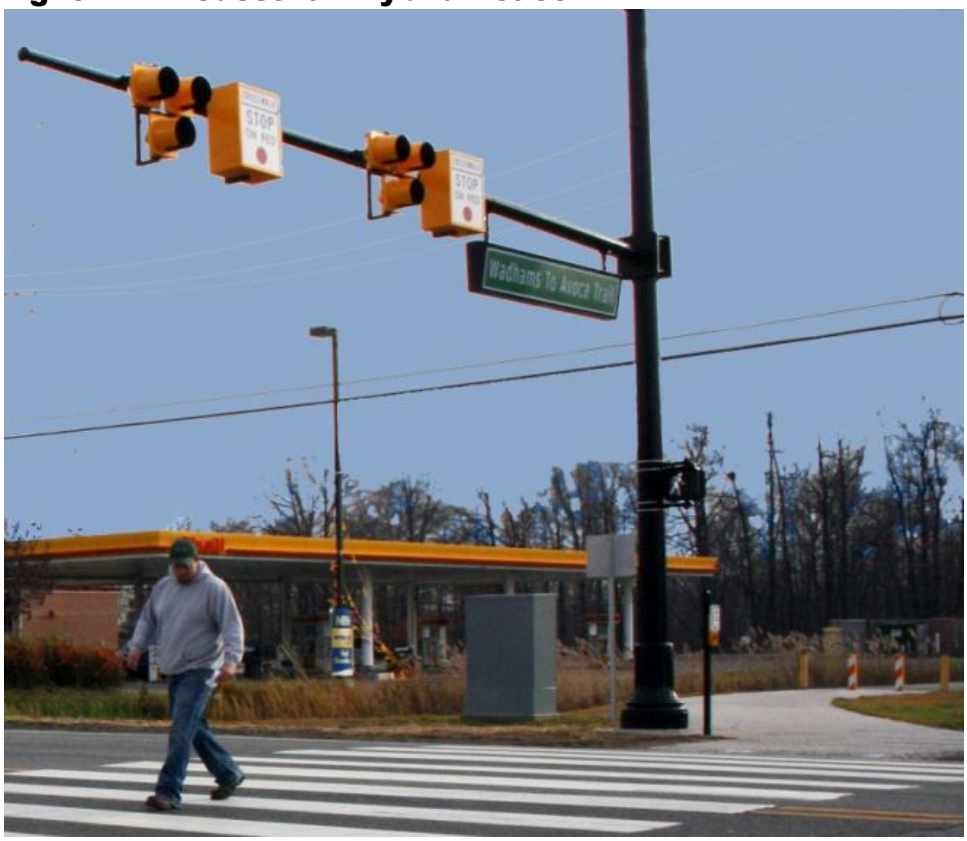
Description

Actuated Rectangular Rapid Flash Beacons are high intensity LED flashers that are paired with crosswalk signs. The LED flashers alternate and get motorists attention when activated. They can be passively or push-button activated and are sometimes linked to advanced warning signs. Various manufacturers have solar powered models that significantly reduce the cost of installation and operation.

Application

These systems are best located at pathway and major road intersections, or mid-block crosswalks on major roadways where pedestrian traffic is sporadic. Passive activation works best when there is a long pedestrian approach such as pathway.

Fig. 5.7l. Pedestrian Hybrid Beacon



Dark Until Activated

Flashing Yellow

Steady Yellow

Steady Red during Pedestrian Walk Interval

Alternating Flashing Red During Pedestrian Clearance Interval

Description

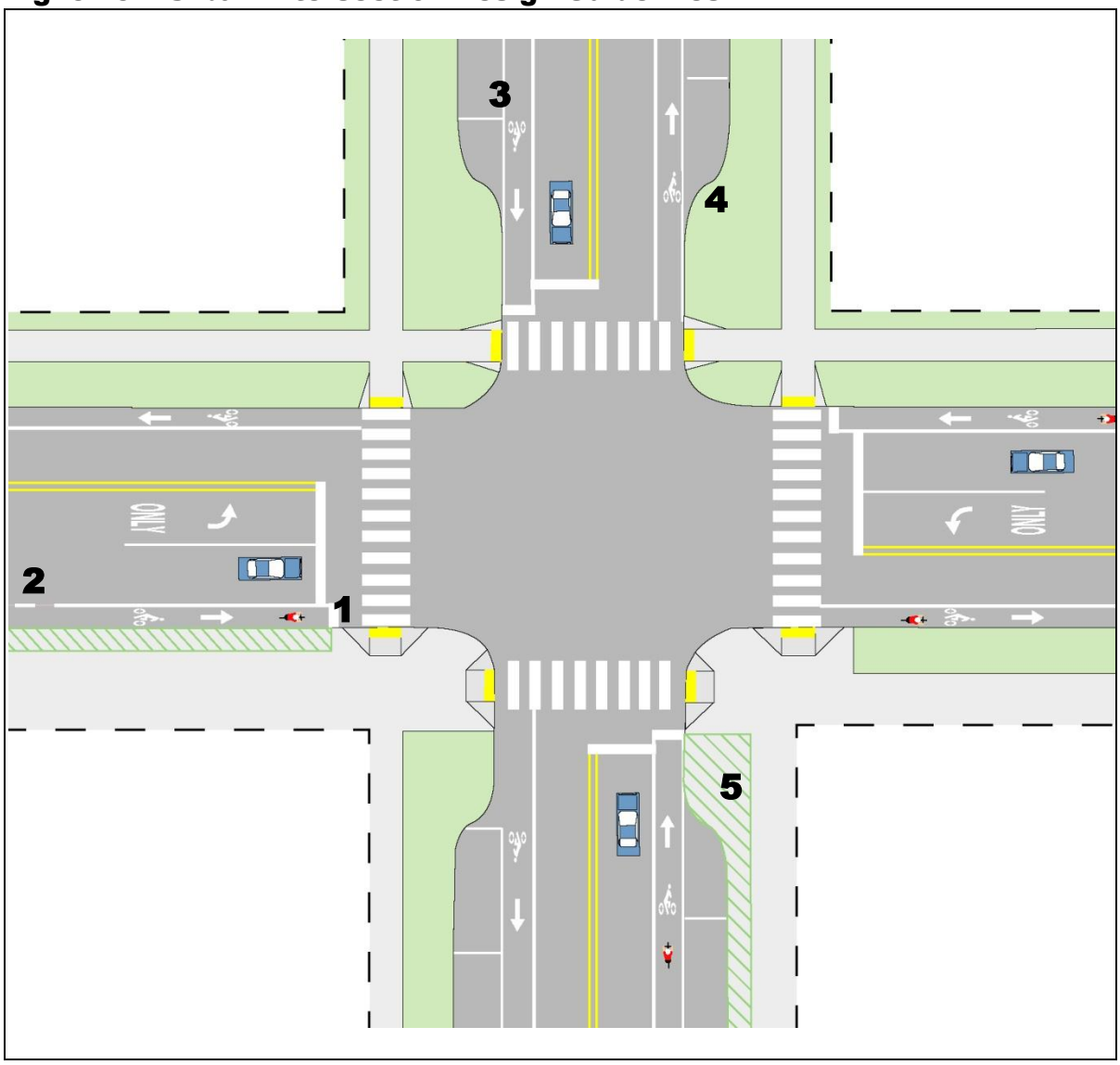
The Pedestrian Hybrid Beacon, also known as a HAWK signal, is a beacon used to help pedestrians cross mid-block where a traditional pedestrian crosswalk signal would be inappropriate. The pedestrian hybrid beacon is similar to an emergency beacon in that the signal's purpose is clearly signed adjacent to the signal.

The signal is kept dark at its resting state. When a pedestrian activates the crossing button, a flashing yellow signal is displayed to motorists. This is followed by a steady yellow then a solid red at which time the pedestrian is displayed a walk signal. During the clearance interval, the motorists are displayed an alternating flashing red signal. Motorists may then move forward if the pedestrian or bicyclist has already crossed the road.

Application

These system work best at mid-block crosswalk locations where poor sight lines, infrequent usable gaps and/or inability to install a crossing island make an unsignalized crossing unsafe. They should not be installed at or within 100 feet of an intersection.

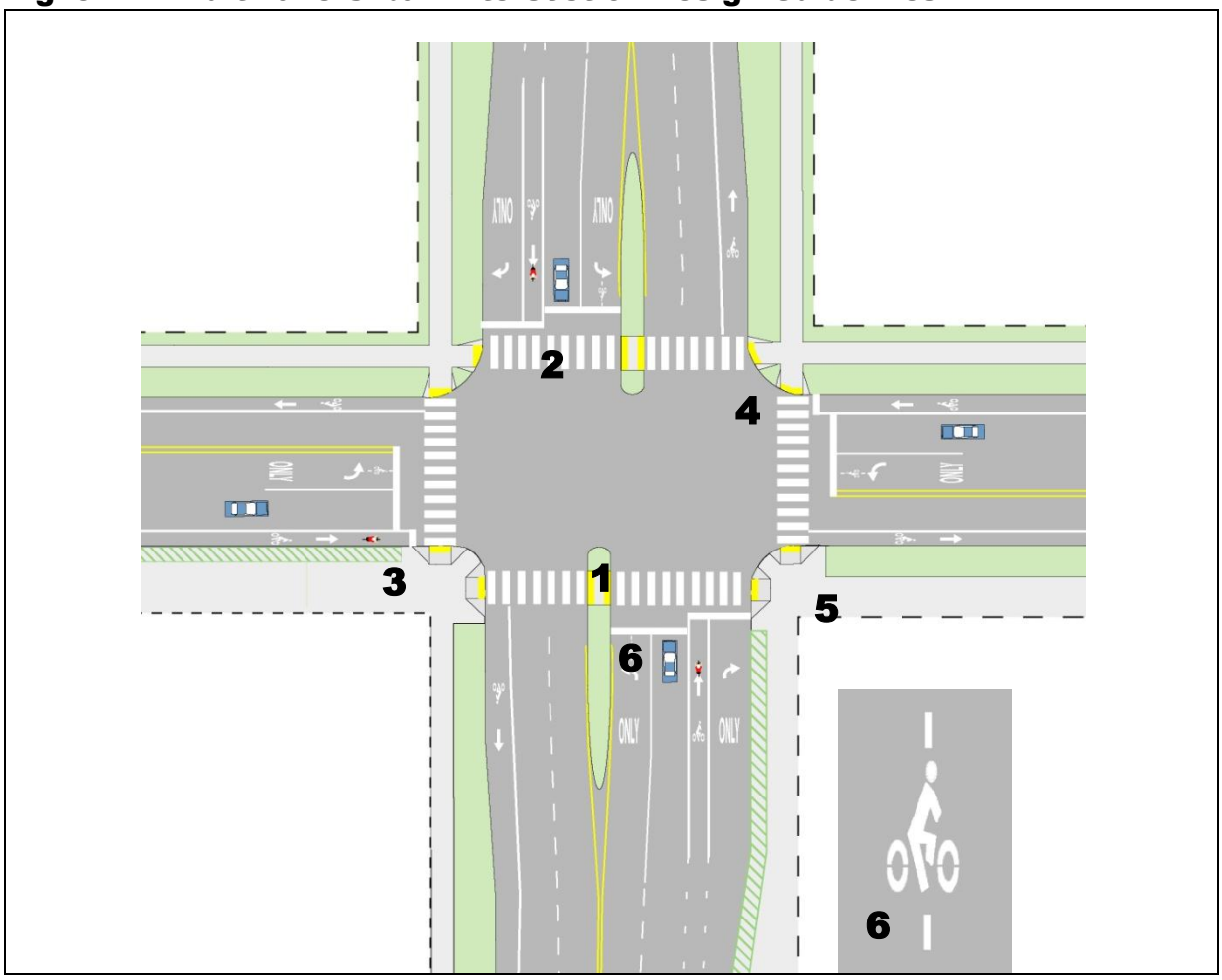
Fig. 5.7J Urban Intersection Design Guidelines



Key Elements

1. Bike lane striping should stop at the pedestrian crosswalks and resume on the far side of the intersection. Unusual alignments may be aided by extending dashed guidelines through the intersection.
2. Bike lane striping is dashed at the intersection approach to indicate that bikers may be merging with traffic to make a turn.
3. Striping between the parking lane and bike lane encourages motorists to park closer to the curb and discourages motorists from using the bike lane in combination with an unused parking bay as a travel lane.
4. Curb extensions reduce the crossing distance of pedestrians and improve sight distance for both motorists and pedestrians. Curb extensions should be used wherever there is on-street parking.
5. In urban areas, a furniture and street tree zone provides a buffer from the street and improves the pedestrian level of service rating. A sufficiently wide travel way should be clear of any obstructions.

Fig. 5.7K. Multi-lane Urban Intersection Design Guidelines



Key Elements

1. Pedestrian crossing islands should be installed at wide, multi-lane streets with high traffic volumes. Curbs, signs, and street hazard markings should delineate the islands.
2. Crosswalks should be a minimum of 10' wide and clearly marked with a white ladder design to increase visibility and resist tire wear.
3. Bike stop bar is advanced several feet ahead of vehicle stop bar to minimize conflicts of right turning cars with through bike traffic.
4. A small curb radius shortens the pedestrian's crossing distance and controls traffic speed around corners. Bike lanes provide a significantly larger effective turning radius than the actual curb radius and should be considered in turning radius calculations.
5. Perpendicular ramps should be built 90 degrees to the curb face and should include a detectable warning strip for visually impaired people.
6. Traffic detectors in left turn lanes should be designed to detect bicycles. Detectors should include pavement markings that indicate where bikes can best be detected.
7. Timing of the traffic signal should allow adequate all red phases to provide sufficient clearance time for bikes to clear an intersection.

Other intersection features may include Right-On-Red turning restrictions, leading pedestrian interval signal phases, and audible signals for visually impaired users where appropriate.

Signal Timing and Turn Restrictions

The length of pedestrian signals are generally determined primarily by the motor vehicle flow with the exception of a few cases where the motor vehicle phase is lengthened to accommodate a long pedestrian clearance interval. Where there is heavy pedestrian flow, such as in the campus area, the flow of pedestrians should be given the same consideration as motor vehicles in setting signal timing.

Where intersection geometry is such that the intersection is wider than typical, motor vehicle clearances should be evaluated to make sure that the pedestrian Walk phase is not started when motor vehicles would be moving through the crosswalk. Also, the motor vehicle clearance time should be set to account for bicycle traffic.

Motorists are prohibited from blocking crosswalks by law. The communities in the region should evaluate restricting right turns where a vehicle cannot see cross street traffic without entering a crosswalk. Where there is significant pedestrian traffic in a crosswalk that conflicts with motor vehicles making right turns, the community should evaluate the feasibility of using a leading pedestrian interval of approximately 5 seconds. A leading pedestrian interval providing pedestrians with the "Walk" phase prior to motor vehicles given the green light has been shown to help prevent right turning vehicles from cutting off pedestrians trying to leave the curb.

Unsignalized Mid-block Crosswalks

The majority of pedestrian trips are ¼ mile or less, or a five to ten minute walk at a comfortable pace[17]. Any small forced detour in a pedestrian's path has the potential to cause significant time delays if not shift the trip to another mode (most likely motorized). Pedestrians will seek the most direct route possible and are not willing to go far out of their way. Thus, they will often cross the road whether there are crosswalks or not. This results in the increased likelihood of pedestrians unexpectedly dashing out mid-block. This is the second most common type of pedestrian/vehicle collision after intersection related crashes.[18]

A concern with any mid-block crosswalk is providing the pedestrian with a false sense of security. This concern must be weighed against accommodating and encouraging pedestrian travel. If we are to encourage safe and legal pedestrian travel, well designed, high visibility mid-block crosswalks should be provided at appropriate locations. The use of a sign oriented toward pedestrians that states "Cross Road When Traffic Clears" has been used in other communities to underscore the pedestrian's responsibilities at unsignalized crosswalks.

Understanding pedestrian routes and common pedestrian destinations will guide the placement of mid-block crosswalks at needed locations. According to AASHTO's *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, there are numerous attributes to consider when determining whether placement of a mid-block crosswalk is appropriate. These include:

- The location is already a source of a substantial number of mid-block crossings.
- A new development is anticipated to generate mid-block crossings.
- The land use is such that pedestrians are highly unlikely to cross the street at the next intersection.
- The safety and capacity of adjacent intersections or large turning volumes create a situation where it is difficult to cross the street at the intersection.
- Spacing between adjacent intersections exceeds 200 m (660 ft or an 1/8 of a mile).
- The vehicular capacity of the roadway may not be substantially reduced by the midblock crossing.
- Adequate sight distance is available for both pedestrians and motorists.

The 2009 MUTCD revised guidance for provision of marked crosswalks states:
New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:

A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or

B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater

[17] AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* July 2004.
[18] FHWA, Pedestrian and Bicycle Crash Types of the Early 1990's, Publication No. FHWA-RD-95-163, June 1996

Unsignalized Marked Mid-block Crosswalk Signage

Fig. 5.7L. Crosswalk Signage

Pedestrain Warning Sign

W11-2
and
W16-Ahead

Preferred
Crossing Sign

R1-5

The current version of the Michigan Manual of Uniform Traffic Control Devices illustrates numerous ways to sign a crosswalk. When an advanced warning sign is desired, the W11-2 and W16-Ahead should be used. At the crosswalk itself there are a number of options. One option to use a W11-2 (pedestrian warning sign) with a W16-7P (arrow pointing at the crosswalk). Another option uses one of the new Yield Here to Pedestrian Signs either the R1-5 (shown) or the R1-5a (where the word pedestrian is used rather than the icon). It is recommended in most cases to use the R1-5 in conjunction with a yield line consisting of a row of isosceles triangle pavement markings across approach lanes and pointed towards approaching vehicles. This help to get vehicles to yield to pedestrians at a safe distance back from the crosswalk.

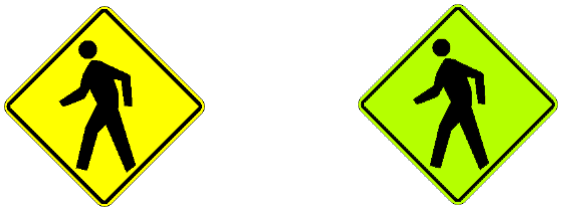
Fig. 5.7M. In-Road Signs

R1-6

Many communities use Yield to Pedestrian signs placed within the crosswalk that alert motorists of pedestrian crossings and calm traffic in the vicinity of the crosswalk. These in-street crossing signs cannot be used at signalized locations. If the In-Street Pedestrian Crossing sign is placed in the roadway, the sign should comply with the breakaway requirements of AASHTO's guidelines. The in-street sign may be used seasonally to prevent damage in winter from plowing operations.

In-Road Removable Yield to Pedestrian signs may be used temporarily as part of an education and/or enforcement program in a targeted area or on a semi-permanent basis for critical crosswalks.

Fig. 5.7N. Yellow vs. Fluorescent Green Signs


W11-2

The 2009 MUTCD requires fluorescent yellow-green colored signs be used for school and school bus signs. MDOT has until the end of 2011 to adopt these changes. Fluorescent yellow-green colored signs are optional for pedestrian, bike and playground signs, however, if they should be used consistently throughout the community.

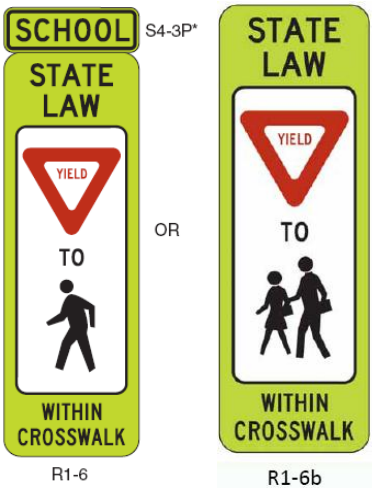
Fig. 5.7O. School Crossing Sign Options

Advanced Warning

Or

Crosswalk Warning

In-Street Pedestrian Crossing Sign Alternative to Crosswalk Warning Sign



The use of the STATE LAW legend is optional on the R1-6 series signs

Overhead Pedestrian Crossing Signs

The Overhead Pedestrian Crossing (R1-9 or R1-9a) may be modified to replace the standard pedestrian with schoolchildren symbols and may be used at unsignalized school crossings. The STATE LAW legend may be omitted on the R1-9 signs.

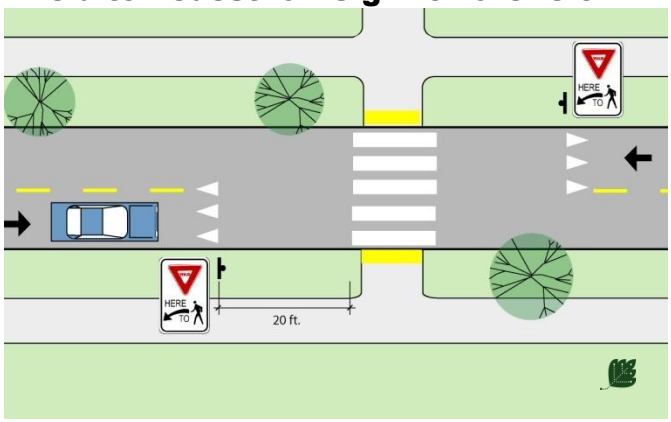
The School Crossing signs are intended to be placed at established crossings that are used by students going to and from school. However, if the crossing is controlled by stop signs, S1-1 should be omitted at the crosswalk location. Only crossings adjacent to schools or on designated routes to school should be signed with S1-1.

The In-street Pedestrian Crossing (R1-b or R1-6a) sign may be used at unsignalized school crossings. If used at a school crossing a SCHOOL (S4-3P) sign may be mounted above the sign.

The signs in Fig. 5.7O are required in the 2009 MUTCD. MDOT has until the end of 2011 to adopt these changes.

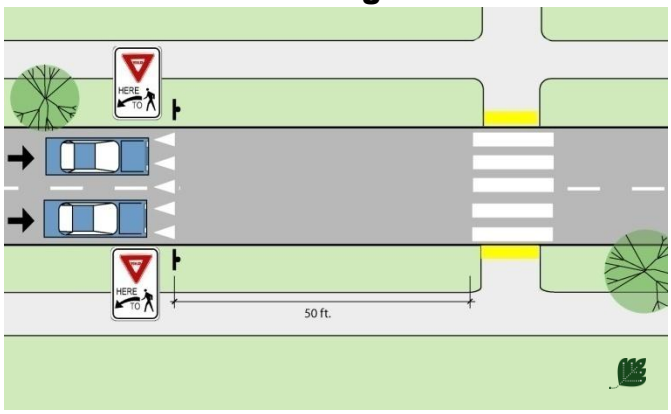
.Fig. 5.7P. Crosswalk Sign and Yield Line Placement

"Yield to Pedestrian Sign" on a One or Two-Lane Road



"Yield Here to Pedestrians" signs and yield line pavement markings should be placed a minimum of 20 ft. in advance of a crosswalk to encourage drivers to stop a greater distance from the crosswalk.

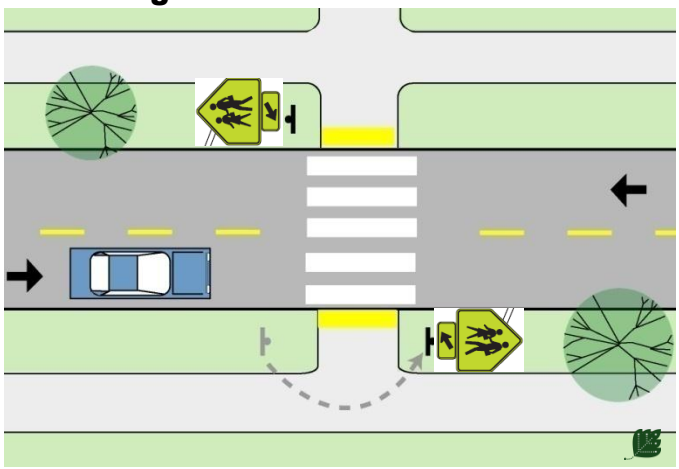
"Yield to Pedestrian Sign" on a Multi-Lane Road



"Yield Here to Pedestrians" signs and yield line pavement markings should be placed further in advance of a crosswalk on multi-lane roads to minimize the risk of a multiple-threat crash (see illustration in this section) and provide improved visibility for motorists in adjacent lanes.

"Yield Here to Pedestrians" signs should be placed on either side of the road to ensure visibility for motorists in both lanes.

School Sign Placement

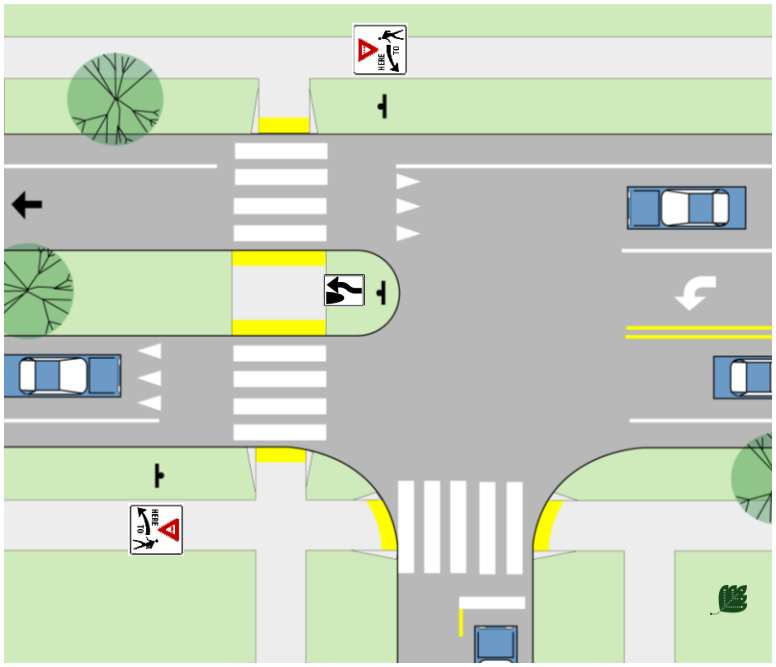


School Crossing Signs should be placed behind the crosswalk to improve visibility of crossing pedestrians rather than in front of the crosswalk where the large signs may obstruct motorists' views.

Selected Placement of Crosswalks at Tee intersections Design Guidelines

On some roads it may be desirable to mark only one of the crosswalks at a Tee intersection in order to channel pedestrians to a safer crossing point and to maximize the effectiveness of the crosswalk by not overusing high visibility crosswalks.

Fig. 5.7Q. Unsignalized Tee Intersection with Turn Lane Guidelines



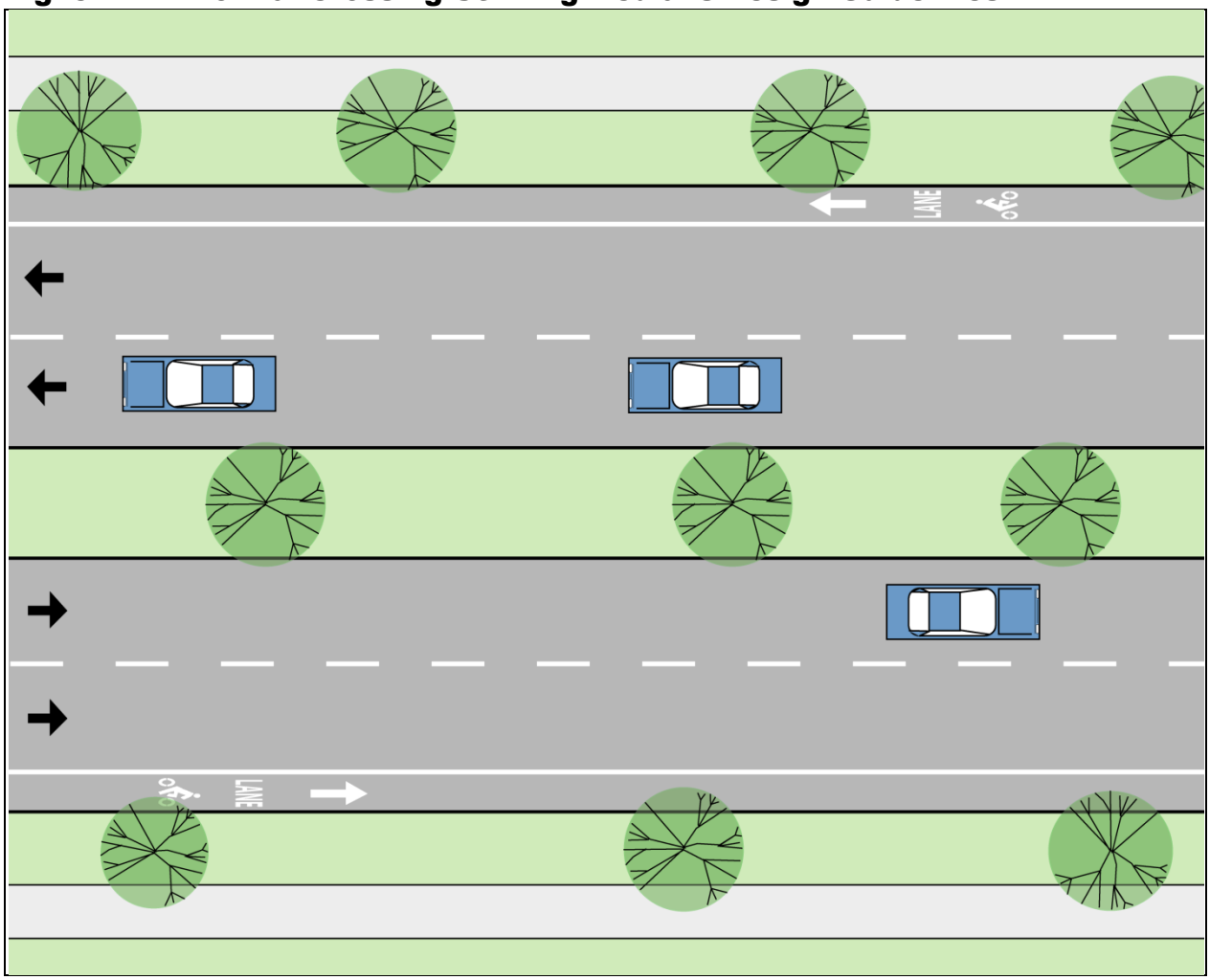
Description

At unsignalized Tee intersections with center turn lanes, the marked crosswalk is located to the left of the intersecting street and the turn lane is converted to a pedestrian crossing island. The crossing island should be located such that it requires left turns from the intersecting street to have a fairly tight turning radius, therefore reducing their travel speed.

Curb ramps should be provided at all legal crosswalks, regardless of whether the crosswalk is marked. Driveways should be prohibited in the vicinity of the intersection.

The treatment shown should be used in conjunction with advance warning signs (not shown).

Fig. 5.7R. Informal Crossing Utilizing Medians Design Guidelines



Description

Raised medians may somewhat accommodate dispersed informal crossings by able-bodied adults during periods of no or low snowfall.

Key Elements

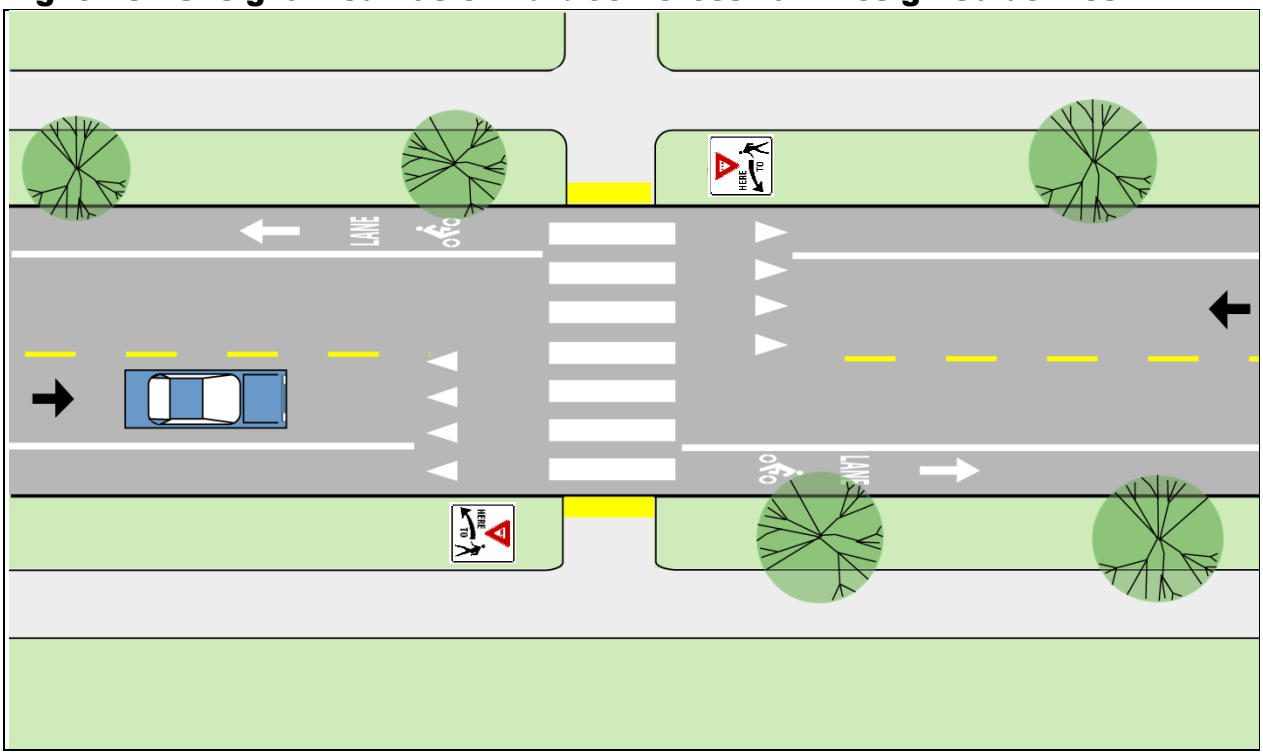
A median with plantings that permits traversing by foot and allows good visibility between the driver and the pedestrian.

Applications

On roads of four or more lanes where dispersed crossings are anticipated, where center left-turn lanes are unused, where minimum pavement is desired, and where traffic calming is desired. They may be used where a marked crosswalk is being considered as a Near-term Opportunities measure.

Example

Fig. 5.7S. Unsignalized Basic Mid-block Crosswalk Design Guidelines



Description

A mid-block crosswalk for a two-lane road at an unsignalized location without parking. The treatments shown should be used in conjunction with advance warning signs (not shown).

Key Elements:

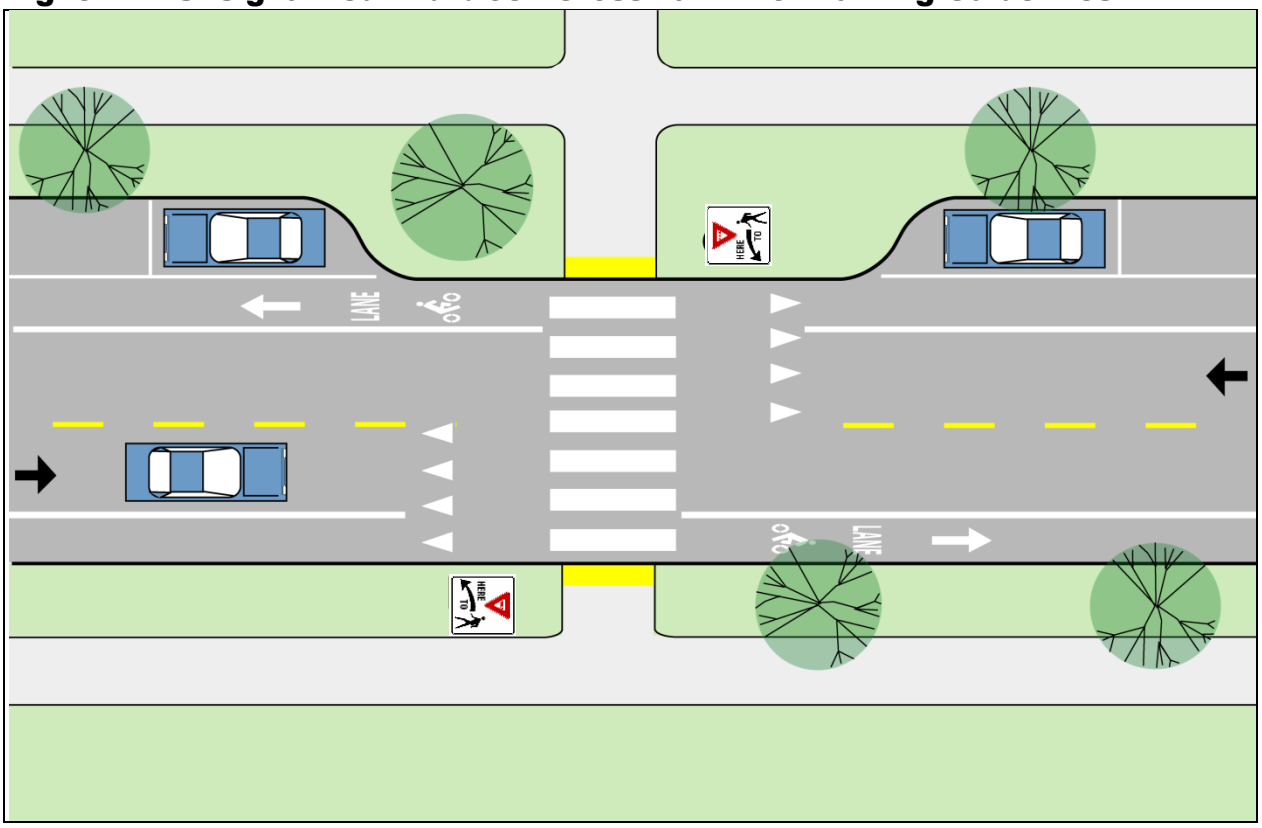
- The yield markings are set back from the ladder crosswalk to minimize the potential for a multiple threat crash.
- Where crossing signs other than the R1-5/ R1-5a "Yield Here to Pedestrians" are used, yield lines should be omitted.
- Sightlines are kept clear of vegetation.
- A 2' wide detectable warning strip is used at the base of the ramps.

Applications

Generally used on relatively low volume, low speed roads where sufficient gaps in the motorized traffic exist. This crosswalk design should not be used in any situations where there are greater than two travel lanes or when there is on street parking.

Example

Fig. 5.7T. Unsignalized Mid-block Crosswalk With Parking Guidelines



Description

A mid-block crosswalk for a two-lane road at an unsignalized location with parking. The treatments shown should be used in conjunction with advance warning signs (not shown).

Key Elements:

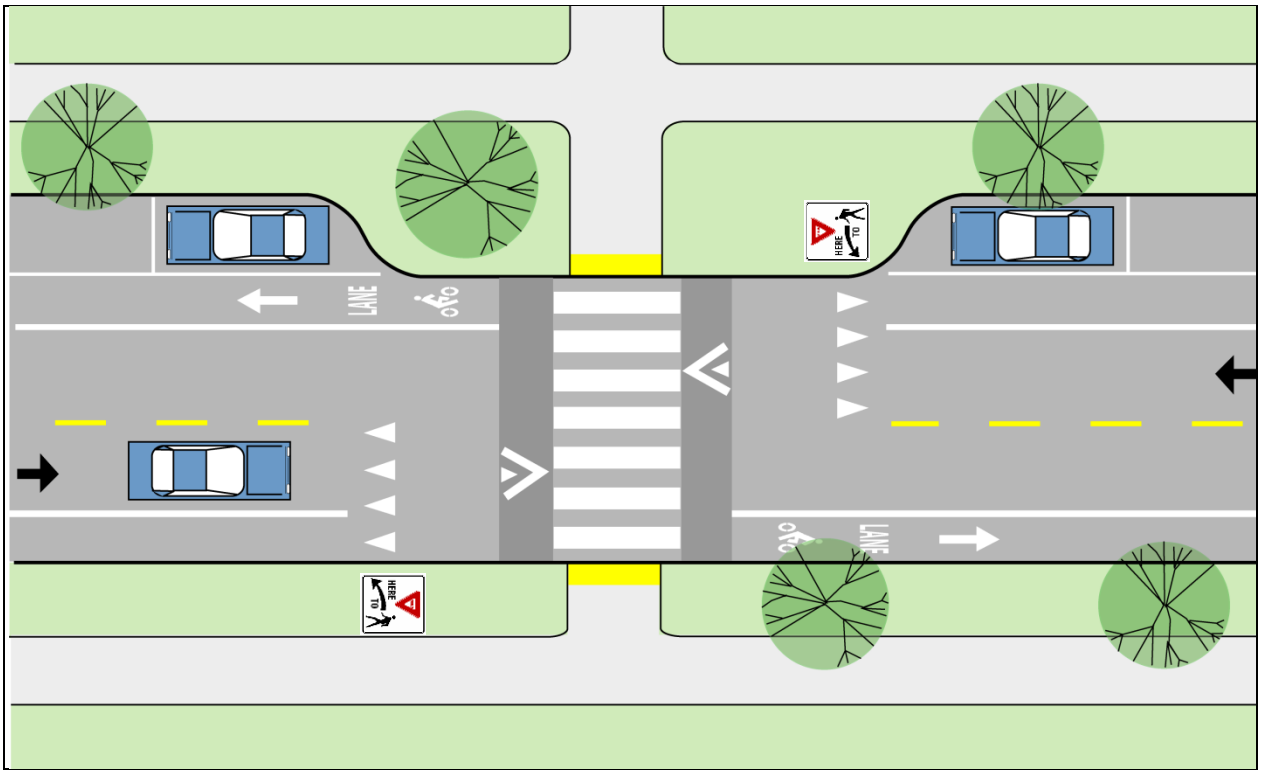
- See elements listed under Unsignalized Basic Mid-block Crosswalk.
- A bulb-out extends the pedestrian ramp into the sightlines of oncoming vehicles, reducing the potential for a "dart-out" type crash.

Applications

Generally used on relatively low volume, low speed roads where sufficient gaps in the motorized traffic exist. This crosswalk design should not be used in any situations where there are greater than two travel lanes.

Example

Fig. 5.7U. Unsignalized Speed Table Mid-block Crosswalk Design Guidelines



Description

A mid-block crosswalk for a two-lane road at an unsignalized location with parking. The treatments shown should be used in conjunction with advance warning signs (not shown).

Key Elements:

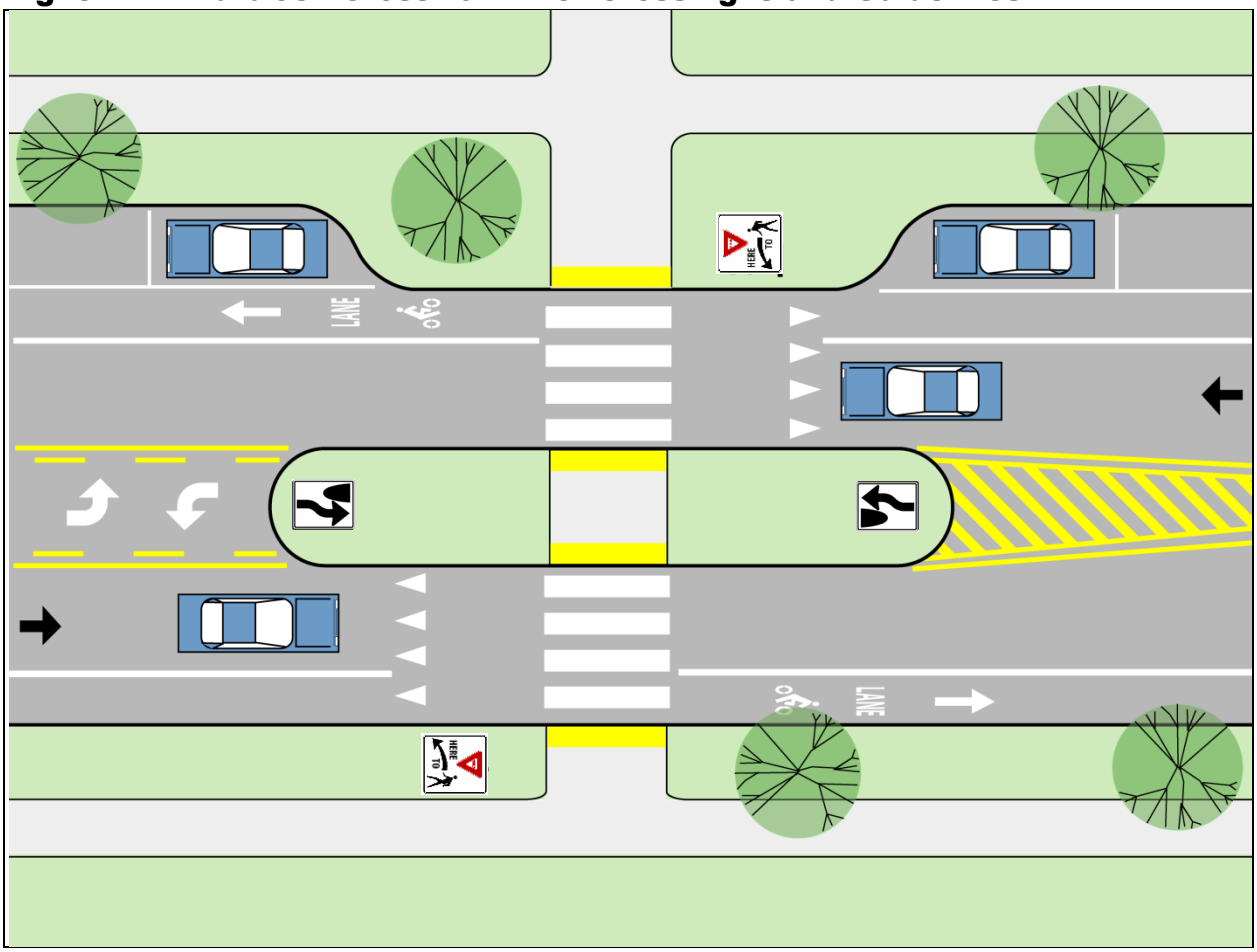
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Parking.
- A speed table with 6' long approach ramps and a 4" high table is placed under the crosswalk to bring travel speeds to approximately 25 MPH.
- When retrofitting existing roadways, maintaining drainage along the curb may present challenges in meeting ADA ramp requirements.

Applications

Generally used on relatively low volume, low speed roads where sufficient gaps in the motorized traffic exist. This crosswalk design should be used in areas where traffic speeds typically exceed posted speeds. May only be used as a part of a traffic calming program.

Example

Fig. 5.7V. Mid-block Crosswalk with Crossing island Guidelines



Description

A mid-block crosswalk for a two-lane or three-lane road at an unsignalized location with or without parking. The treatments shown should be used in conjunction with advance warning signs (not shown).

Key Elements:

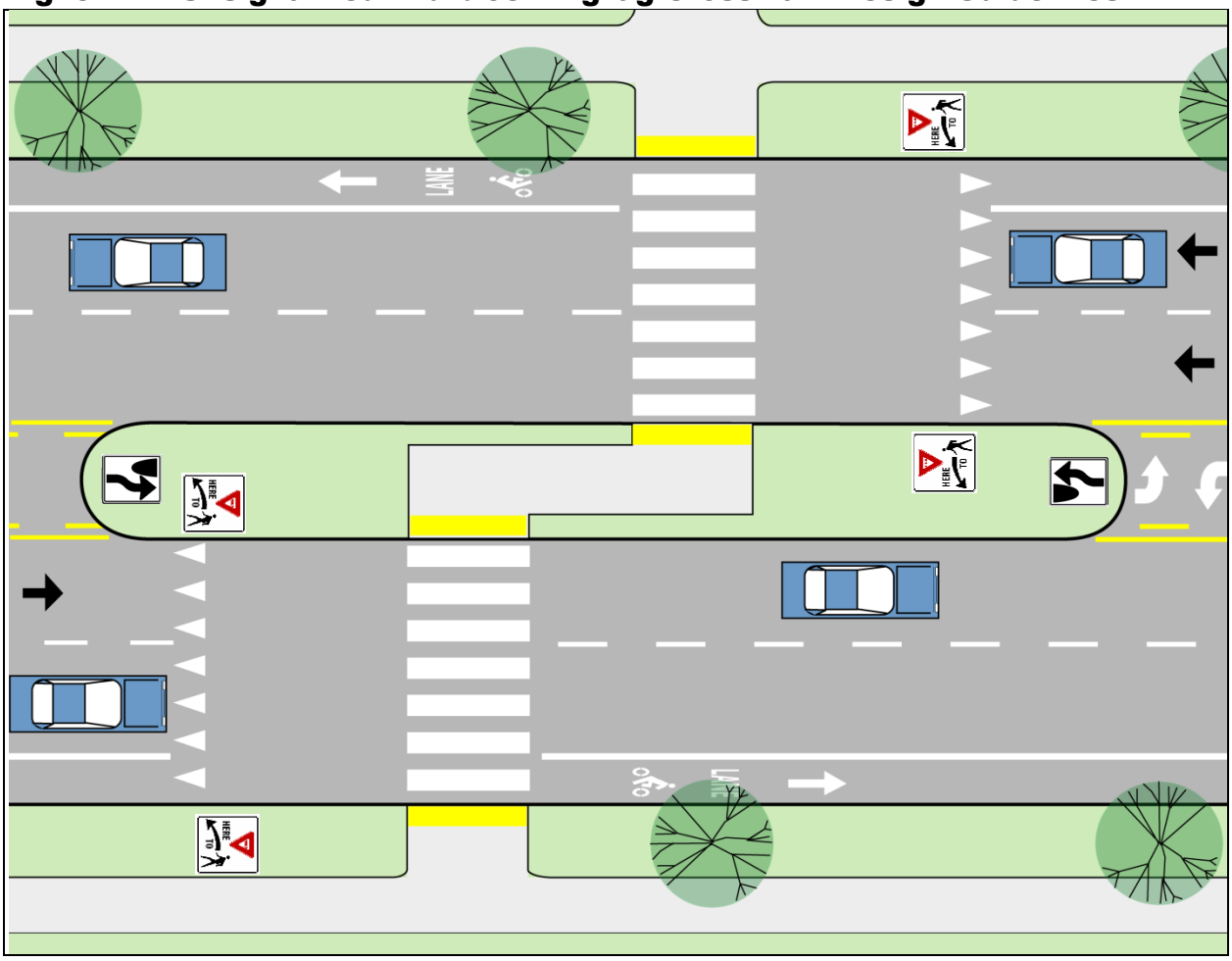
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Parking.
- A crossing island is provided to break the crossing into two separate legs. The island has a minimum width of 6' with 11' or wider preferred.
- Planting on crossing islands should be kept low so as not to obstruct visibility.

Applications

Generally used on a higher volume and higher speed road where suitable gaps to cross both directions of traffic in one movement are infrequent.

Example

Fig. 5.7W. Unsignalized Mid-block Zigzag Crosswalk Design Guidelines



Description

A mid-block crosswalk for a four or more lane road at an unsignalized location without parking.

Key Elements:

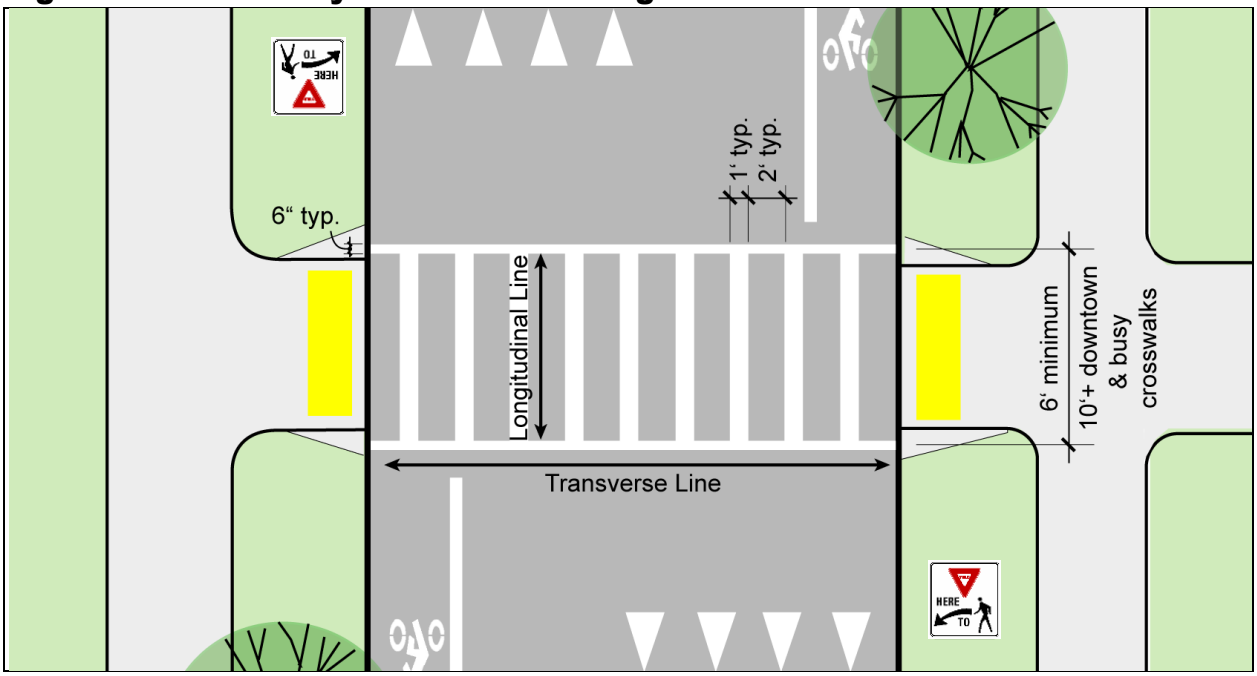
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Crossing island.
- The crosswalks are staggered to direct the pedestrian view towards oncoming traffic.
- Yield markings are set further back to improve pedestrian visibility from both lanes and minimize multiple-threat crashes.
- Median signs are placed higher than typical so as not to impede sightlines.

Application

Generally used on high volume / high-speed multi-lane roads.

Example

Fig. 5.7X. Ladder Style Crosswalk Design Guidelines



Description

A combination of Transverse and Longitudinal style crosswalks to improve visibility for motorists and usability for pedestrians with sight impairments.

Key Elements:

- All crosswalk markings are highly skid-resistant and strongly contrast pavement.
- Longitudinal lines are no more than 1’ wide to minimize areas of thermoplastic markings.
- The clear spacing between the longitudinal lines is no more than 2’ to improve the visibility of the crosswalk to motorists.
- Transverse lines are used to aid pedestrians with sight impairments in finding the edge of the crosswalks (this can be difficult with longitudinal lines alone, especially when spaced far apart).
- The width of the crosswalk is set such that it can easily accommodate all pedestrians crossing the road.

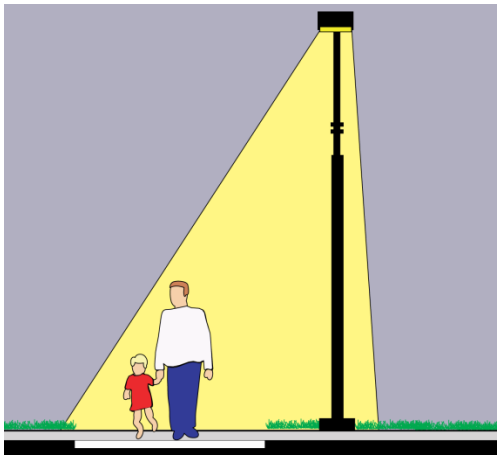
Application

For all marked mid-block crosswalks across Arterial and Collector streets and signalized crosswalks downtown. Also, on local streets where there is a high potential for conflict between motorists and pedestrians such as crosswalks that serve schools. Locations where pedestrian crossing is sporadic require high visibility as the motorist’s expectation for the presence of pedestrians is low.

Example

Lighting of Crosswalks

Lighting is a key element for a pedestrian's safety and comfort. It is most important to provide lighting where a pedestrian crosses a roadway to make the pedestrian visible to motorists. All marked crosswalks, including intersections and midblock crossings, should be well lit with overhead lighting. The lighting should be such that it illuminates the side of the pedestrian facing traffic. Lighting along sidewalks and roadside pathways increases the comfort level for pedestrians at night and in the early morning, especially for school age children. However, the cost of lighting an entire pathway could be prohibitive; therefore lighting should be administered where there are safety issues first and foremost.



Marking of Crossing Islands

Crossing islands can present an obstruction in the roadway for motorists. The presence of this obstacle is key to the visibility of the crosswalk even more so than the signage or pavement markings and flush crossing islands have not been shown to have the same safety benefits as raised crossing islands. When the crosswalk is located in a left-turn lane it is located outside of the typically traveled roadway and is a minimum obstruction. When the road flairs around a crossing island it is more of an obstruction for a motorist. To draw attention to the obstruction, typical pavement markings as called for in MUTCD should be utilized. In addition, reflective material may be added to the sign posts, and reflective flexible bollards may be placed on the ends of the islands to increase the island's visibility at night and during inclement weather.

Roundabouts

In many situations, roundabouts have several advantages over typical intersection design: vehicles move at slower speeds, traffic flows more smoothly, and reduced pavement enhances aesthetics and offers the opportunity for landscaping in the central and splitter islands. There are however, serious drawbacks to roundabouts for those with vision impairments, and two-lane roundabouts are problematic for bicycles in particular. Roundabouts, especially larger ones, can present significant out-of-direction travel for pedestrians. Depending on the nature of the surrounding land uses and the design of the roundabouts, pedestrians may attempt to walk directly across the center of the roundabout.

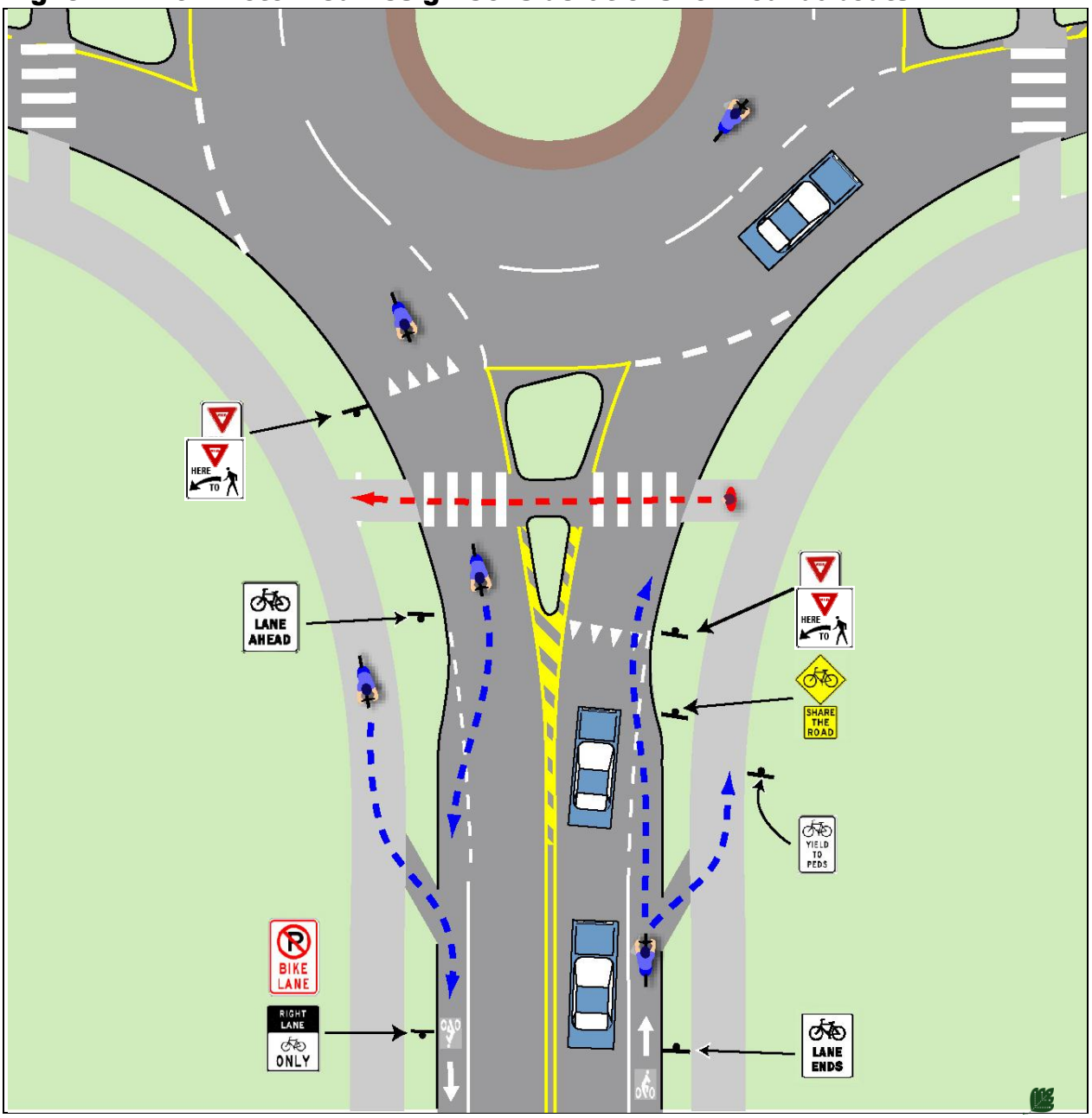
Because there are no traffic control signals to provide a pedestrian "walk" signal, pedestrians wait for an appropriate gap in traffic and cross. The splitter or diversion islands provide a crossing island for the pedestrian, breaking the road crossing into two stages so that they are only dealing with one direction of traffic at a time. This system works quite well for pedestrians without vision difficulties. Studies have shown a reduction in pedestrian crashes for single lane roundabouts and about the same number for multiple lane roundabouts as compared to a traditional signalized intersection. Pedestrians with vision impairments often find roundabouts very intimidating as the audible queues are sometimes insufficient to judge a suitable gap in traffic. Research is currently underway to determine the most appropriate way to accommodate blind and vision impaired pedestrians in roundabouts.

Multi-lane roundabouts are especially problematic for bicyclists. Studies have shown that while single lane roundabouts have about the same number of bicycle crashes when compared to traditional signalized intersections, multi-lane roundabouts have significantly more. AASHTO warns that the overbuidiling of roundabouts should be avoided. Design guidelines recommend allowing bicyclists who are traveling in the roadway approaching the roundabout to exit the roadway prior to the roundabout and navigate the roundabout as a pedestrian would. More confident bicyclists may remain in the roadway and merge with the motor vehicles. Bike lanes should not be placed within the roundabout itself because a bicyclist close to the edge of the roadway is not the usual position where an entering motorist expects to look for circulating traffic.

Design Guidelines:

- Roundabout approaches should include bicycle entrance and exit ramps to give bicyclists the option of biking on a sidewalk bikeway as well as the roadway.
- Roundabouts should include pedestrian crossing islands on all entering roadways.
- The use of roundabouts should be accompanied by an education campaign regarding the issues with blind pedestrians and a motorist responsibly when they see a pedestrian using a white cane.
- The bicycle and pedestrian safety issues should be carefully evaluated for any multiple lane roundabouts.
- The latest research on accommodating blind and vision impaired pedestrians in roundabouts should be consulted before designing and constructing a roundabout.
- Bicycle and pedestrian pavement markings and signs should be regularly evaluated for every roundabout.

Fig. 5.7Y. Non-motorized Design Considerations for Roundabouts



5.8 Neighborhood Connectors

The local roadways that serve residential and mixed use areas are critical to the success of the community's non-motorized system. Local roads that serve neighborhoods are typically attractive non-motorized links due to the lower vehicle volumes and speeds.

Bicycle Travel in Neighborhoods

Bicycles typically do not need any special accommodations on local residential streets as they can comfortably share the road with the limited motor vehicle traffic. Some local residential streets, by themselves or in combination with off-road paths, provide excellent and attractive alternatives to the primary road system. In some cases, it may be desirable to sign bicycle routes that provide access to destinations such as schools and parks where the route may not be obvious to a cyclist unfamiliar with the area. See Section 5.9 Bike Route Signs and Wayfinding for more information.

Public vs. Private Roads

It is just as important to provide safe and comfortable pedestrian facilities on private streets as on public streets. Regardless of ownership, neighborhood roads should include concrete sidewalks a minimum of 5' wide and compliant with ADA standards, on both sides of the street with a landscaped buffer between the sidewalk and the road.

An issue with private roads is the perception that they may not be open for use by the general public. For this reason public roads should always be the preference for new developments. In crafting development agreements that incorporate private roads it should be clear that the roads are open to all pedestrians and bicyclists and that there should be no signage or physical structures that imply that non-motorized access is limited to the residents of that neighborhood.

Both public and private neighborhood streets should be designed to incorporate the same pedestrian safety enhancing measures as those previously noted for primary public roadways. These include reduced curb radii, narrower street widths, curb extensions, and traffic calming measures such as speed tables.

Connectivity Between Neighborhoods and to the Primary Road System

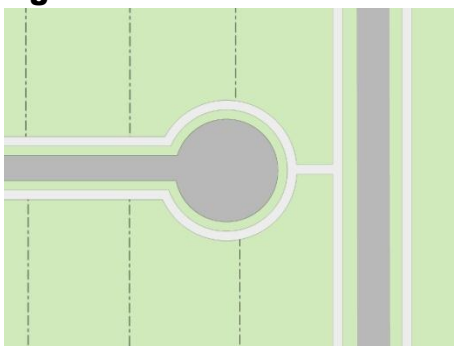
If a new development has limited road access to surrounding arterial streets, special access points for pedestrians and bikes should be incorporated between property lines or along utility rights-of-way. Non-motorized connectivity between adjacent residential, commercial and institutional developments should be provided. The community can regulate the form and shape of new neighborhoods to support and promote pedestrian and bike mobility by modifying master plans and development standards. Careful site design encourages walking by making non-motorized travel more direct than motorized transportation modes.

Neighborhood Roadways Design

Public and private street standards should clearly require sidewalks on both sides of the street, subject to City review. Neighborhood streets should have the following amenities to encourage pedestrian and bicycle access in neighborhoods:

- Design the road to slow vehicular speeds.
- Small block sizes.
- Interconnected streets.
- Sidewalks on both sides of the streets.
- Landscaped buffer between the street and the sidewalk with street trees that will provide shade.
- Connections to adjoining neighborhoods.
- Direct walkway connections between residential areas and commercial and institutional areas when not afforded by the street system

Fig. 5.8A. Cul-de-sac connector



Grid patterned streets with sidewalks and small block sizes are preferred for pedestrian use. They allow pedestrians to have multiple options in route choices and follow the most direct route possible. It is desirable for street networks and pedestrian facilities to correspond wherever possible. However, even if grid streets are not desired or feasible, pedestrian and bike links should still be provided even where the road does not connect. If cul-de-sacs and dead end streets are used, pedestrian and bike cut-throughs meeting AASHTO guidelines should be created to link to adjacent streets (Figure 5.8A).

Neighborhood Connector Routes

Neighborhood connector routes can be as simple as implementing signage or they can provide the opportunity to change the complete character of the street. Generally, neighborhood connector routes begin as guided routes and as their popularity grows and opportunities arise they can be developed to incorporate additional amenities, such as traffic calming measures, rain gardens and public art. Figure 5.8B illustrates the different types of elements that can be developed into a neighborhood connector route.

Fig. 5.8B. Neighborhood Connectors Overview

GUIDED ROUTES:

At each decision point signs, about the size of a typical street sign, indicate the route direction, destination and distance

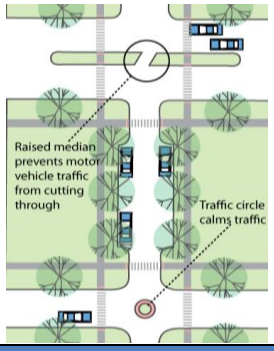
- Located primarily on low speed, low traffic volume local roads and connecting pathways
- Signs provide wayfinding by noting direction and distance to key destination such as schools, parks and the downtown
- Identify routes that may not be obvious to someone who is unfamiliar to the area
- Along the route signs are used periodically to reassure users they are still along the route

NAMED ROUTES:

- Incorporates the elements of the Guided Routes
- Provides trail system branding and specific route identification
- Are helpful in providing consistency where a long-distance route is comprised of a number of different facility types
- Generally used on routes that provide key connections between major destinations – something worthy of a name or number

BICYCLE AND PEDESTRIAN BOULEVARDS:

- Generally Incorporates the elements in Guided Routes, and Named Routes
- Route is optimized for bicycle travel while discouraging through motor vehicle traffic via tools such as motor vehicle diverter islands that are permeable to bicycles and pedestrians
- Motor vehicle speeds reduced through calming measures
- Stop signs and yield sign are oriented to provide



NEIGHBORHOOD GREENWAYS:

- Incorporates elements of the Guided Bike Routes, Named Bike Routes, and Bicycle Boulevards
- Designed for pedestrian and bicycle use
- Contains elements that reflect the character of the surrounding community such as natural areas, local art, community gardens and historic features.
- Has sustainable design elements such as rain gardens and permeable pavement

5.9 Bike Route Signs and Wayfinding

Bike Route Signs

In order to navigate the inland bike routes, route guide signs should be incorporated. They help to note changes in direction in the route and identify major destinations.

On-Road Bike Routes

Bike Route Guide Signs are used along designated bike routes to inform bicyclists of bike route direction changes and to confirm route direction, distance and destiantion. When used, these signs should be repeated at regular intervals so that bicyclists entering from side streets will have an opportunitiy to know that they are on a bicycle route.

Bicycle Destination Signs (MUTCD D1-1c) are about the size of a street sign and indicate the direction to bicycle destinations along with the distance.

Alternative Bike Route Guide Signs (MUTCD D11-1c) are used to provide information on the destination and reassure bicyclists that they are on the correct route.

Named Bike Route

In addition to Bike Route Guide Signs, the bike route that follows the M-25 Heritage Route along the shoreline is significant enough to warrant a name desingnation. In this case, the Bike Route Identification Sign (MUTCD M1-8a) should be used.

Bike Route Identification Signs establish a unique identifcation for a bike route. These signs are typically used with auxilary plaques that indicate the direction of travel and any changes in direction of the route. A custom logo and route name can be applied to these signs.

MUTCD M1-8a

5.10 Off-Road Trails

There are many types of Off-road Trails, each with unique issues. One type of Off-road Trail is the independent pathway that is separate from the road system. Independent pathways include rail-to-trail corridors, paths through parks and other trail systems. Independent pathways can be important and beneficial links to the non-motorized transportation system provided they have direct connections to the existing network of bike lanes and sidewalks. If designed and maintained properly, they can be the "jewels" of a community's non-motorized transportation system.

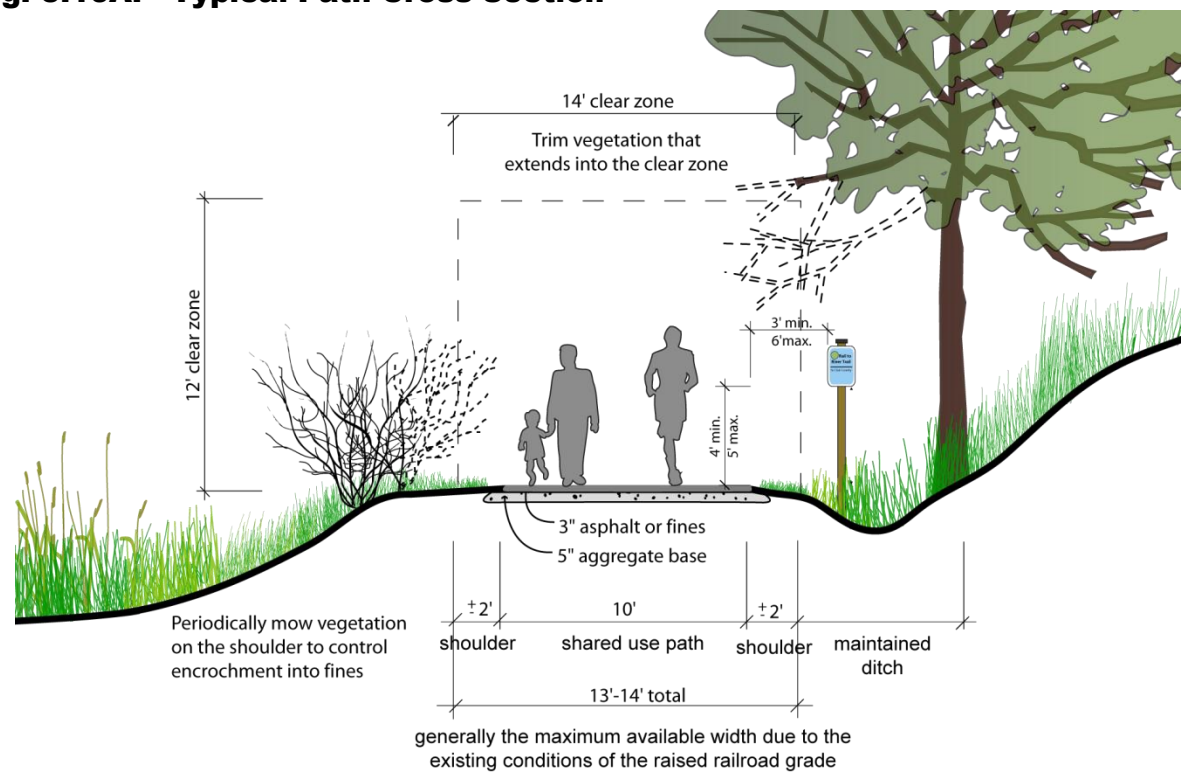
Independent pathways should be designed to accommodate shared uses including cyclists, walkers, strollers, in-line skaters, and people in wheelchairs. For the safety of all users, the pathway should be built wide enough to accommodate these shared uses. AASHTO guidelines indicate that a 10' wide path is the minimum width for a Shared-Use path. The preferred minimum width is 12' in most cases in urban areas with 14' to 16' being common widths.

Studies done by the Rails-to-Trails Conservancy have shown that off-road pathways in general are quite safe from a personal safety standpoint. But in urban areas it is important that pathways follow the principles of Crime Prevention Through Environmental Design (CPTED).

Trail Cross Section Design Guidelines

Figure 5.11A below illustrates several key points about the design and maintenance of Shared-Use paths. Whether the surface of the path is asphalt, fines or other material, it should have a solid base and positive drainage as the path may have maintenance vehicles on it at all times of the year. The vegetation along the trail should be regularly trimmed and mowed to maintain a clear zone around the trail.

Fig. 5.10A. Typical Path Cross Section



Independent Pathway / Road Intersection Design Guidelines

Independent pathways often intersect roadways at unsignalized mid-block crossings. Many of the design guidelines for a typical mid-block crosswalk apply but because of the unique nature of independent pathways, several additional safety points must be considered. The following plan illustrates the key points needed for a safe design of the intersection of an independent pathway with a roadway:

- Clear signage that identifies user rights-of-way and notifies both the users of the pathway and the motorists that an intersection is approaching.
- Pavement markings at the beginning of the trail intersection notify users of direction of travel and rights-of-way. Pavement markings further along the trail should be minimized to avoid visual clutter.
- The pathway should meet the roadway at as close to a 90-degree angle as possible for maximum visibility of users.
- Supplemental trail signage is often set back outside the road right-of-way.
- Regardless of the surfacing material of the trail, asphalt or concrete should be used for the portion of the trail that intersects the road. The hard surface increases traction for bicycle users and cuts down on debris from the shoulder of the road accumulating in the pathway. The change in materials can also help to notify users of the upcoming intersection. At rural intersections, gravel shoulders should also be paved adjacent to the trail to minimize debris in the stopping zone.

Fig. 5.10B. Typical Pathway/Roadway Intersection

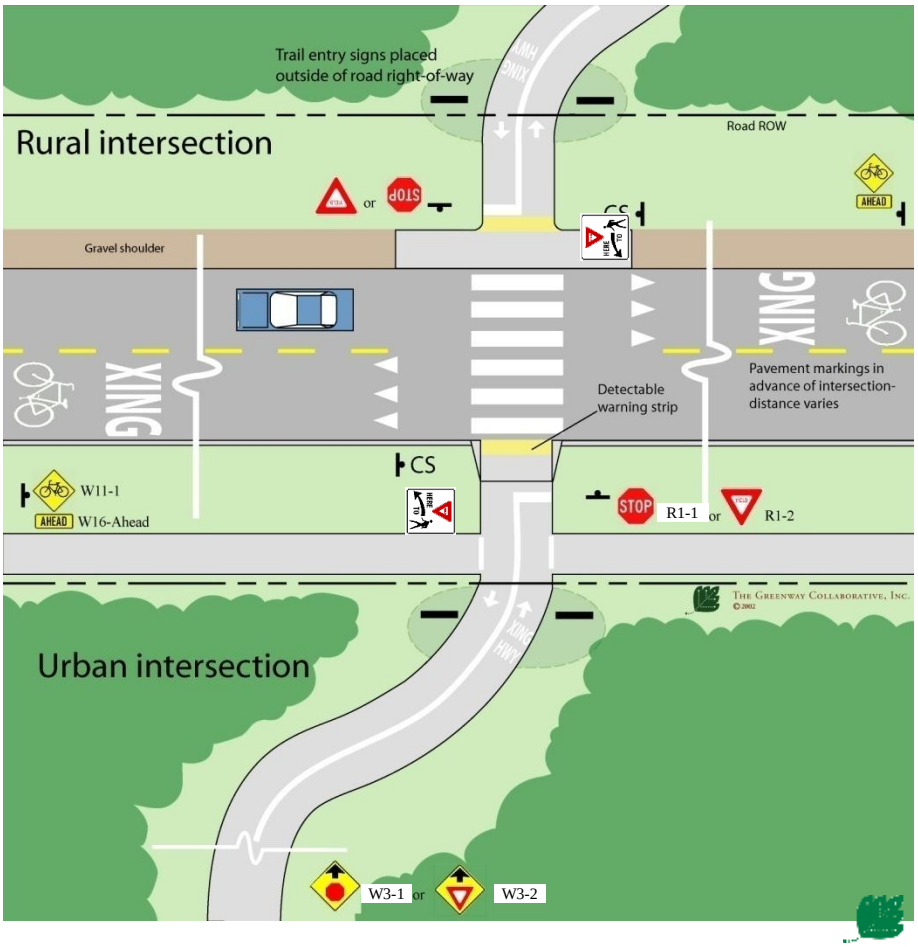


Fig. 5.10C. Trail Signs at Road Intersections

Trail View

Key Recommendations:

- Two sign posts form a gateway to the trail at road intersections.
- On the right above a Stop or Yield sign, a standard street name sign is used to identify the cross street.
- All parts of the signs should be set back 3’ from the trail.
- On the left side, an optional plaque identifies the local agency in charge of the trail, trail rules, and emergency and maintenance contact numbers.

Road View

Key Recommendations:

- On the right side, a No-Motor-Vehicle Sign and a Bicycle Yield-to-Pedestrian Sign should be posted to address the key rules of the trail.
- On the left side, a Bike Route Destination sign listing the direction and distance to the next major destination may be placed.
- On the left side, the Bike Route Identification Sign with a custom logo, direction of travel and route name may be used to identify the route.
- A detectable warning strip should be placed across the entire trail.
- Pavement markings should be used for the first 100’ to 150’ of trail.

5.11 Commercial Centers

Many new commercial, office, institutional and mixed use developments being built today are designed for easy access by motor vehicles and do not take into adequate consideration the patrons arriving by other means of travel. Aspects of site design can discourage non-motorized traffic when designed solely for automobile use. New developments today often have poorly placed bike-parking facilities, large setbacks with parking lots that lack direct access for pedestrians or bicyclists and face large arterial roadways with little or no direct access to neighborhoods and residential areas that may be surrounding them. These problems can be remedied by improving site design and enhancing connections to the external transportation system.

Most commercial developments are oriented to motor vehicles, resulting in an often oppressive environment for pedestrians and bicyclists.

Connections to the External System

The site must have convenient and safe access to pedestrian, bicycle and transit facilities outside the development. Frequently, large new developments are located on the edge of town along major arterials with limited non-motorized facilities. New developments should always connect to an existing non-motorized transportation network. Commercial developments should include specific plans for connecting to existing facilities and neighborhoods in surrounding areas.

Motor vehicle access to commercial development should be constructed as a conventional driveway with small turning radii and a ramp up to the sidewalk level, rather than a typical public intersection where the roadbed continues at the same level and there are curbs on either side. Use of driveway entrances rather than typical intersections enhance pedestrian safety and comfort because motorists must drive slowly when entering and exiting the development. When a typical intersection-style entrance is used, the sidewalk should continue across the entrance, preferably at sidewalk height, so the right-of-way is clearly established and motorists understand they are entering a pedestrian area. Supplemental signage and crosswalk pavement markings should be used to indicate a crosswalk and the pedestrian right-of-way.

Plantings should be pulled back away from the entrance crossings to allow maximum visibility for both pedestrians crossing the entrance and the cars entering the commercial development. The radius of the intersection curb should be kept as small as possible, and the width of the driveway should be the minimum needed. Just as roads are updated to accommodate vehicular access at new developments with turning lanes or signals, so should non-motorized facilities be updated with new crosswalks, signage and pedestrian signals.

New roadway designs often favor access control for businesses along the road. In this scenario, several businesses share access through one driveway instead of each business having its own entrance and exit onto the main street. In addition to the advantages for vehicles, this is an advantage for the lateral movement of pedestrians along the street because they do not have to cross as many driveways. However, more direct pedestrian access points from the sidewalk to the individual building entrances should be incorporated. The spacing of crosswalks along the primary road to developments across the road should also be considered.

The design and placement of the buildings should allow direct and clear access from surrounding neighborhoods and residential areas. Too often, what could be a short walk to a nearby store from a

residential street becomes dangerous and un-navigable because the store does not have public access on the side facing the residential streets. Both pedestrian and bicycle access should be unimpeded from these areas. During site plan evaluation, development access and travel distances from surrounding residential areas should be a prime consideration.

Encouraging Mixed Use

While tying commercial developments to surrounding residential areas is a good practice, a better practice is to eliminate the segregation of commercial and housing areas. Incorporating higher density housing into commercial developments can dramatically alter the character of commercial development making the project more similar in feel to a small downtown rather than a strip development. Mixed land uses can significantly increase the number of non-motorized trips.

Site Design Checklist

A site design checklist or similar tool should be provided to developers and used by the community in their review of site plans to make sure that bicycle and pedestrian issues are being adequately addressed. The following checklist was adapted with minor modifications from *The Canadian Guide to Promoting Sustainable Transportation through Site Design* by the Canadian Institute of Traffic Engineers. It is a part of a larger publication that looks at site design issues more fully.

Land Use & Urban Form Checklist:

- ❑ Densities are sufficient to support transit (3 to 7 households an acre / 4 to 7 jobs an acre)
- ❑ Highest density land uses are located close to activity nodes such as transit corridors and intersections.
- ❑ Proposed use provides or adds to a diversity of land uses in the surrounding area and does not result in large tracts of similar uses.
- ❑ Proposed use is compatible with adjacent land uses and with long term land use plans for the area.
- ❑ Adjacent street network provides for connectivity of transit, cycling and pedestrian routes.
- ❑ Mixed uses help support non-motorized transportation.

Safety & Security Checklist:

- ❑ Overall site design attempts to minimize conflict points between vehicles, pedestrians and cyclists.
- ❑ Sight distances have been considered in overall site design and in the placement of entry signs and landscaping.
- ❑ Consideration has been given to personal security for pedestrians, cyclists and transit users.
- ❑ Buildings are located close to the street, but provide adequate clearance for pedestrian activities along street frontage.
- ❑ Where appropriate, retail, restaurants and other pedestrian oriented uses animate the street frontage.

Building Entrances Checklist:

- ❑ Building entrances are located close to the street, with direct pedestrian access.
- ❑ Potential conflict points between users arriving by different modes are minimized.

Internal Transportation Network Checklist:

- ❑ Roads and paths match up with surrounding networks and ensure direct connections through the site for cyclists and pedestrians.
- ❑ Block lengths are limited and mid-block crosswalks are provided where appropriate.
- ❑ Traffic-calming principles are applied, where appropriate (proper site design should avoid the need to apply extensive traffic calming).
- ❑ Appropriate measures have been taken to ensure easy progress of transit through the site.

Desired Pedestrian & Cyclist Routes Checklist:

- ❑ Safe, continuous and clearly defined routes for pedestrians and cyclists are provided along desire lines including links to surrounding residential areas.
- ❑ Weather protection and amenities such as trees are provided.
- ❑ Intersections are designated to facilitate pedestrian and cyclist crossings.

Transit Stops Checklist:

- ❑ Walking distances to stops do not exceed 1300 feet, and pathways to stops are safe and direct.
- ❑ Waiting areas are well lit and attractive.

Site Grading Checklist:

- ❑ Terrain along pathways is kept reasonably level, and ramps are also provided wherever stairs are necessary.
- ❑ Slopes along pathways are designed to avoid the ponding of slush and water.

Motor Vehicle Parking Configuration & Treatment Checklist:

- ❑ Off-street parking is located away from the street, preferably behind buildings or underground.
- ❑ Vehicle access is separate from pedestrian access, and access and egress controls are designed so vehicles do not block pedestrian ways.
- ❑ Parking lots are kept small and designed to prevent speeding.
- ❑ Pedestrians have protected walkways through the lots.

Motor Vehicle Parking Supply & Management Checklist:

- ❑ Off-street parking should be provided, where necessary, at the sides and rear of buildings.

Bicycle Parking Checklist:

- ❑ Bicycle parking is located near entrance for short term users in a high visibility location.
- ❑ Weather protected bicycle parking for longer term users is provided in a secure area. Storage possibilities for gear are considered.
- ❑ Showers, changing rooms and lockers are provided within employment centers.

Passenger Pick-up & Drop-off Areas Checklist:

- ❑ Passenger pick-up and drop-off areas are located to the side or rear of buildings, downstream from the entrance, but no more than 100 feet away from it.

Loading Areas Checklist:

- ❑ Loading areas are located off the street, and are screened from public view.
- ❑ Loading area access is designed so that pedestrian, cyclist, and transit routes are never severed.

Internal Road Design Checklist:

- ❑ Appropriate traffic signals and compact geometry of intersections control speeds and allow for safe passage of cyclists. Roads are designed to cross at right angles. Sight lines are respected.
- ❑ Lanes are designed to accommodate motor vehicles and cyclists, and remind users of the other networks on the site.
- ❑ Facilities for cyclists and sustainable modes are provided and continued across the site.

Pedestrian Facilities Checklist:

- ❑ Sidewalks are provided along all roads, and follow pedestrian desire lines where possible.
- ❑ Properly signed crossings are provided wherever a path or sidewalk crosses a road.
- ❑ Pathways are clearly defined, delineated, and are of a sufficient unobstructed width. Appropriate amenities such as lighting and weather protection are provided and safety along path is addressed.

Transit Facilities Checklist:

- ❑ Stops are located close to the main entrances of activity generators. Crosswalks are provided at all stops.
- ❑ Stops and waiting areas are properly illuminated, visible from a distance, and have warranted amenities such as shelters and benches.
- ❑ Spacing between stops is minimized.
- ❑ Shelters and rest areas are provided at transit stops and locations where there is a high number of users, the elderly or the disabled.
- ❑ Shelters and rest areas are identifiable, accessible, placed appropriately, and are comfortable.

Wayfinding Checklist:

- ❑ Appropriate signage and physical features are provided for users of all networks to determine their location, identify their destination, and progress towards it.

Street Furniture & Amenities Checklist:

- ❑ Amenities are provided to create a comfortable and appealing environment, pre-empting litter and responding to user needs.

Landscaping Checklist:

- ❑ Landscaping does not compromise user security and safety.

6. Projected Energy Savings

The desire to expand non-motorized transportation choices is generally driven by two factors. First, is the goal to accommodate non-motorized transportation given the numerous economic, social and public health benefits. The second goal is to reduce the number of Vehicle Miles Traveled (VMT) and the corresponding reduction in Green House Gas (GHG) emissions. This could include shifting trips from single occupancy motor vehicles to bicycling, walking or transit. Regardless of the goal, the question is what change in transportation choices will occur if the environment for walking or bicycling is improved?

Answering this question precisely is hampered by limited data, sparse research on the subject, and the nuances that go into any transportation choice. What is likely, though, is that the number of people who walk and bicycle will increase when the environment for bicycling and walking is improved. It should be noted though that these increases in walking and bicycling do not necessarily have a reciprocal increase in bicycle and pedestrian crashes. Rather, with improved facilities and increases in the number of bicyclists and pedestrians, the crash rates typically decrease as motorists become accustomed to the presence of non-motorized traffic.

One of the least understood aspects of transportation planning is the notion of self-selection. It has been demonstrated that individuals who move to an area with a better non-motorized environment will indeed walk and bicycle more[19]. What is unknown is how much of that increase is the result of the environment alone vs. how much is the result of an individual's choice to live in a place because its environment supports bicycling and walking.

Many of the shoreline communities in the Thumb region also have significant amount of traffic generated by tourism and seasonal residents. One of the goals of this project is to replace as many automobile trips with walking and bicycle trips as possible once these visitors arrive at their destination. Determining just how many visitors there are is a challenge. The number of seasonal households is the only reliable statistic at our disposal and that was used as a proxy to account for the seasonal trips.

[19] Krizek, Kevin J., Residential Relocation and Changes in Urban Travel: Does Neighborhood-Scale Urban Form Matter? *Journal of the American Planning Association*. Spring, Vol. 69, No. 3, p.265-281.

Existing Commuter Mode-split

To understand the potential to increase the number of people walking and bicycling, it is helpful to look at how the communities' current bicycling and walking trends compared to other similar sized communities in Michigan. Then we may be able to gauge approximately how many more people may be enticed to walk and bicycle.

The mode-split is the overall proportion of trips made by a particular mode of travel. This information is generally determined by local surveys, 2000 census data or the American Community Survey. For smaller communities, gathering data can be challenging as the American Community Survey generally cannot be reliably applied to small communities.

The data shows that Port Hope, Port Austin, Port Sanilac and Harbor Beach all have a significant percentage of people walking to work and compare well to their peer communities. Only two communities had higher than average bike to work trips, Port Austin and Harbor Beach. Port Austin is the only community with a bicycle rental and Harbor Beach has constructed a major bike path. Caseville, Unionville and Lexington have below average percent of people walking to work.

Table 6A Commute to Work Comparison

Rank			Place	Pop.	% of Commuters Who: Bike	Walk	Use Transit	Don't Drive	Percent Households W/O Car
Michigan Communities 100 to 500:									
2	of	92	Port Hope	284	0.0	13.6	6.8	20.4	8.8
				Avg.	*0.2*	*4.3*	*0.8*	*5.2*	*5.8*
				Max.	*2.3*	*21.6*	*14.5*	*21.6*	*20.9*
				Min.	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Michigan Communities 500 to 1,000:									
9	of	93	Port Austin	707	0.7	9.5	0.0	10.2	9.7
10	of	93	Port Sanilac	658	0.0	7.8	2.2	10.0	7.8
56	of	93	Caseville	866	0.0	2.9	1.3	4.2	5.1
81	of	93	Unionville	619	0.0	2.1	0.0	2.1	3.4
				*Avg.**	*0.3*	*4.9*	*0.3*	*5.5*	*6.6*
				*Max.**	*3.6*	*28.2*	*4.1*	*30.5*	*31.1*
				Min.	*0.0*	*0.0*	*0.0*	*0.0*	*0.4*
			* Mackinaw Island Data Not Included for Averages and Maximums						
Michigan Communities 1,000 to 2,000:									
2	of	127	Harbor Beach	1,840	0.4	15.8	1.0	17.3	15.6
44	of	127	Sebewaing	1,969	0.0	5.7	0.0	5.7	9.7
67	of	127	Lexington	1,105	0.0	4.3	0.0	4.3	7.9
				Avg.	*0.3*	*5.2*	*0.4*	*6.0*	*8.4*
				Max.	*3.3*	*20.8*	*2.8*	*21.1*	*27.4*
				Min.	*0.0*	*0.5*	*0.0*	*2.5*	*2.3*

From the US 2000 Census commute to work data as compiled in the online Carfree Census Database found at Bikesatwork.com, compiled by Bikes At Work, Inc., Ames, IA.

Probable Mode Shift Due to Environmental Change

California Department of Transportation (Caltrans) Air Resources Board has developed guidelines to determine the emission reduction benefits associated with auto trips replaced by bicycle trips. Their research concluded that the key aspect in projecting the percent of trips that may done by bicycle is the ratio of bicycle lane miles to arterial/freeway miles. They concluded that if the ratio is less than 0.35 then a 0.65% bicycle mode share should be projected. If the ratio is greater than 0.35 a 2% mode share should be used (or 6.8% for university towns).

While it may seem easy to dismiss these numbers because they are from California, a state with a much milder climate that Michigan, climate is not the factor most people think it is. In fact, the 2000 census commute data show that many of the cities with the highest percentage of bicycle commuters are from northern climates: Boulder, Colorado - 7.4%, Aspen, Colorado - 6.6%, Missoula, Montana -5.9% and Madison, Wisconsin, 3.29%. These percentages are also ten years old. The 2009 National Household Travel Survey found that bicycling and walking has increased by 25% from 2001.

These numbers are also difficult to apply to the Thumb region as there are not any freeways in the region. But if we apply the concept that a 2% bicycle mode share is reasonable for a community that has a relatively well established system of bicycle facilities and look at the mode share of peer cities some reasonable targets can be established.

For bicycles, a 2% increase in mode share would be below the maximum of the peer cities by about 1 percentage point for every community except Port Hope. Small communities like Port Hope generally do not have large commute to work by bike numbers as they are such compact places where one can get to most destinations easily by walking. But even a 2% mode share for bicycling in Port Hope would be below the maximum of its peer communities.

For walking, a 3% increase in mode share would be well below the maximum of the peer cities. The proposed improvements address one of the major issues with these communities and that is convenient and safe crossings of the state trunkline roadways. Given the compact nature of the communities a 3% increase should be a reasonable target. A 3% overall increase in the pedestrian and a 2% overall increase in the bicycle mode share will be used for the targets.

Reduction Vehicle Miles Traveled

Not all trip types are the same. People tend to devote more time to a trip to work than a trip to a grocery store. A 30 minute commute may be typical, but people generally would not spend more than 10 minutes traveling to a grocery store. And the average trip distance varies dramatically based on the mode. For example, a 30 minute commute to work may be 20 miles by car, 4 miles by bike or little less than 2 miles by foot.

Some trips are more likely to be undertaken via walking and bicycling than others. Many work commute trips do not require carrying substantial amounts of materials or supplies. But a trip to the grocery store to acquire a week or two worth of groceries is unlikely to be done by bike or foot. But, if a grocery store is located between home and work, a person's shopping patterns may change. They may find they make more frequent trips to the grocery store carrying only a few days worth of food home each time which is easily accomplished via foot or bike. This is very common travel and shopping pattern in some communities.

Small towns present unique challenges and opportunities to increasing non-motorized trips. To the work commute, many of the jobs may be in neighboring communities making the trip too long to accomplish

by foot or bike. But the compact nature of the communities means that many of the other trips may be easily accomplished by foot. As the home to work trip only comprises 16% of all trips made, there are many options to substitute motorized trip with non-motorized trips.

To estimate the trip and related greenhouse gas reduction, an estimate of the percent of trip types that may be done by walking or bicycling has been made. Also, for each trip type reduced, an estimate of the miles for that trip type has been completed.

The end result is that with a substantially complete system, the shoreline communities in the Thumb region could expect to daily replace 3,854 miles of automobile trips with bicycle or pedestrian trips each day. This would require on average for each person in the shoreline communities to replace about a1/2 of a mile trip that currently done by automobile with a trip by bicycle or walking. The trip could be of any sort – a trip to work, the store, to visit with friends, for recreation or to school.

This would result in 9.5 fewer barrels of oil being used and nearly 2 tons less of CO2 being released into the environment each day – that translates into nearly 4,000 barrels of oil and over 700 tons of CO2 per year. The active transportation choices will also improve resident's health in many other ways.

Table 6B Estimated Population with Seasonal Adjustments

Population Estimates	2010 Census Total Pop.	Seasonal Households	Average Household Size	Seasonal Population Estimate	Seasonal Adjustment Factor*	Seasonally Adjusted Population
Lexington	1,178	459	1.95	895	0.30	269
Port Sanilac	623	102	2.09	213	0.25	53
Harbor Beach	1,703	91	2.14	195	0.25	49
Port Hope	267	51	2.01	103	0.20	21
Port Austin	664	299	1.91	571	0.40	228
Caseville	777	371	1.84	683	0.40	273
Sebewaing	1,759	8	2.19	18	0.20	4
Unionville	508	-	2.33	-	-	-
Total	7,479	1,381		2,677		896
Seasonally Adjusted Total	8,375					

* Seasonal adjustment factor is both an attempt to recognize that seasonal residents are only there for part of the year as well as account for visitors who are staying at hotels, Bed and Breakfasts, Campgrounds, Boats, etc. or there on day trips.

Table 6C Estimated Trip and Greenhouse Gas Reduction

Vehicle Miles Traveled (VMT)							
Daily Trips per Person	4.03	2010 National Household Travel Survey					
Daily Total Number of Trips	33,751	Seasonally Adjusted Pop. Total * Daily Trips per Person					
Average Vehicle Trip Length	10.1	2010 National Household Travel Survey					
Daily Total Vehicle Miles Traveled	75,538	Miles					
Reduction in Vehicle Miles Traveled By Walking Trips:							
	Daily Total		**Percent**	**Reduction**	**Trip**	**Trip**	**VMT**
Trip by Type	**of Trips**		**of Total**	**Goal**	**Reduction**	**Length**	**Reduction**
To or From Work	5,299		16%	2%	106	1	106
Work Related Business	1,013		3%	0%	-	0.25	-
Shopping	6,649		20%	2%	133	0.25	33
All Other Family & Personal Business	8,134		24%	2%	163	0.5	81
School/Church	3,308		10%	2%	66	0.5	33
Social and Recreational	8,978		27%	6%	539	2	1,077
Other	270		1%	0%	-	1	-
	33,650		100%	3.0%	1,006		**1,331**
Reduction in Vehicle Miles Traveled By Bicycle Trips:							
	Daily Total		**Percent**	**Reduction**	**Trip**	**Trip**	**VMT**
Trip by Type	**of Trips**		**of Total**	**Goal**	**Reduction**	**Length**	**Reduction**
To or From Work	5,299		16%	1%	53	2	106
Work Related Business	1,013		3%	0%	-	0.5	-
Shopping	6,649		20%	1%	66	1	66
All Other Family & Personal Business	8,134		24%	2%	163	1	163
School/Church	3,308		10%	1%	33	1	33
Social and Recreational	8,978		27%	4%	359	6	2,155
Other	270		1%	0%	-	2	-
	33,650		100%	2.0%	674		**2,523**
Reduction in Vehicle Miles Traveled	3,854	Miles Per Day					
	5.1%	Total Reduction in VMT					
	0.52	Miles Per Person/Per Day					
	1,406,667	Total Reduction in VMT Per Year					
Projected CO2 Reductions							
CO2 Emission Factor	454	Grams Per Mile					
Daily CO2 Reduction	1,749,663	Grams (based on 454 grams per mile)					
Daily CO2 Reduction	1.93	Tons					
Yearly CO2 Reduction	704	Tons					
Projected Fuel Savings							
Daily motor gasoline savings	190	Gallons of Gasoline (based on avg. of 20.3 mi. / gal.)					
Daily Oil Savings	9.5	Barrels of Oil (based on20 gallons of gas per barrel)					
Yearly Oil Savings	3,465	Barrels of Oil					

7. Appendix

Add Into Text.

Topics:

7.1– Complete Street Policy

7.2– ADA and Transition Plans

7.3 – Cost Estimates

7.4 – Potential Funding Sources

7.5– Glossary of Terms

7. 1 Complete Streets Policy

Complete Streets Background

States, regions, counties and cities around the country have used various complete street policies to unambiguously endorse and define their support for non-motorized transportation. Complete streets are planned, designed, operated and maintained such that all users may safely, comfortably and conveniently move along and across streets throughout a community. The complete streets concept recognizes that streets serve multiple purposes and that a community's roadways must be designed such that they balance the needs of all of the transportation users. Complete streets are key to creating healthy, active communities and establishing safe routes to school. There has been a concerted move towards complete streets in the United States since the 1990's.

Recently, the US Department of Transportation issued a Policy Statement on Complete Streets. It indicated that it is the DOT's policy to incorporate safe and convenient walking and bicycling facilities into transportation projects. It also noted that it is every transportation agency's responsibility to improve conditions and opportunities for walking and bicycling and integrate improvements for such into the transportation system. It also encourages transportation agencies to go beyond the minimum standards. Part of the DOT recommended actions include:

- Providing accommodations on new, rehabilitated and limited-access bridges
- Collecting data, setting targets and tracking progress
- Maintaining sidewalks and pathways the same way roads are maintained
- Improving facilities as part of maintenance projects

In short the policy states that walking and bicycling should be considered equals with other transportation modes.

In the fall of 2010, The State of Michigan adopted Complete Streets legislation. The complete streets legislation was in the form of two bills. The first bill revised Act 51, addressing transportation issues. The second bill revised Act 33 that addresses planning issues.

Act 51 Revision Highlights:

- Requires interjurisdictional consultation on non-motorized projects and 5-year plans
- Use of established best practices
- Directs MDOT to draft and adopt a complete streets policy as well as develop model polices for local agencies
- Directs MDOT to advise local agencies on non-motorized issues
- Enables interjurisdictional agreements for maintenance

Act 33 Revision Highlights:

- Expands the definition of "streets" to include all legal users
- Expands elements that may be included in a master plan to include all forms of transportation
- Specifies that transportation improvements be appropriate to their context
- Specifies cooperation with road

National Complete Streets Coalition Model

Since the FHWA model was developed, The National Complete Streets Coalition has taken the idea further and identified ten elements of a comprehensive Complete Streets policy:

1. A vision for how and why the community wants to complete its streets. Specifies that all users including pedestrians, bicyclists and transit passengers of all ages and abilities, as well as trucks, buses and automobiles.
2. Specifies that 'all users' includes pedestrians, bicyclists and transit passengers of all ages and abilities; as well as trucks, buses and automobiles.
3. Encourages street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
4. Is adoptable by all agencies to cover all roads.
5. Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
6. Makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions.
7. Directs the use of the latest and best design standards while recognizing the need for flexibility in balancing user needs.
8. Directs that complete streets solutions will complement the context of the community.
9. Establishes performance standards with measurable outcomes.
10. Includes specific next steps for implementation of the policy.

Numerous local communities, such as Lansing, East Lansing and Novi have already adopted complete streets resolutions or ordinances.

7. 2 ADA and Transition Plans

Title II of the Americans with Disabilities Act of 1990 (ADA) requires local governments to make their activities, programs and services accessible to persons with disabilities. In the area of non-motorized transportation, the City is required to use accessible design standards for newly constructed and reconstructed sidewalks and shared use paths to the maximum extent feasible and make altered facilities readily accessible. In addition, the City is required to bring non-compliant curb ramps into compliance throughout the City as part of a transition plan.

Four recent publications address accessibility of non-motorized facilities. They are:

1. *Designing Sidewalks and Trails for Access Part 2 – Best Practices Design Guide* (FHWA, Publication # FHWA-EP-01-027)
2. *Building a True Community – Final Report of the Public Rights-of-Way Access Advisory Committee*, November, 2005 (Public Rights-of-Way Access Advisory Committee)
3. *Draft Guidelines for Accessible Rights-of-Way*, November 23, 2005 (FHWA, Pub. # FHWA-SA-03-019, based in part on the preceding publication)
4. *Accessible Public Rights-of-Way, Planning and Designing for Alternations*, July 2007 (Public Rights-of-Way Access Advisory Committee)

Together these documents define current best practices for accommodating pedestrians with disabilities for sidewalks and shared-use paths, intersections, crosswalks, and signalization. Until public rights-of-way standards are adopted by the Department of Justice and the U.S. Department of Transportation, the DOT has identified the 2005 draft PROWAG as the current best practice in accessible pedestrian design.

Transition Plan

Title II requires that public entities with 50 or more employees create and regularly update an ADA Transition Plan and make this plan available to the public. The transition plan should at a minimum identify physical barriers and provide a detailed outline to remove those barriers. An ADA coordinator must be designated to coordinate compliance efforts. The following outlines the key elements of a transition plan.

Identification of Physical Barriers

The identification of physical barriers may take place on a number of levels:

- **Complaint-Based** – At the most basic level, there should be a process in place for citizens to register a complaint and for that complaint to receive appropriate evaluation and action.
- **Inventory Based** – More commonly, existing facilities receive a base line documentation that may be accomplished with simple tools such as a smart level, digital camera and a standard recording form. For example, the inventory of sidewalk curb ramps would identify issues such as the presence of a ramp, ramp slope and cross slope and the presence, type and condition of a detectable warning strip. The goal of this inventory is to identify the geographic location, type and severity of barriers. Often this survey would be done using a Global Positioning System and the data stored in a Geographic Information System. This inventory would be completed over time with the most heavily traveled areas completed first and then covering other, less traveled areas in a systematic approach.
- **Survey Based** – In a few cases where there is a high degree of controversy regarding a specific area or facility type, trained surveyors will take detailed field measurements and elevations of the

facilities and translate them into survey drawings. This is by far the most expensive identification approach but may be appropriate if construction to remedy the solution is considered likely to occur in the near future.

Outline of Methods to Remove Barriers
A systematic approach for removing barriers should be established.

- **New and Altered Facilities Policy** – There should be in place a policy for how accessibility is achieved for new construction and alterations. This should include addressing how areas adjacent to new construction or alternation projects may be incorporated into a project. For example, when a new construction or alternation project is undertaken, the inventory of physical barriers for the immediate surrounding areas should be consulted to see if limited targeted improvements in adjacent areas would make a much larger area accessible. If so, those changes should be incorporated into the project.
- **Prioritization of Routes** – As it will be many years before new construction and alterations will provide accessible routes along all public right-of-ways, a process should be established to identify which routes should be upgraded independent of new or altered facilities. This would be based on the inventory of the physical barriers, citizen complaints and relative demand. This way, key routes such as those in the downtown, near schools and public buildings may be targeted improvements independently of new construction or alternation projects.

Schedule for Implementation
After the routes are prioritized, general costs of removing the barriers should be determined. Then using those costs, the removal of barriers should be integrated into the city's capital improvement plan.

7. 3 Cost Estimates

In order to illustrate magnitude of costs and begin planning and budgeting for implementation, planning level cost estimates have been completed for a few of the proposed Regional Improvements as well as the near- and mid-term improvements within each community. In addition, cost estimates for a handful of "typical" treatments have been developed so that staff and officials can consider these treatments in other areas of the region if so desired.

It should be noted that these estimates are based on concepts only, and while many include healthy contingencies, they are not based on detailed designs. Quantities were derived from GIS data and aerial imagery. "Typical" costs for improvements were applied across the board, when in reality, each situation will have different variables that could impact the eventual design and construction costs. If the region or individual municipalities move forward with implementation, detailed design will need to be completed and construction cost estimates recalculated at that time.

Non-Motorized Elements

Curb Extension (per corner)	$	13,000.00	ea	
Crossing Island	$	10,000.00	ea	Bollards, landscaping, concrete curbs, pavement removal, striping (no signals/lights)
Edge Striping (white)	$	0.10	lf	4"
Shared Use Arrows (Overlay Cold Plastic)	$	225.00	ea	place every 200' - 250'
Bike Route Signing (urban)	$	1,200.00	mi	6 signs in 3 locations
Bike Route Signing (rural)	$	400.00	mi	2 signs in 1 location
Concrete Sidewalk	$	3.00	sf	
Asphalt Path (10' wide, $45/lf)	$	310,000.00	mi	8 ADA ramps, restoration and contingency
ADA Ramps	$	600.00	ea	
Paved Shoulders (4', signs, markings)	$	160,000.00	mi	
Bike Locker	$	1,800.00	ea	
Restripe Road and Add Bike Lanes	$	6,000.00	mi	Assuming 4 to 3 lane conversions, stripe removal and bike signage
Repair Brick Pavers	$	12.00	sft	removal of pavers and base, new base and reset existing pavers

Curb Extension (Typical Existing 15' radius curb - Proposed 20' radius)

Removals/Demo	1	ls	$	2,200	$ 2,200	
Drainage Structures (Adjust)	1	ls	$	2,200	$ 2,200	This item is highly variable depending on drainage issues
Concrete (Curb, Gutter, Sidewalk)	1	ls	$	5,700	$ 5,700	
ADA Ramps	2	ea	$	600	$ 1,200	
Detectable Warning Strip	20	sft	$	35	$ 700	
Restoration	1	ls	$	1,000	$ 1,000	
		TOTAL			$ 13,000	

Non-Motorized Elements

	Quantity	Unit	Unit Price	Cost Estimate
Inland Bike Route Signage (2/mile)	455.1	mi	$ 400	$ 182,040

	Quantity	Unit	Unit Price	Cost Estimate
Active Transportation Hub - Downtown				
Pad/Plaza (12' x 15') concrete (4")	180	sf	$ 5	$ 900
Compressed Air	1	ea	$ 3,000	$ 3,000
Bench	1	ea	$ 1,000	$ 1,000
Hub Kiosk	1	ea	$ 14,000	$ 14,000
Bike Rack	4	ea	$ 200	$ 800
Ped Level Light Fixture	1	ea	$ 3,500	$ 3,500
Landscaping	1	ls	$ 1,500	$ 1,500
Trash/ Recycle Receptacle	1	ea	$ 1,000	$ 1,000
	Sub-Total			$ 25,700
	Contingency (15%)			$ 3,855
			TOTAL	$ 29,555
Active Transportation Hub - Marina				
Pad/Plaza (12' x 15') concrete	180	sf	$ 5	$ 900
Compressed Air	1	ea	$ 3,000	$ 3,000
Bench	1	ea	$ 1,000	$ 1,000
Hub Kiosk	1	ea	$ 14,000	$ 14,000
Canoe/Kayak Rack (6-8 boats)	1	ea	$ 1,500	$ 1,500
Equipment Locker	6	ea	$ 350	$ 2,100
Ped Level Light Fixture	1	ea	$ 3,500	$ 3,500
Landscaping	1	ls	$ 1,500	$ 1,500
Trash/ Recycle Receptacle	1	ea	$ 1,000	$ 1,000
	Sub-Total			$ 28,500
	Contingency (15%)			$ 4,275
			TOTAL	$ 32,775
Active Transportation Hub Kiosk (7' tall; 3.5' wide)			4 sided, glass and steel	
Kiosk Frame/Structure	1	ls	$ 14,000	$ 14,000
Bike Weathervane				
Limestone Base Vineer				
Vinyl Graphics				
Back Lighting				
	TOTAL			$ 14,000
Orientation Kiosk (2-sided; no backlighting)				
Kiosk Frame/Structure	1	ls	$ 8,500	$ 8,500
Limestone Base Vineer				$ -
Vinyl Graphics				$ -
	TOTAL			$ 8,500
Information Sign (24"x 24" custom metal signs on 2 4x4 wood posts)				$ 200
Gateway Transition				
Street Trees	6	ea	$ 450	$ 2,700
Pavement Markings	1	ls	$ 400	$ 400
Community Sign	2	ea	$ 1,800	$ 3,600
Landscaping	1	ls	$ 800	$ 800
	Sub-Total			$ 7,500
	Contingency (15%)			$ 1,125
			TOTAL	$ 8,625

7. 4 Potential Funding Sources

There are several potential funding sources to investigate as projects move toward implementation. Some projects have a higher likelihood of receiving outside funding assistance than others. Potential funding sources from outside entities change and evolve on a regular basis. Understanding available funding programs, their requirements and deadlines requires continuous monitoring. A few of the more common funding sources have been detailed here as a reference and resource. These are in addition to traditional funding methods such as the general fund, millages, bonds, Community Development Block Grants, etc.

MDOT Transportation Enhancement Program
Transportation Enhancement (TE) activities are federally funded, community-based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of the transportation infrastructure. To be eligible, a project must fall into one of the 12 TE activities and relate to surface transportation. Activities that relate to the implementation of this Master Plan include:

- Provision of facilities for pedestrians and bicycles. Includes bike lane striping, wide paved shoulders, bike parking, bus racks, off-road trails, bike and pedestrian bridges and underpasses.
- Paved shoulders four or more feet wide
- Bike lanes
- Pedestrian crosswalks
- Shared use paths 10 feet wide or greater
- Path/trail user amenities
- Grade separations
- Bicycle parking facilities
- Bicycle accommodations on public transportation
- Provision of safety and educational activities for pedestrians and bicyclists
- Programs designed to encourage walking and bicycling by providing potential users with education and safety instruction through classes, pamphlets and signage
- Preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian and bicycle trails).
- Acquiring railroad rights-of-way; planning, designing and constructing multi-use trails; developing rail-with-trail projects; purchasing unused railroad property for reuse.

A minimum 20% local match is required (although more match is preferred) for proposed projects and applications are accepted on an on-going basis.

Michigan Natural Resources Trust Fund
The MNRTF provides funding for both the purchase of land (or interests in land) for recreation or protection of land because of its environmental importance or scenic beauty and the appropriate development of land for public outdoor recreation use. Goals of the program are to: 1) protect Michigan's natural resources and provide for their access, public use and enjoyment; 2) provide public access to Michigan's water bodies, particularly the Great Lakes, and facilitate their recreation use; 3) meet regional, county and community needs for outdoor recreation opportunities; 4) improve the opportunities for

outdoor recreation in Michigan's urban areas; and, 5) stimulate Michigan's economy through recreation-related tourism and community revitalization.

All proposals for grants must include a local match of at least 25% of the total project cost. There is no minimum or maximum for acquisition projects. For development projects, the minimum funding request is $15,000 and the maximum is $300,000. Applications are due in April.

DALMAC Fund
Established in 1975 to promote bicycling in Michigan, the DALMAC Fund is administered by the Tri-County Bicycle Association and supported by proceeds from DALMAC. The DALMAC Fund supports safety and education programs, bicycle trail development, state-wide bicycle organizations, and route mapping projects. Applications must be submitted by March 1. They are reviewed by the DALMAC Fund Committee and approved by the Board. Grants are made by May of the year they were submitted. Applications can be found at www.biketcba.org. This is a relatively small grant program with a total of $70,000 in 2010.

KODAK American Greenways Awards
Kodak, The Conservation Fund, and the National Geographic Society, provide small grants to stimulate the planning and design of greenways in communities throughout America. Made possible by a grant from Eastman Kodak, the program also honors groups and individuals whose ingenuity and creativity foster the creation of greenways. The application period typically runs from March 1st through June 1st. Program goals are to: develop new, action-oriented greenways projects; assist grassroots greenway organizations; leverage additional money for conservation and greenway development; and, recognize and encourage greenway proponents and organizations. Maximum grant is $2,500. For more information go to www.conservationfund.org.

Safe Routes to School
The Safe Routes to School Program is a national movement to make it safe, convenient and fun for children to bicycle and walk to school. In Michigan, the program is sponsored by the Michigan Fitness Foundation and has gained momentum over the past few years. Examples of projects and programs eligible for funding include sidewalks, traffic calming, crossing improvements, bicycle and pedestrian facilities, public awareness campaigns, traffic education and enforcement, etc. Schools must be registered and develop a Walking Audit in order to be eligible to apply. SR2S funding is 100 percent federal; no match is required. Projects must be constructed within 2 miles of the school. Applications are received and reviewed quarterly. Typical funding is approximately $200,000 per school and does not cover engineering, administration or permits.
www.saferoutesmichigan.org

Bikes Belong
The Bikes Belong Coalition is sponsored by members of the American Bicycle Industry. Their mission is to put more people on bikes more often. The program funds projects in three categories: Facility, Education, and Capacity Building. Requests for funding can be up to $10,000 for projects such as bike paths, trails, lanes, parking, and transit, and safe routes to school. Applications are accepted via email three times per year (April, August and November). More information can be found at www.bikesbelong.org.

7. 5 Glossary of Terms

Within this document there are a number of terms that may be unfamiliar to many people. The following is a brief glossary of some of the transportation terms that are found in this document:

AASHTO – American Association of State Highway & Transportation Officials.

Bicycle Quality/Level of Service (Bike Q/LOS) – a model for evaluating the perceived safety and comfort of bicycling in a roadway based on conditions within the road (not surrounding land uses) expressed as a letter grade with "A" being best and "F" being worst.

Bicycle Boulevard - a low-volume and low-speed street that has been optimized for bicycle travel through treatments such as traffic calming and traffic reduction; signage and pavement markings; and intersection crossing treatments.

Bike Lane – a portion of the roadway designated for bicycle use. Pavement striping and markings sometimes accompanied with signage are used to delineate the lane.

Bike Route –a designation that can be applied to any type of bicycle facility. It is intended as an aid to help bicyclists find their way to a destination where the route is not obvious.

Bulb-outs – see Curb Extensions.

Clear Zones – area free of obstructions around roads, Shared-use Paths, and Walkways.

Clearance Interval – the flashing "Don't Walk" or flashing "Red Hand" phase of pedestrian signals. It indicates to pedestrians that they should not begin to cross the street. A correctly timed clearance interval allows a pedestrian who entered the crosswalk during the "Walk" phase to finish crossing the street at an unhurried pace.

Complete Street- streets that are planned, designed, operated and maintained such that all users may safely, comfortably and conveniently move along and across streets throughout a community.

Crossing Islands – a raised median within a roadway typically set between opposing directions of traffic that permits pedestrians to cross the roadway in two stages. A crossing island may be located at signalized intersections and at unsignalized crosswalks. These are also known as **Refuge Islands.**

Crosswalk – the area of a roadway that connects sidewalks on either side at an intersection of roads (whether marked or not marked) and other locations distinctly indicated for pedestrian crossings by pavement markings.

Curb Extensions – extending the curb further into the intersections in order to minimize pedestrian crossing distance, also known as **Bulb-outs**.

Dispersed Crossing – where pedestrians typically cross the road at numerous points along the roadway, rather than at an officially marked crosswalk.

E-Bike – a bicycle that is propelled by an electric motor and/or peddling.

Fines – finely crushed gravel 3/8" or smaller. The fines may be loosely applied or bound together with a stabilizing agent.

Inside Lane – the travel lane adjacent to the center of the road or the Center Turn Lane.

Ladder Style Crosswalk – a special emphasis crosswalk marking where 1' to 2' wide white pavement markings are placed perpendicular to the direction of a crosswalk to clearly identify the crosswalk.

Lateral Separation – horizontal distance separating one use from another (pedestrians from cars, for example) or motor vehicles from a fixed obstruction such as a tree.

Leading Pedestrian Interval –a traffic signal phasing approach where the pedestrian "Walk" phase precedes the green light going in the same direction by generally 4 to 5 seconds.

Level of Service (LOS) – a measurement of the motor vehicle flow of a roadway expressed by a letter grade with "A" being best or free flowing and "F" being worst or forced flow/heavily congested. Also see Bicycle Level of Service and Pedestrian Level of Service.

Long-term Plan – reflects the vision of the completed non-motorized system. Some improvements may require the reconstruction of existing roadways, the acquisition of new right-of-way, or significant capital investments.

Mid-block Crossings – locations that have been identified based on land uses, bus stop locations and the difficulty of crossing the street as probable candidates for Mid-block Crosswalks. Additional studies will need to be completed for each location to determine the ultimate suitability as a crosswalk location and appropriate solution to address the demand to cross the road.

Mid-block Crosswalk – a crosswalk where motorized vehicles are not controlled by a traffic signal or stop sign. At these locations, pedestrians wait for a gap in traffic to cross the street, motorists are required to yield to a pedestrian who is in the crosswalk (but not if the pedestrian is on the side of the road waiting to cross).

MMUTCD – Michigan Manual of Uniform Traffic Control Devices. This document is based on the National Manual of Uniform Traffic Control Devices (MUTCD). It specifics how signs, pavement markings and traffic signals are to be used. The current version is the 2005 MMUTCD. It was adopted on August 15, 2005 and is based on the 2003 National MUTCD. In 2009 a new National MUTCD was adopted, the state has two years to adopt the national manual. Typically, there are only minor divergences between the two manuals due to specifics in Michigan traffic laws.

Mode-share / Mode split – the percent of trips for a particular mode of transportation relative to all trips. A mode-share / mode split may be for a particular type of trip such as home-to-work.

Mode – distinct types of transportation (cars, bicycles and pedestrians are all different modes of travel).

MVC – Michigan Vehicle Code, a state law addressing the operation of motor vehicles and other modes of transportation.

Near-term Opportunities –improvements that may generally be done with minimal changes to existing roadway infrastructure. They include road re-striping projects, paved shoulders, new sidewalks and crossing islands. In general, existing curbs and drainage structures are not changed.

Neighborhood Greenway – a route that utilizes residential streets and short connecting pathways that link destinations such as parks, schools and **Shared Use Paths**. Neighborhood Greenways may contain the characteristics of a **Bicycle Boulevard** but, in addition, provide accommodations for pedestrians and sustainable design elements such as rain gardens.

Out-of-Direction Travel – travel in an out-of-the-way, undesirable direction.

Outside Lane – the travel lane closest to the side of the road.

Off-road Trail – see Shared Use Path

Pedestrian Desire Lines – preferred pedestrian direction of travel.

Pedestrian Quality/Level of Service (Ped. Q/LOS) – a model for evaluating the perceived safety and comfort of the pedestrian experience based on conditions within the road ROW (not surrounding land uses) expressed as a letter grade with "A" being best and "F" being worst.

Refuge Islands – see Crossing Islands.

Roundabouts – yield-based circular intersections that permit continuous vehicle travel movement.

Shared Roadway –bicycles and vehicles share the roadway without any portion of the road specifically designated for the bicycle use. Shared Roadways may have certain undesignated accommodations for bicyclists such as wide lanes, paved shoulders, and/or low speeds. These routes may also be signed and include pavement markings such as shared-use arrows.

Shared Lane Markings – a pavement marking consisting of a bike symbol with a double chevron above, also known as "sharrows". These pavement markings are used for on-road bicycle facilities where the right-of-way is too narrow for designated bike lanes. The shared lane markings alerts cars to take caution and allow cyclist to safely travel in these lanes when striping is not possible. They are often used in conjunction with signage.

Shared Use Path – a wide pathway that is separate from a roadway by an open unpaved space or barrier or located completely away from a roadway. A Shared Use Path is shared by bicyclists and pedestrians. There are numerous sub-types of Shared Use Paths including Sidewalk Bikeways that have unique characteristics and issues.

Shy Distance – the distance that pedestrians, bicyclists and motorists naturally keep between themselves and a vertical obstruction such as a wall or curb.

Sidepath – see **Roadside Pathway**

Roadside Pathway – a specific type of Shared Use Path that parallels a roadway generally within the road right-of-way. This is also known as a **Sidepath**.

Signalized Crosswalk – a crosswalk where motor vehicle and pedestrian movements are controlled by traffic signals. These are most frequently a part of a signalized roadway intersection but a signal may be installed solely to facilitate pedestrians crossings.

Speed Table – raised area across the road with a flat top to slow traffic.

Splitter Islands – crossing islands leading up to roundabouts that offer a haven for pedestrians and that guide and slow the flow of traffic. They may also be used at intersections in place of a turning lane.

UTC – Uniform Traffic Code, is a set of laws that can be adopted by municipalities to become local law that address the operation of motor vehicles and other modes of transportation. The UTC is a complementary set of laws to the MVC.

Yield Lines – a row of triangle shaped pavement markings placed on a roadway to signal to vehicles the appropriate place to yield right-of-way. This is a new pavement marking that is used in conjunction with the new "Yield to Pedestrians Here" sign in advance of marked crosswalks.