City of Novi
Non-Motorized Master Plan 2011

Prepared by:

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Contents

1. Introduction

Encouraging healthy, active lifestyles through pathway and sidewalk connectivity has been a focus for the City of Novi. The City is a four-time Promoting Active Communities Gold Award winner from the Governor's Council on Physical Fitness, largely due to the over 225 miles of exiting and 90 miles of planned public pedestrian and bicycle facilities.

The City of Novi 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.

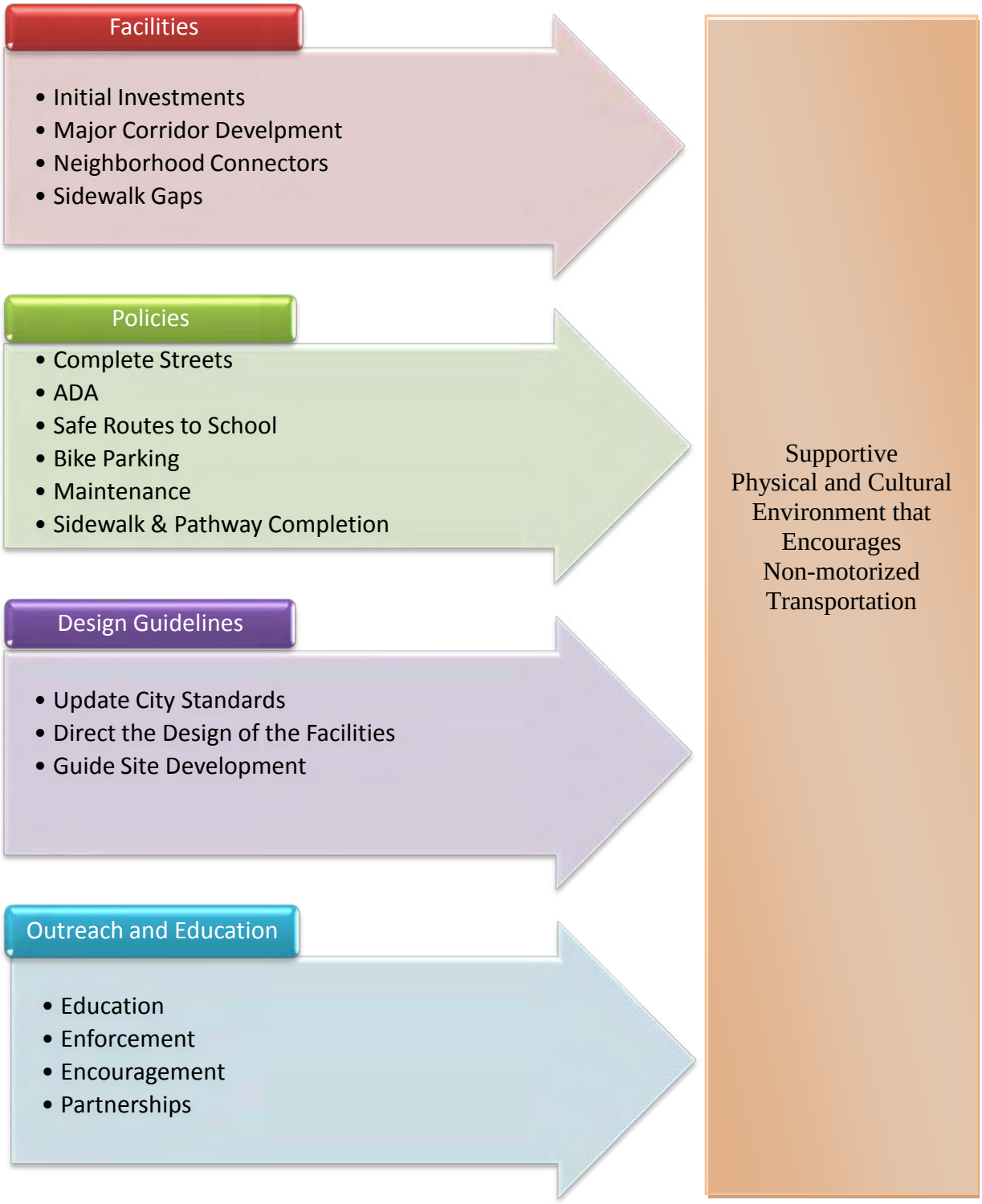
Helping to shape this plan, has been a dedicated group of elected officials, appointed officials, public employees and the general public. The results of an on-line survey and the input gathered at two public workshops guided the proposed non-motorized network as well as setting implementation priorities.

The Non-Motorized Master Plan is comprised of four concurrent implementation tracts that when employed in concert will establish a physical and cultural environment that supports and encourages safe, comfortable and convenient ways for pedestrians and bicyclists to travel throughout the city and into the surrounding 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, and a more energy efficient and sustainable transportation system.

The following chart outlines the four implementation tracts in the plan. Each sub-element may move forward independently as resources allow. As the Non-Motorized Master Plan is in many ways a continuation and expansion of the City's sidewalk and pathway program, a natural first step for implementation is to address the top priorities from that effort. These top priorities are included in the Initial Investments category.

Fig 1a Four Concurrent Implementation Tracts of the Non-Motorized Plan



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 Novi. The benefits of a comprehensive non-motorized transportation system extend beyond the direct benefits to the users of the system 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 and 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.

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

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

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.[3] Forty percent of adults do not participate in any leisure time physical activity;[4] of those who do participate in exercise, 66.1% use their local streets.[5]
- 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.[6]
- 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.[7]
- The nation is experiencing an obesity epidemic; 61% of Michigan's adults are considered overweight, which is the second highest rate in the country.[8] 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.[9]
- In southeast Michigan, people spend on average 18.8% of their income on transportation, second only to shelter at 19.1%.[10]
- The number of children that walk or bike to school has dropped 37% over the last twenty years.[11] 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.[12] Today only about 8% of children walk to school.

[3] Ibid.
[4] 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.
[5] Brownson, Dr. Ross, et.al. "Environmental and policy determinants of physical activity in the United States", American Journal of Public Health, Dec 2001.
[6] Chicago Department of Transportation
[7] Surface transportation Policy Project, "Mean Streets 2000", 2000.
[8] Michigan Governor's Council on Physical Fitness, Health, and Sports.
[9] Ed Pavelka, "Can Commuting Help You Lose Weight?", League of American Bicyclists, Summer 2002.
[10] Surface Transportation Policy Project, "Driven to Spend", 2000.
[11] 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.
[12] 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%.[13]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.

Despite these circumstances, local public demand for improved facilities is significant as made evident by the Community Attitude and Interest Survey conducted in the winter of 200802009. 65% of the households indicated that they have a need for walking and bicycling trails. This was nearly double the need stated for the next highest category.

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 City of Novi. Given the evolving nature of non-motorized transportation planning, these guidelines should be periodically reevaluated to determine their appropriateness.

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 should be done in order to fully investigate the appropriateness of the proposed roadway modifications and/or proposed bicycle or pedestrian facilities.

[13] 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 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. Examples can be found on portions of South Lake Drive, East Lake Drive and Taft Road.

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. An example of a Shared Use Path would be the I-275 Metro Trail.

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.

2. Inventory and Analysis

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 urban 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 City of Novi and Oakland County as a whole are 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.

Topics:

2.1 General Conditions

The City of Novi generally consists of dispersed land uses that for the most part, are scaled towards automobile use. Typical of the region, Novi has a primary road system based on a one mile grid with commercial centers located along the busy roadways frequently crusted at the intersections as well as near freeway interchanges.

Bicycle and pedestrian travel outside of neighborhood streets generally follows the primary road system on sidewalks and roadside pathways, although there are some bike lanes in the north and south of town. Opportunities to cross the primary road system are limited with poor bicycle and pedestrian connectivity between neighborhoods that are located on opposite sides of the roadway.

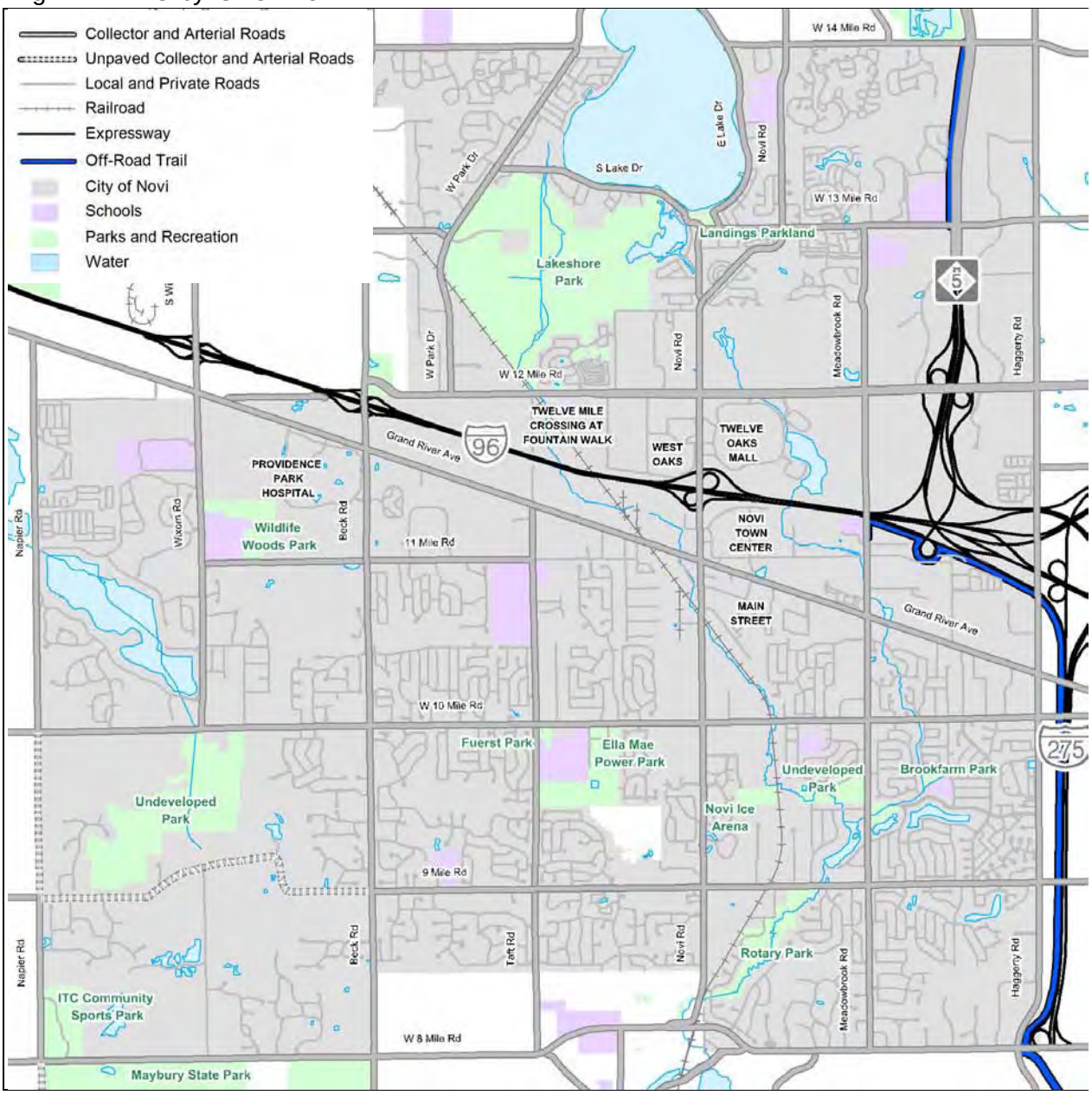
Over the past number of years, the City of Novi has systematically been adding sidewalks and pathways along the primary road system. However, there are still numerous gaps remaining in the system which makes many trips challenging. Trips on unfamiliar routes may often result in a dead end without an obvious alternative. The artificial barriers of the railroad, expressways and the four and five-lane arterials also tend to fragment the City 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 city's primary roads though are only two to three lanes wide. These roads may be more easily converted to a more bicycle and pedestrian corridors.

The following maps provide a general summary of the existing conditions in the City of Novi:

- Fig. 2.1A. City Overview
- Fig. 2.1B. Existing Land Use
- Fig. 2.1C. Future Lane Use
- Fig. 2.1D. Population Density
- Fig. 2.1E. Existing Trails Inventory
- Fig. 2.1F. Regional Trails Inventory
- Fig. 2.1G. Existing Sidewalks and Roadside Pathways
- Fig. 2.1H. Road Jurisdiction
- Fig. 2.1I. Transportation Improvement Projects
- Fig. 2.1J. Average Daily Traffic Volumes
- Fig. 2.2 K. Posted Speed Limit
- Fig. 2.2 L. Existing Road Cross-Sections
- Fig. 2.1M. Block Size

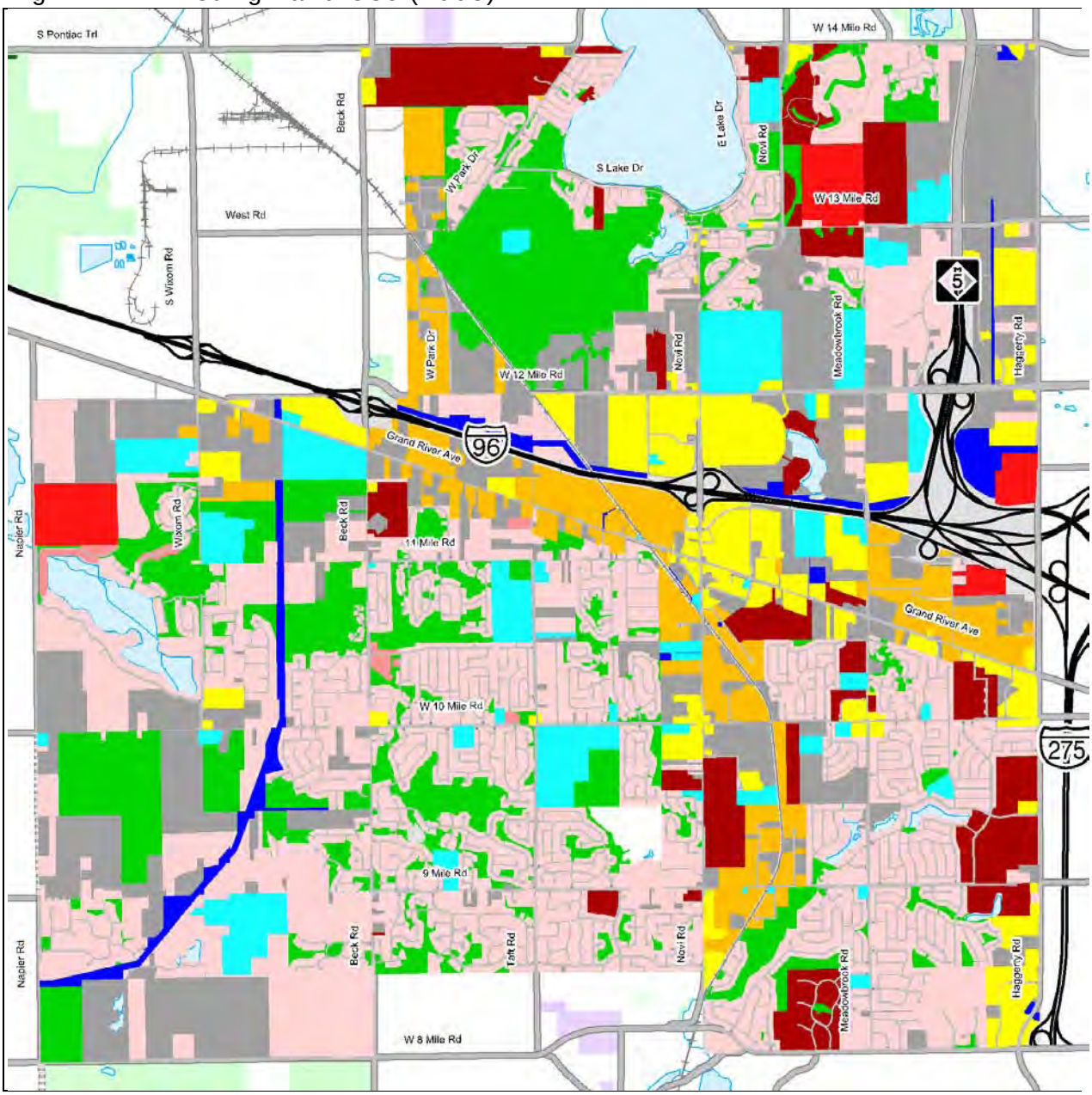
Fig. 2.1A. City Overview



Population: currently estimated to be 52,231 (city special census, 2007)

Size: Over 30 Square Miles

Fig. 2.1B. Existing Land Use (2008)

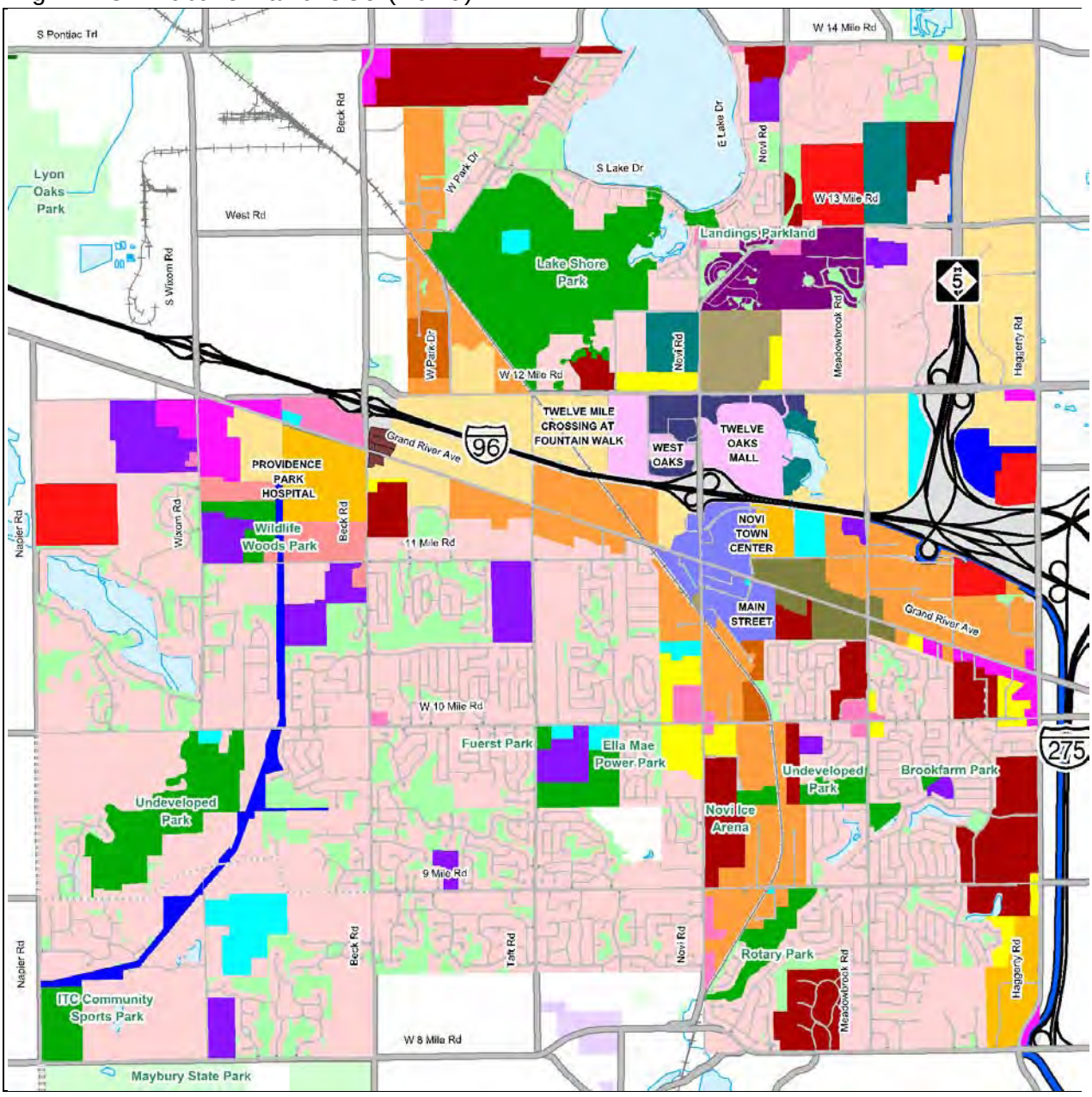


Existing Land Use (2008)

- Single Family (2+ Acres)
- Single Family
- Mobile Home Park
- Multiple Family
- Commercial/Office
- Industrial
- Public/Institutional
- Recreation/Preservation
- Utility
- Vacant

0 1/4 1/2 1
MILES

Fig. 2.1C. Future Land Use (2010)

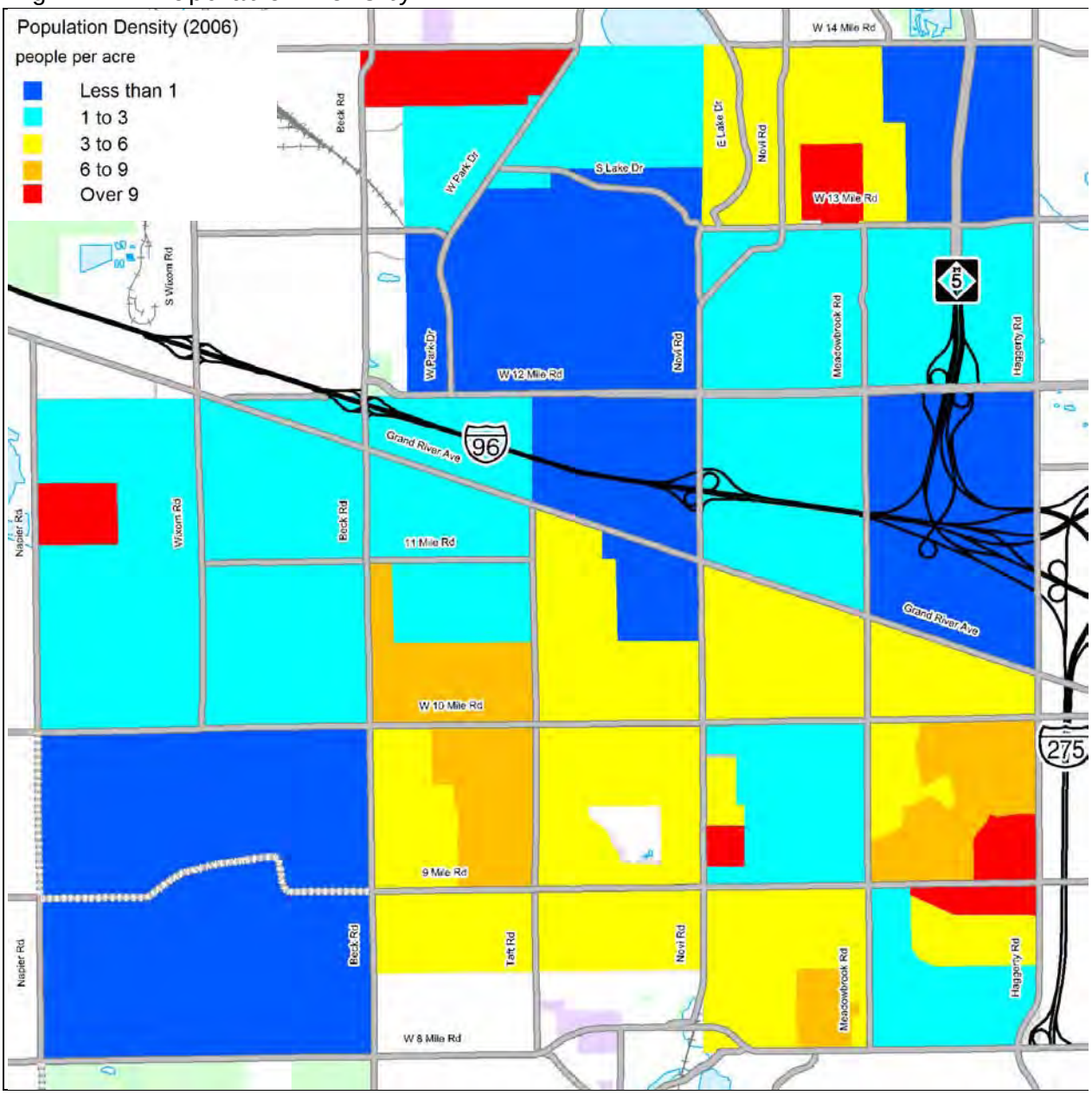


Future Land Use (2010)

- Suburban (Low Rise)
- Single Family
- Mobile Home Park
- Multiple Family
- Local Commercial
- Community Commercial
- Regional Commercial
- Office Commercial
- Community Office
- Office Rd Tech
- Industrial Rd Tech
- Heavy Industrial
- TC Commercial
- TC Gateway
- PD1
- PD2
- PUD
- Educational Facility
- Public
- Private Park
- Public Park
- Cemetery
- Utility

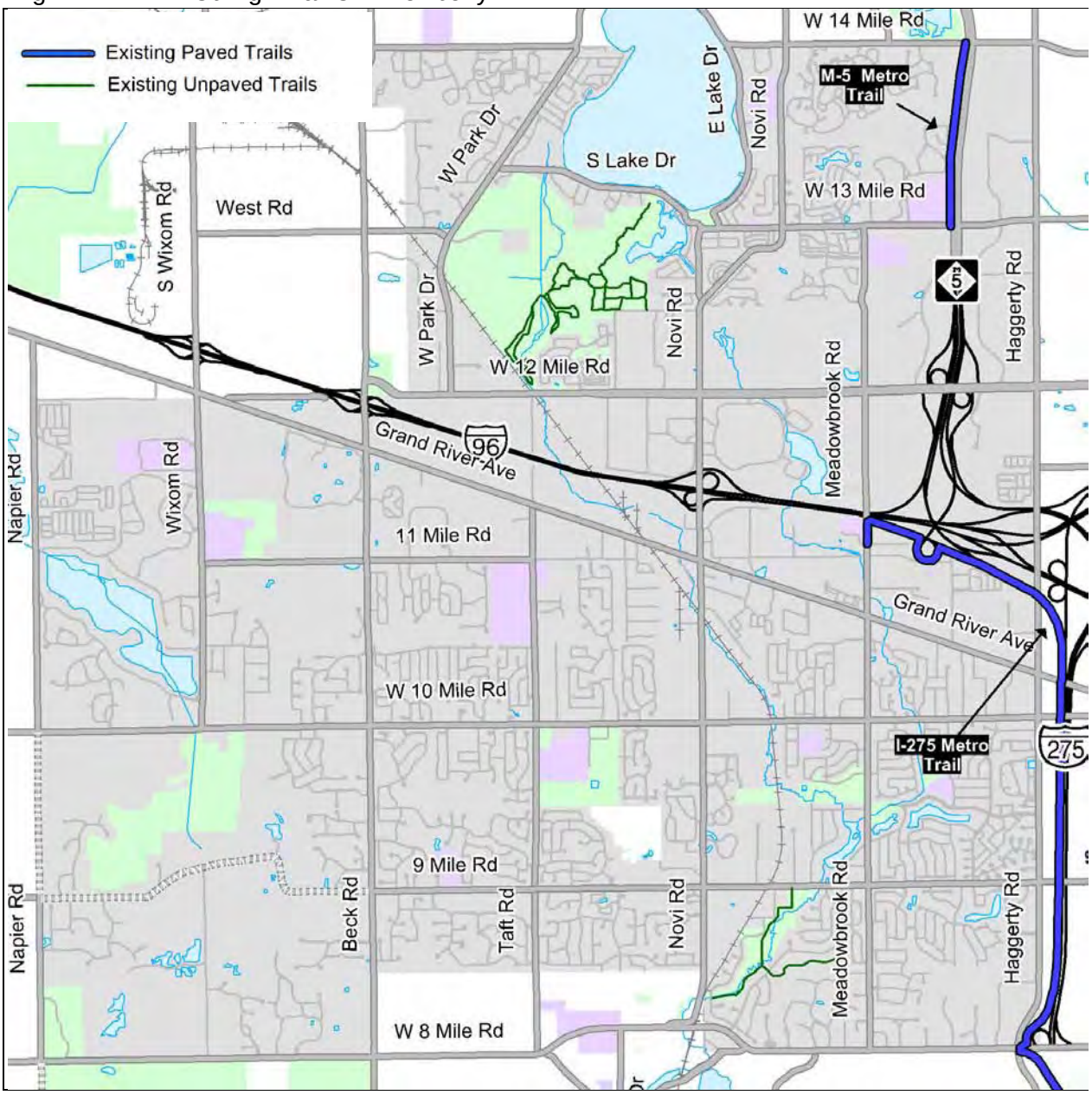
0 1/4 1/2 1
MILES

Fig. 2.1D. Population Density



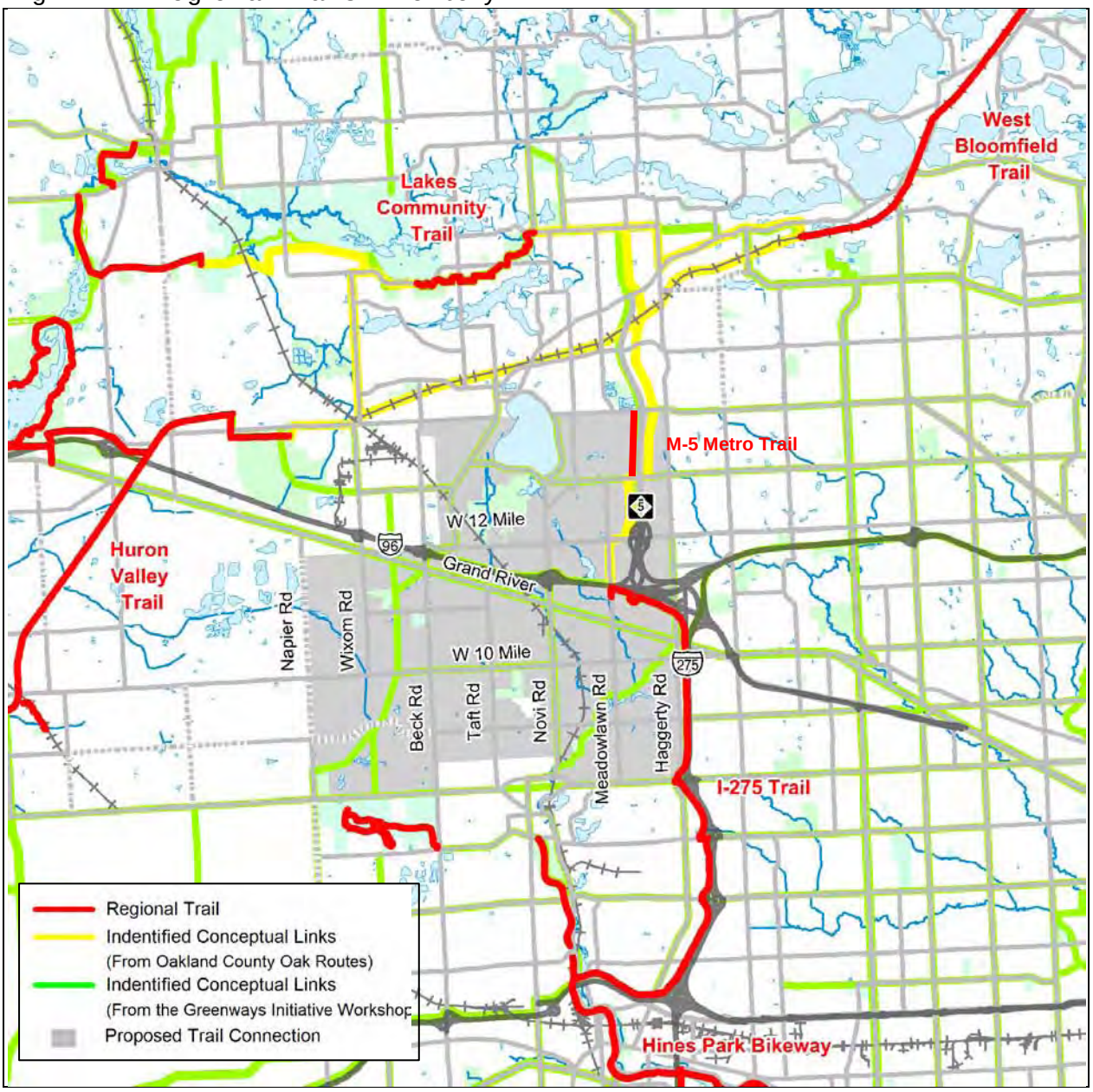
Based on the 2007 special census.

Fig. 2.1E. Existing Trails Inventory



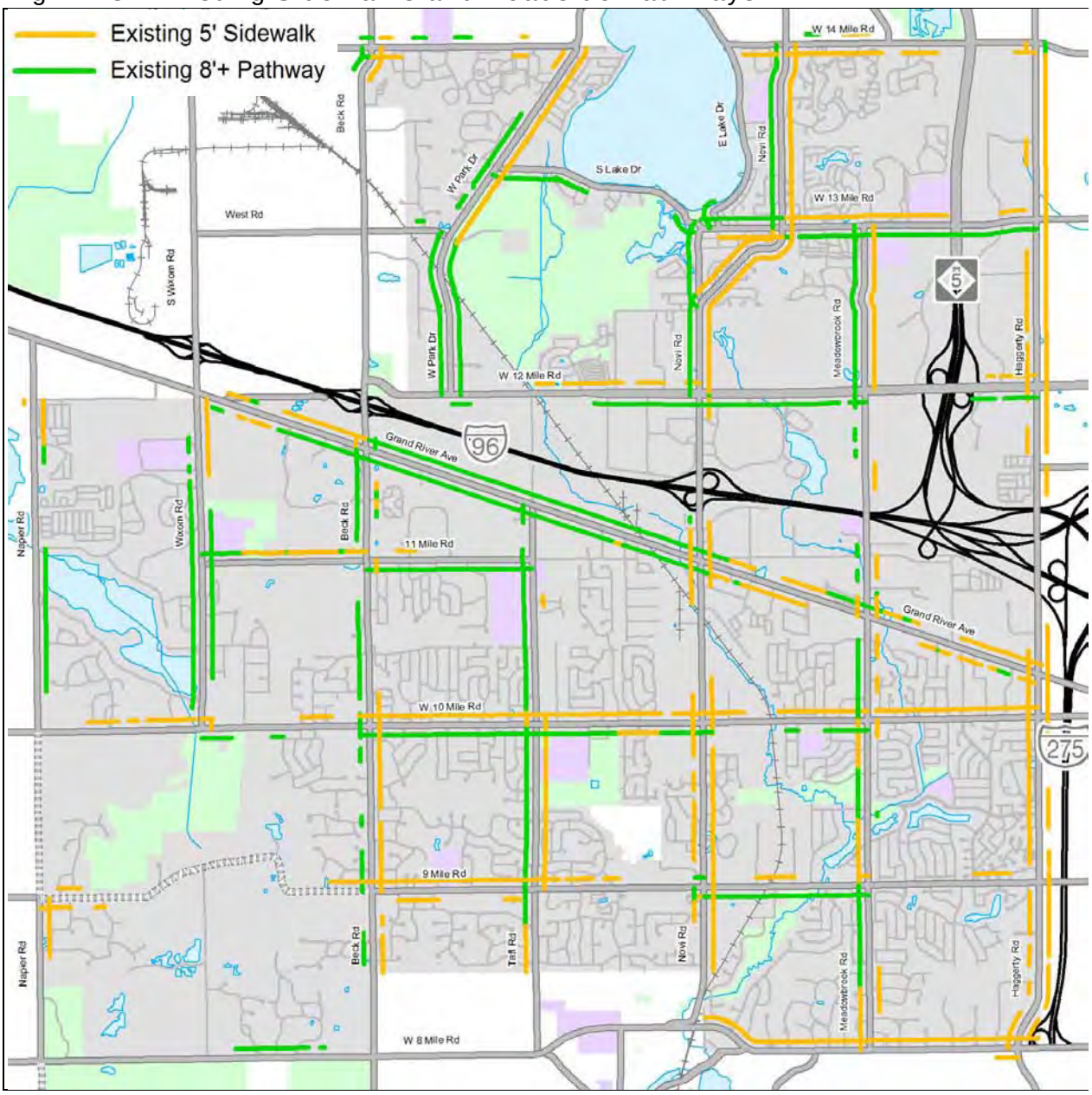
The I-275 Metro Trail is a 40 mile bikeway that links communities in Wayne, Oakland and Monroe counties. The trail terminates at Meadowbrook Road just south of the I-96 expressway. The M-5 Metro Trail was recently built in 2010 with plans to extend north along M-5.

Fig. 2.1F. Regional Trails Inventory



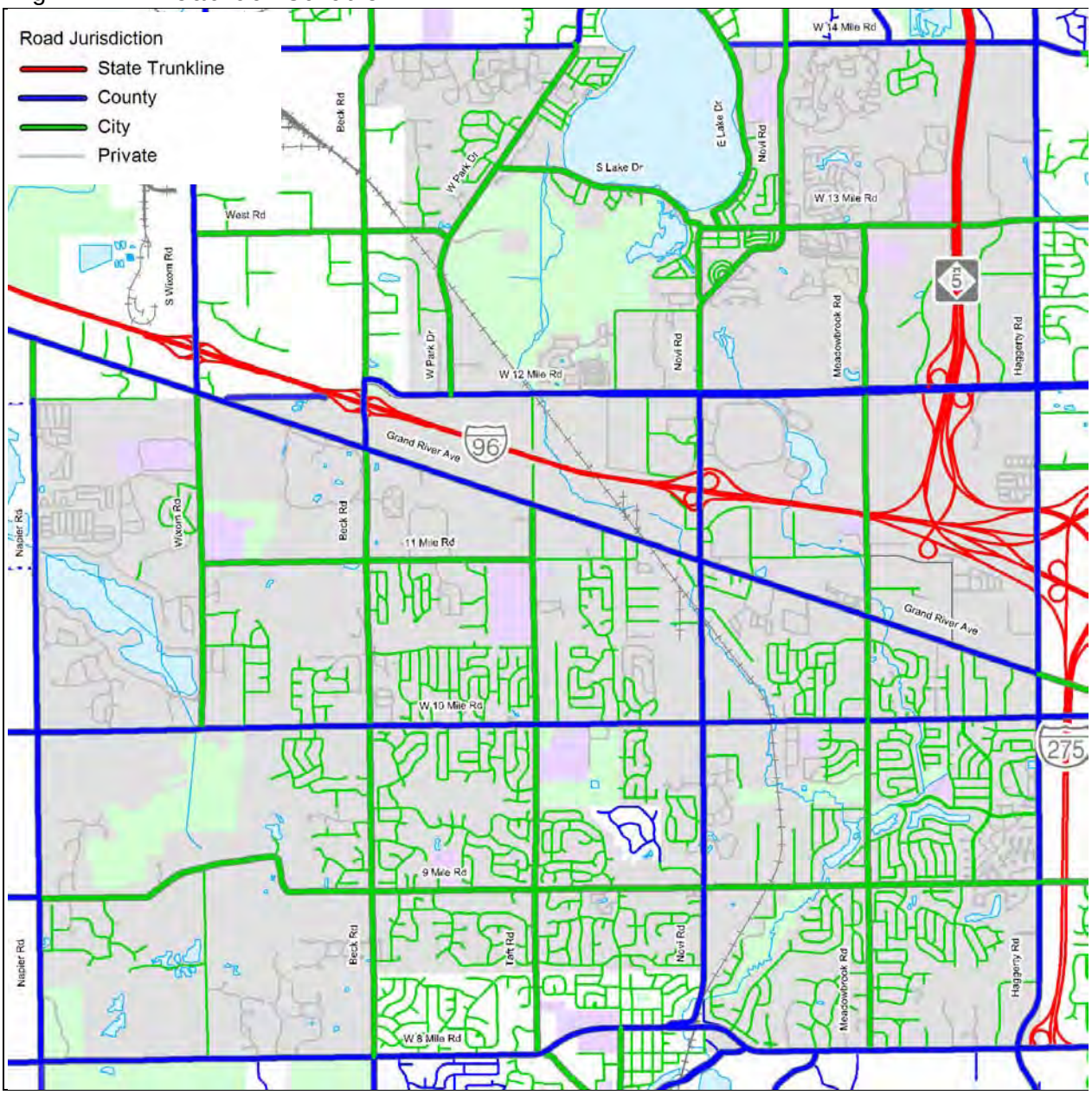
The existing I-275 Metro Trail and under development M-5 Metro Trail runs up the eastern border of the city. When completed it will provide a key link between the extensive regional trail system to the south and the proposed cross state trail to the north. The ITC corridor that generally runs north-south between Wixom Road and Beck Road between Maybury State Park and just east of Lyon Oaks County Park has the potential to link key regional parks to the residents.

Fig. 2.1G. Existing Sidewalks and Roadside Pathways



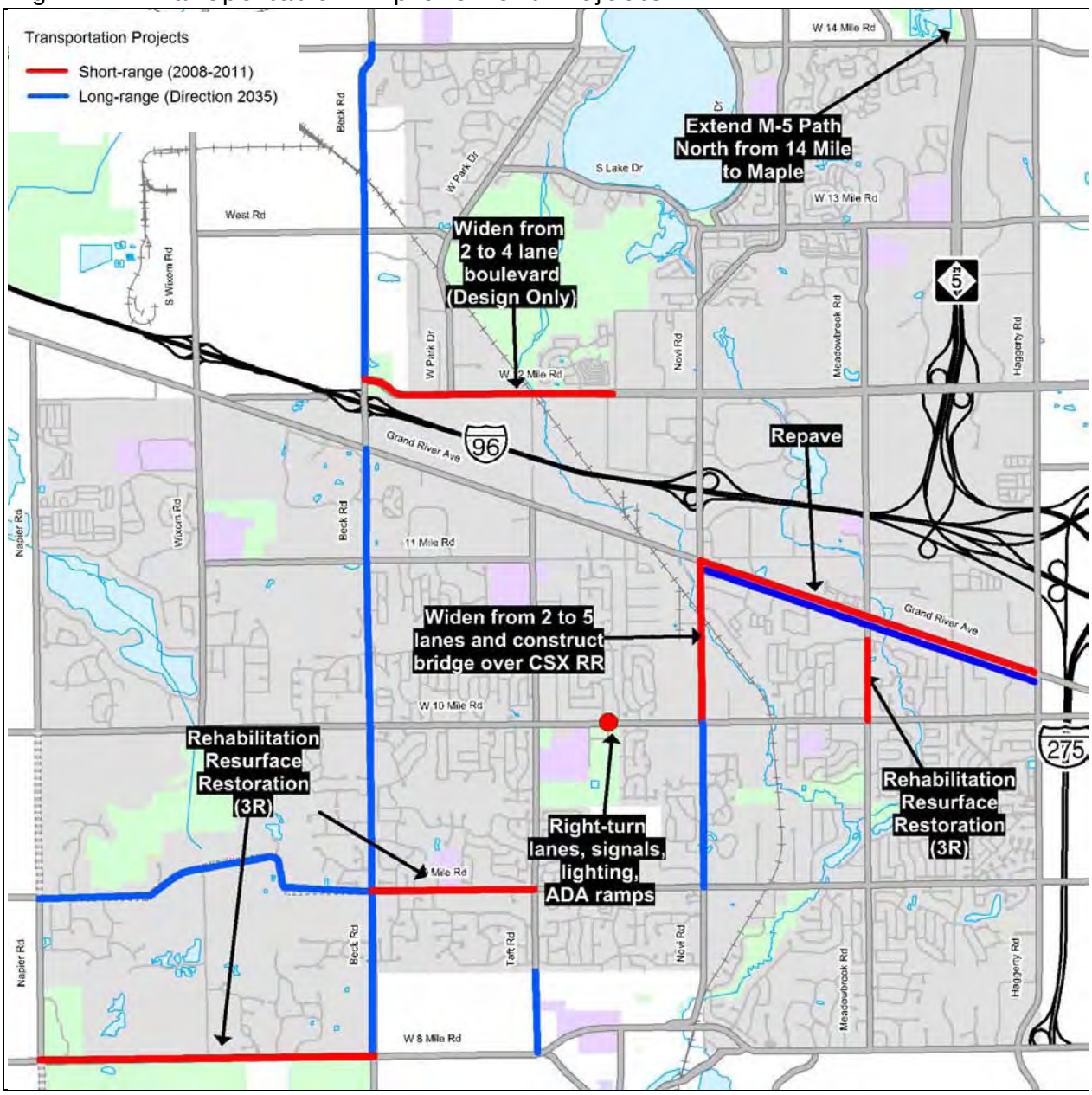
Along major roadways, the city generally has 5’ concrete sidewalks on one side of the road and 8’ asphalt pathways on the other side of the road. In 2006 the City of Novi Pathway and Sidewalk Prioritization Analysis and Process was approved by the City Council. Since that time the City of Novi has completed around 20,000 feet of pathways and sidewalks and developers completed over 10,000 feet of pathways and sidewalks in the City of Novi.

Fig. 2.1H. 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. 2.1l. Transportation Improvement Projects

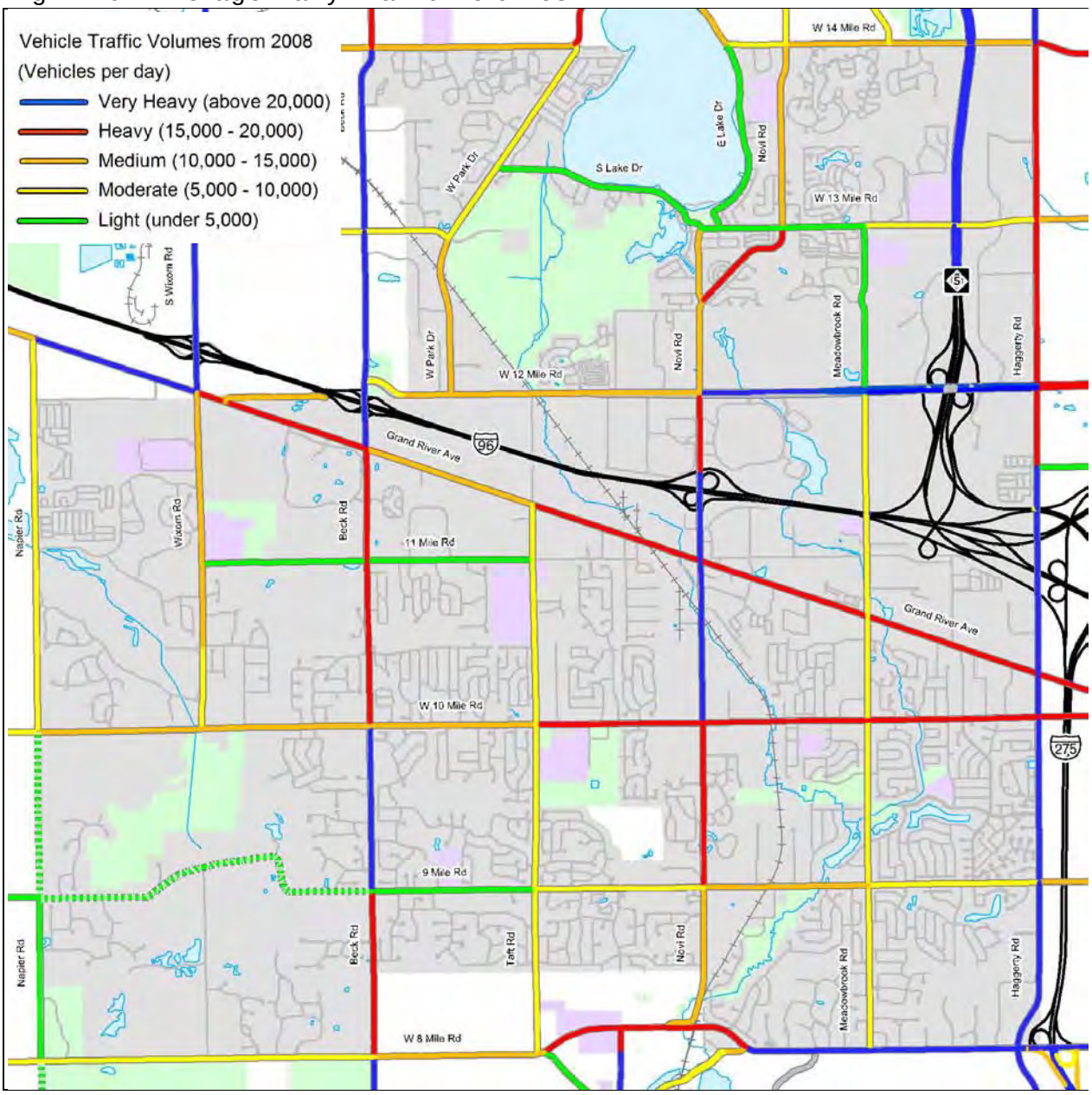


Short –Range – FY 2008-2011 Transportation Improvements (TIP) is a list of all transportation projects receiving federal funding in Southeast Michigan through 2011. The TIP represents the priorities of the cities and transportation agencies for implementing Direction 2035, the region's long range transportation plan.

Long – Range – Direction 2035 is the long-range vision for the proper maintenance and expansion of the transportation infrastructure to meet basic transportation and regional sustainability goals. It serves as a guide for developing a transportation system that is accessible, safe and reliable and contributes to a higher quality of life for the region's citizens. The long-range vision guides implementation of the short-range project in the TIP.

Only Projects on federal-aid eligible roads are mapped.

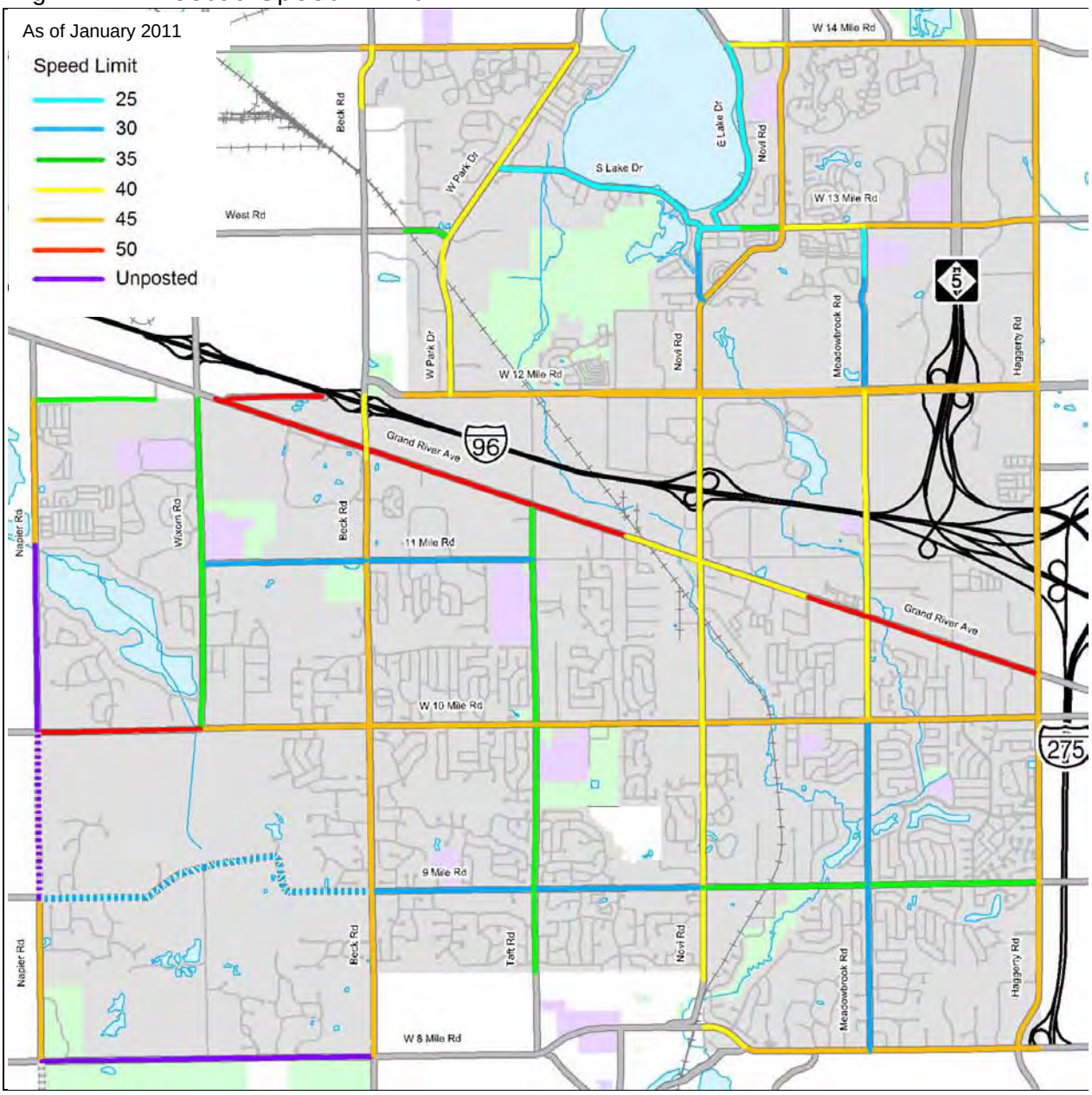
Fig. 2.1J. Average Daily Traffic Volumes



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.

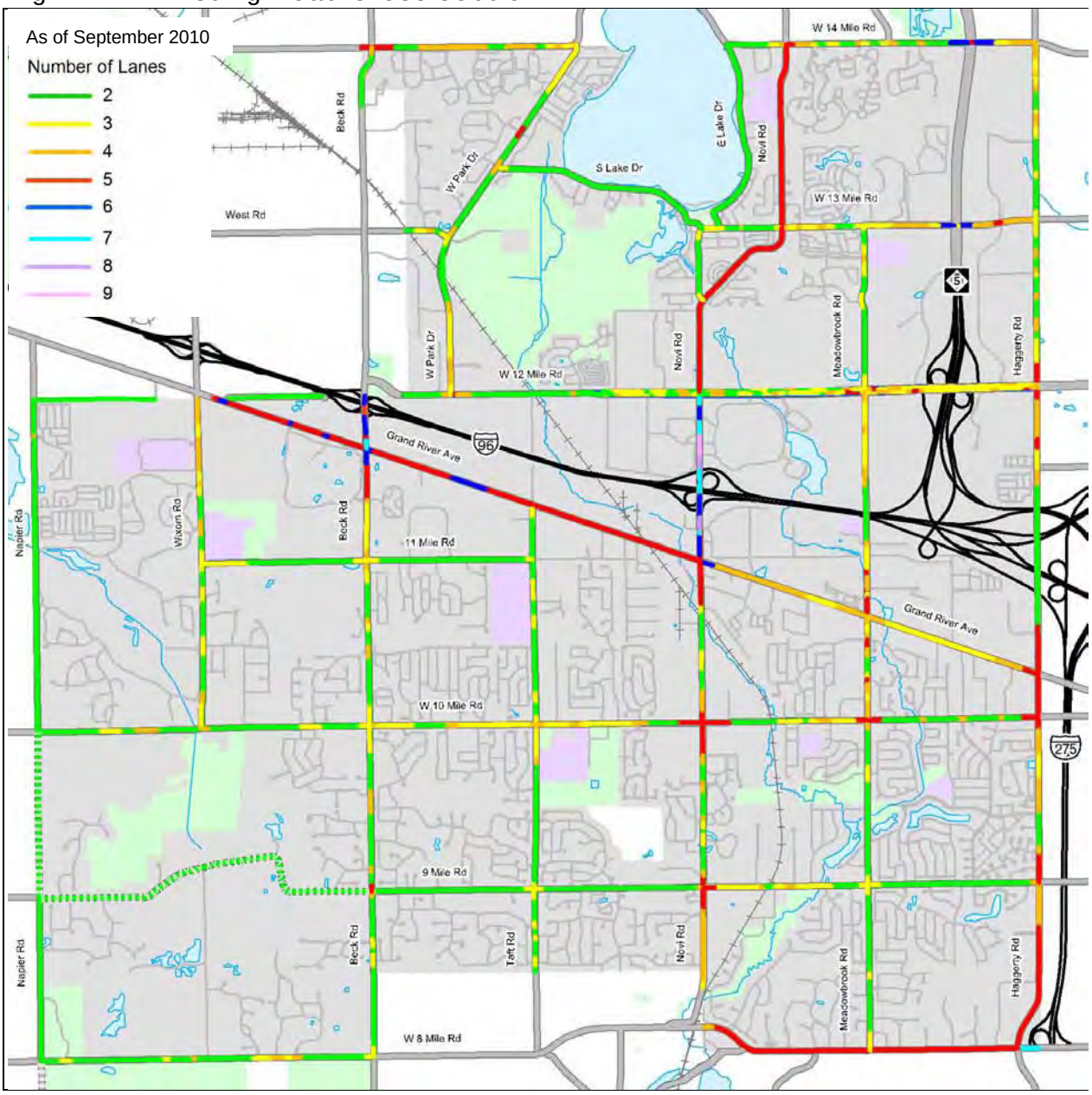
Fig. 2.1K. Posted Speed Limit



Roadways with high speeds can reduce the comfort level for bicycles and pedestrians traveling along a road corridor, and my even discourage bicycle and pedestrian use all together. Actual running speeds are likely higher than posted speeds.

Please note that speed limits along some roads are in the process of changing so some of the speeds listed above may be outdated.

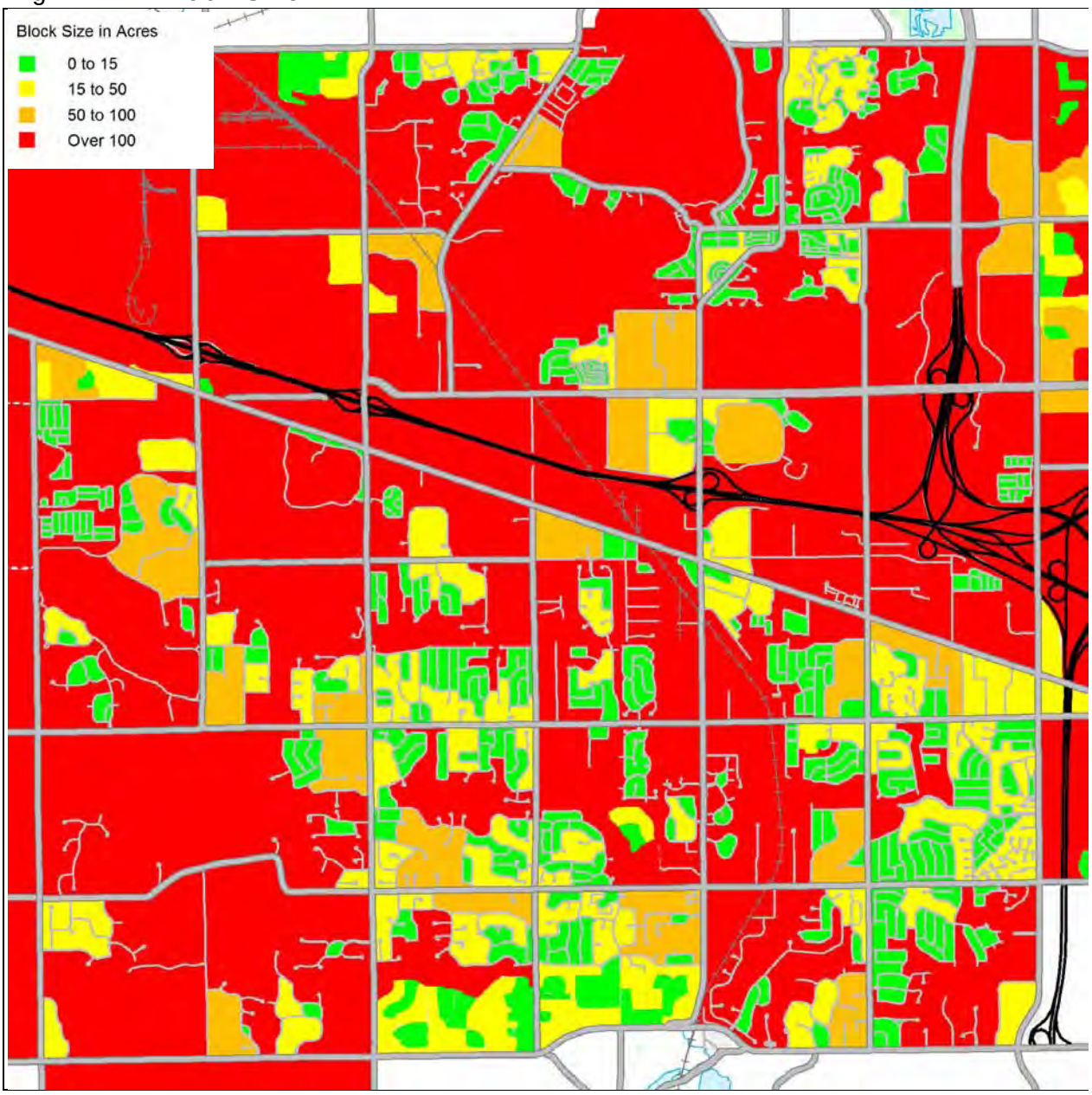
Fig. 2.1L. Existing Road Cross-section



The majority of the roads in the city are two lane roads, although many of these roads have designated turn lanes and by-pass lanes in places. The widest roads for the most part border the freeway corridors.

Generally, roadways with numerous designated turn lanes and by-pass lanes present challenges when trying to incorporate bicycle facilities into the existing road cross-section.

Fig. 2.1M. Block Size



Block size is an excellent measurement of directness of travel and a key indicator in the level of pedestrian activity. A block is defined as an area that a person cannot pass through. These areas usually do not have any sidewalks, roadways or bike paths allowing access between two points. One example is an expressway where you may have to go a mile or more out of your way just to get to the other side.

The majority of the city's landmass is in blocks over 100 acres in size. There are no large contiguous areas where the block size is 15 acres or less in size. Finding ways to create more direct pedestrian travel ways will be key to making Novi a more walkable community.

2.2 The Pedestrian Environment

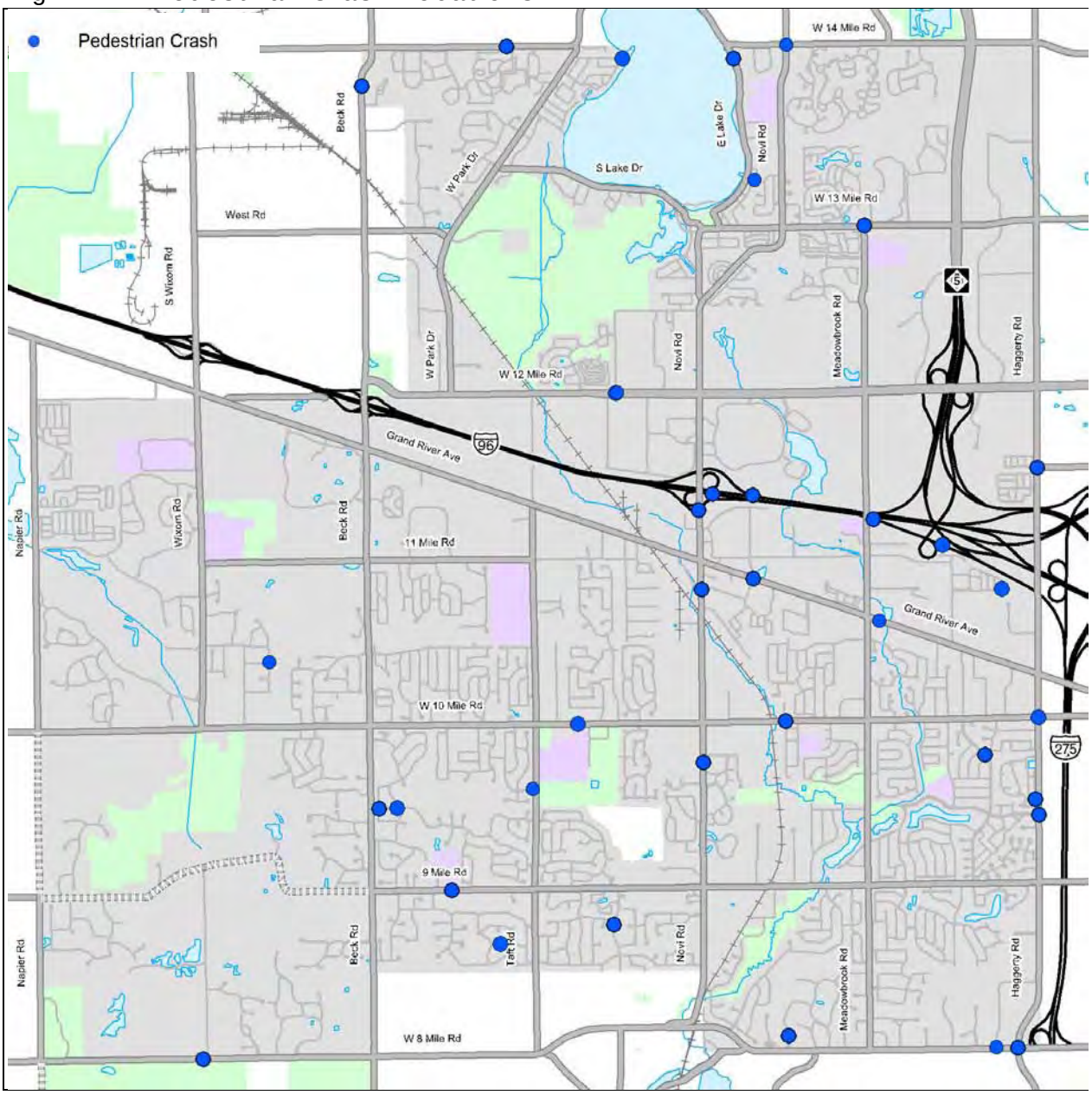
The City of Novi has a partially complete sidewalk system along the major roadways, however there are still significant gaps along major roadways in both the built up and more suburban parts of town. The quality of the pedestrian experience on these sidewalks varies greatly throughout the City. Some sidewalks have little if any buffer such as a row of trees or parked cars, between the sidewalk and the roadway. This lack of a barrier has been shown to have a significant adverse impact on the quality of the walking experience. Other sidewalks and roadside pathways are set well back from the road and have substantial vegetated buffer.

Another major issue lies with cross-roadway accommodations. There are significant stretches of the major thoroughfares that provide no means to cross the roadway safely. There are also places where logical crossings are not accommodated. Even where there are marked crosswalks, they are often inadequate. Many times the existing crossings are missing key safety features, making them difficult to cross, especially on high speed multi-lane roadways.

The following maps provide a general summary of the existing conditions of pedestrian facilities in the City of Novi:

- Fig. 2.2 A. Pedestrian Crash Locations
- Fig. 2.2 B. Pedestrian Crash Data
- Fig. 2.2 C. Existing Sidewalk Quality
- Fig. 2.2 D. Existing Crosswalk Spacing Analysis
- Fig. 2.2 E. Existing Road Crossing Difficulty Assessment

Fig. 2.2A. Pedestrian Crash Locations



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

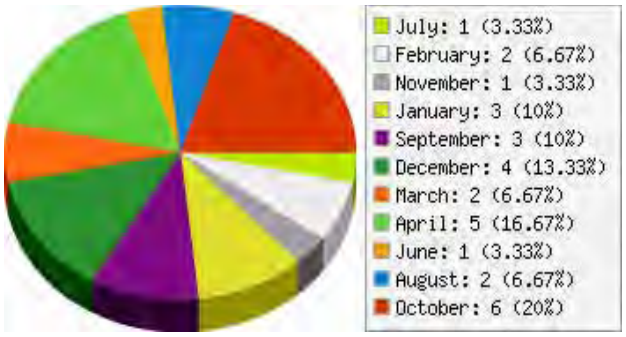
There were 30 pedestrian involved crashes, none were fatal and ten resulted in serious injuries. Drinking or drug use was involved in 3 of the crashes. There was no traffic control at 70% of the crash locations.

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

Fig. 2.2B. Pedestrian Crash Data

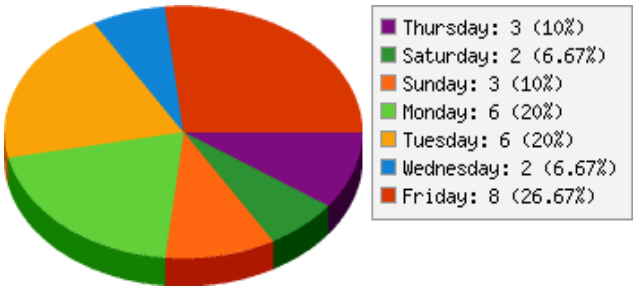
Month of Crash

Pedestrian crashes occurred in every month except February.



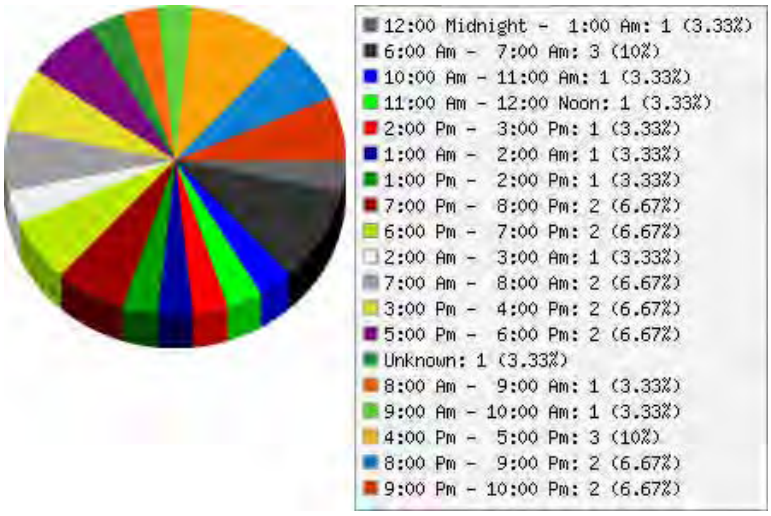
Day of Week

Crashes took place on every day of the week with the most occurring on a Friday.



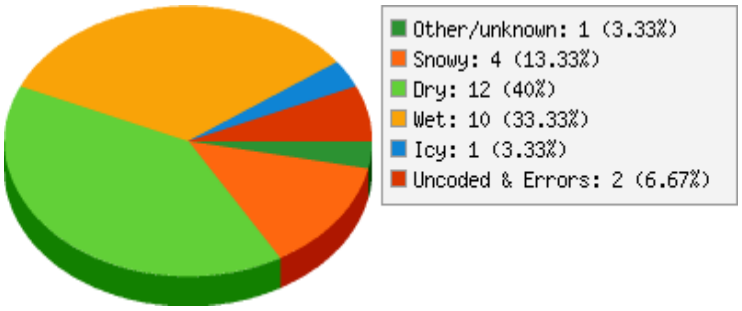
Time of Day

All but one crash took place between 6:00 AM and 10 PM. Half the crashes took place during daylight, 7% took place during dawn and 40% took place in the dark (3% were not coded).



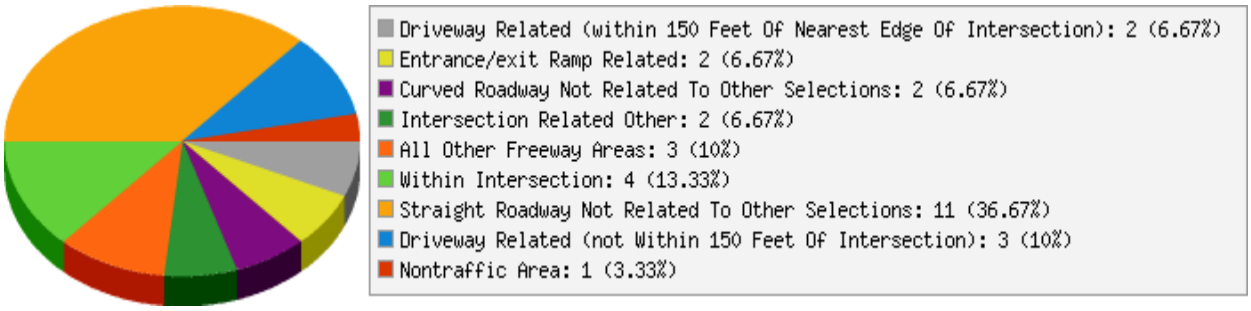
Road Conditions

Wet, Snowy or Icy roads were a factor in about half the crashes.



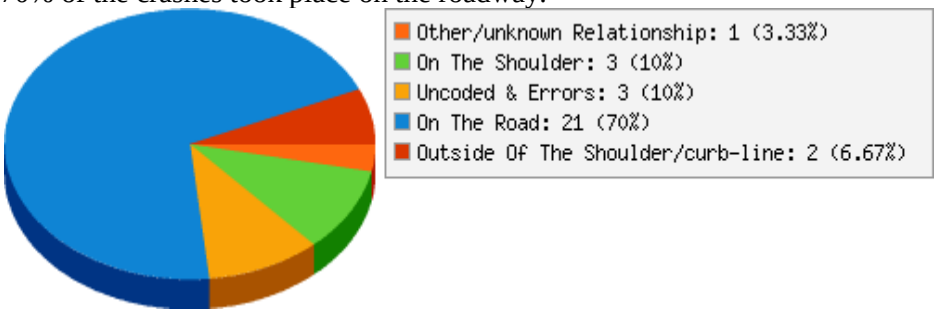
Area of Road at Crash

43% of the crashes are related to an intersection or driveway.



Relation to Roadway

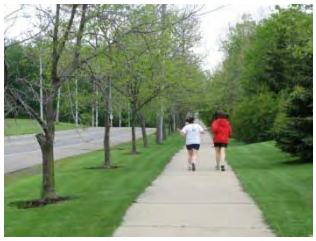
70% of the crashes took place on the roadway.



Sidewalk Quality

A key factor to a pedestrians comfort level on a sidewalk is the degree of separation from the roadway. Elements such as lawn buffers and vertical elements tend to make a pedestrian feel more separated from the roadway, increasing the pedestrian's level of comfort when on a sidewalk.

The sidewalk quality rating system is designed to help identify a pedestrian's level of comfort when on a sidewalk based on the amount of separation from the roadway. The rating system is broken up into five categories A, B, C, D and E. A sidewalk with a rating of "A" has the best pedestrian comfort level and a sidewalk with a rating of "E" has the worst pedestrian comfort level.



A - Rating
Sidewalk is setback from roadway and contains vertical elements such as closely spaced trees and/or light poles.

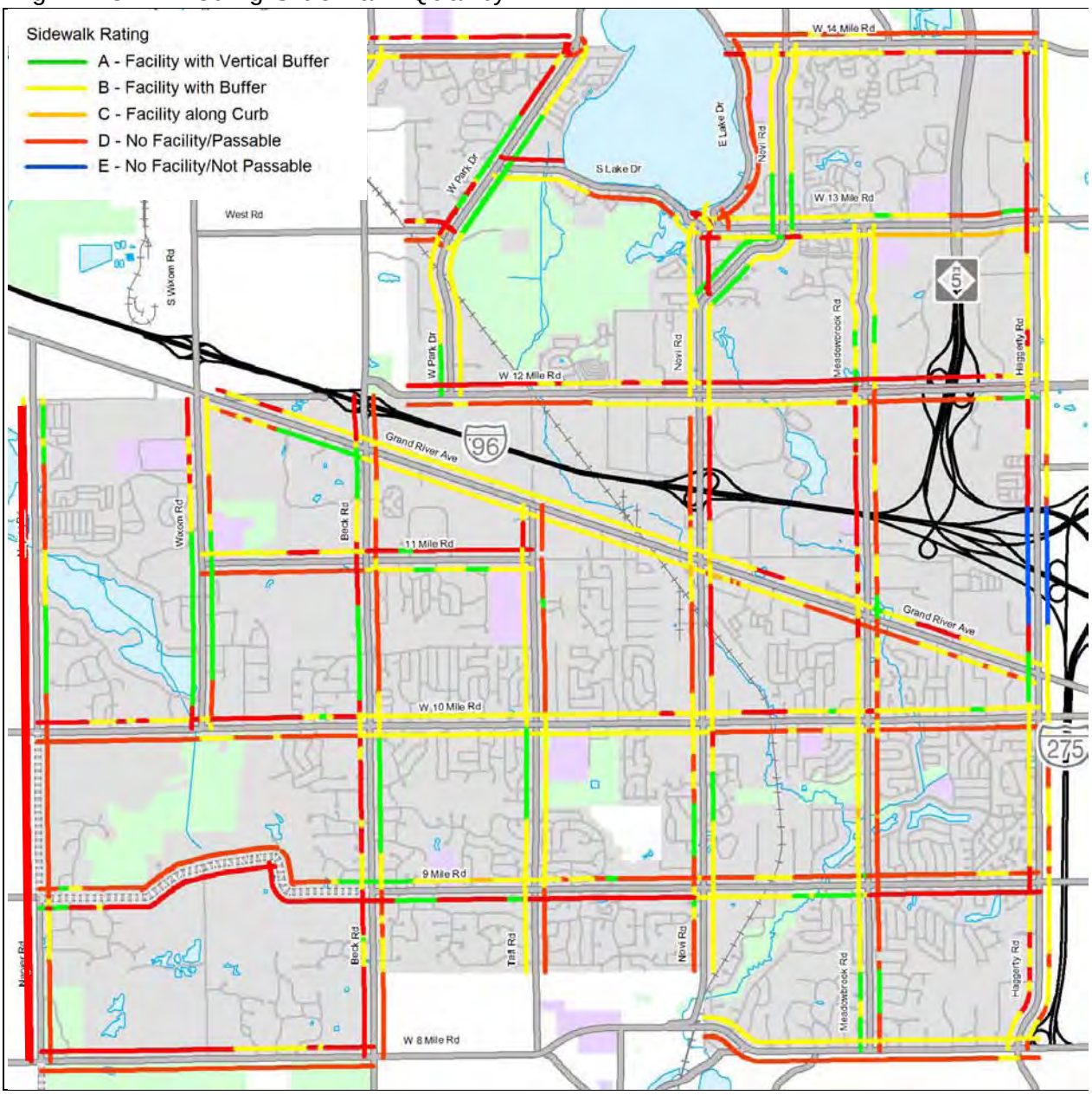
B - Rating
Sidewalk is setback from roadway but contains no vertical elements.

C - Rating
Sidewalk is directly adjacent to the roadway along the curb and has no buffer space or vertical elements.

D - Rating
No sidewalk facility is built, but the area is physically passable by foot.

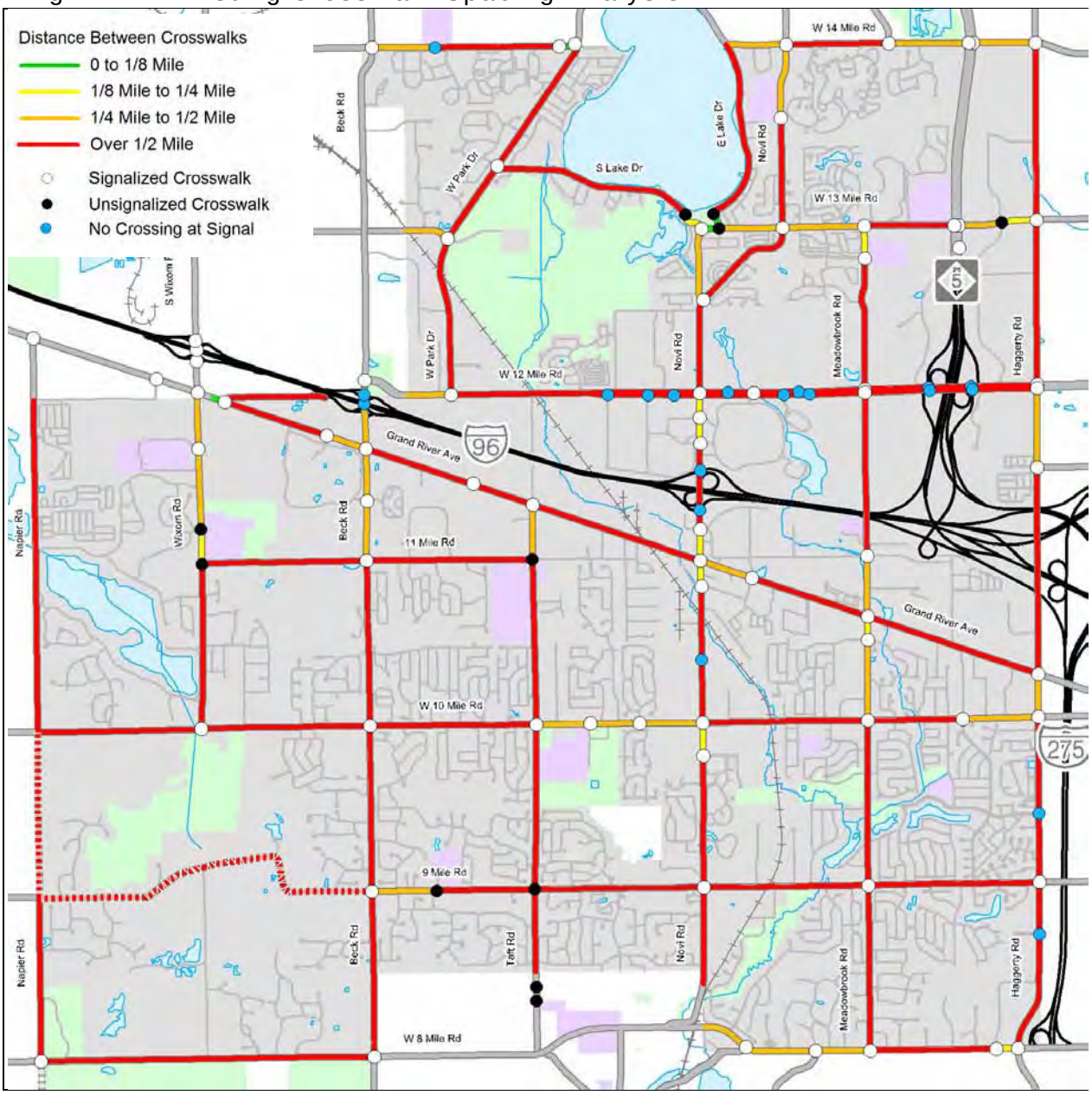
E - Rating
No sidewalk facility is built and the area is not physically passable by foot. Physical barriers such as streams or expressway overpasses usually contribute to this type of situation.

Fig. 2.2C. Existing Sidewalk Quality



A key factor to a pedestrians comfort on a sidewalk is the degree of separation from the roadway. Buffer (lawn extensions) and vertical elements such as trees and light poles increase the pedestrians comfort level.

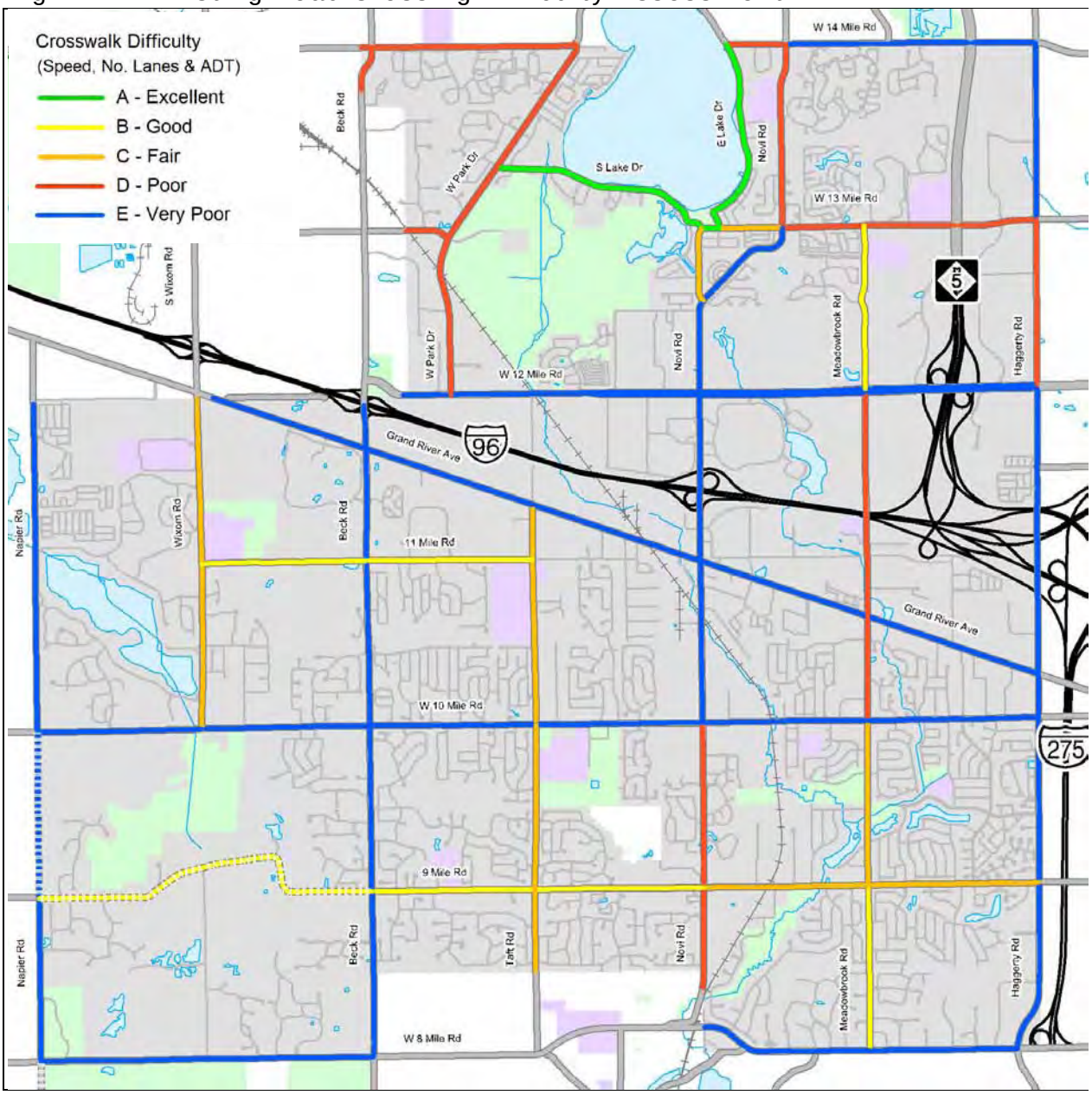
Fig. 2.2D. Existing Crosswalk Spacing Analysis



Crosswalk spacing is a key factor in directness of travel. Most pedestrian trips for personal business (like walking to the store) are about ½ mile long. Where there is demand to cross the road and crosswalk spacing is over 1/8 of a mile apart, midblock crossings are likely to occur. There are numerous stretches or roadway on primary streets within the city with over ½ mile between crosswalks. This analysis measures the distance that a pedestrian would have to travel in order to cross the road at a designated crossing.

This analysis was based on existing conditions. Signalized intersections without pedestrian crossings were not used in this calculation because they do not provide a safe crossing. However, please note that existing signalized crossings that were used in this analysis may not be up to ADA standards, so even if they have a crossing, they may not be accessible to everyone.

Fig. 2.2E. Existing Road Crossing Difficulty Assessment



Road crossing difficulty is a measurement of how difficult a person would typically find it to cross a road at an unmarked mid-block crosswalk. It is based on the number of lanes, speed and average daily traffic. Overall, it is generally difficult to cross with ADT being the most restrictive factor on primary roads in the city.

Grade	Lanes	Speed	ADT
A	2	<30	<5,000
B	3	30	5,000-10,000
C	4	35	10,000-15,000
D	5	40	15,000-20,000
E	6	45+	20,000+

Road crossing difficulty is based on the number of lanes, speed limit and daily traffic volumes. For example a road that has 25,000ADT, 4 lanes and a posted speed limit of 40mph with no existing bike lane would get a E rating. A 5 lane with a speed limit of 40mph receives a D rating, however the 25,000ADT makes it a E rating because the most restrictive rating is applied (please refer to the chart above).

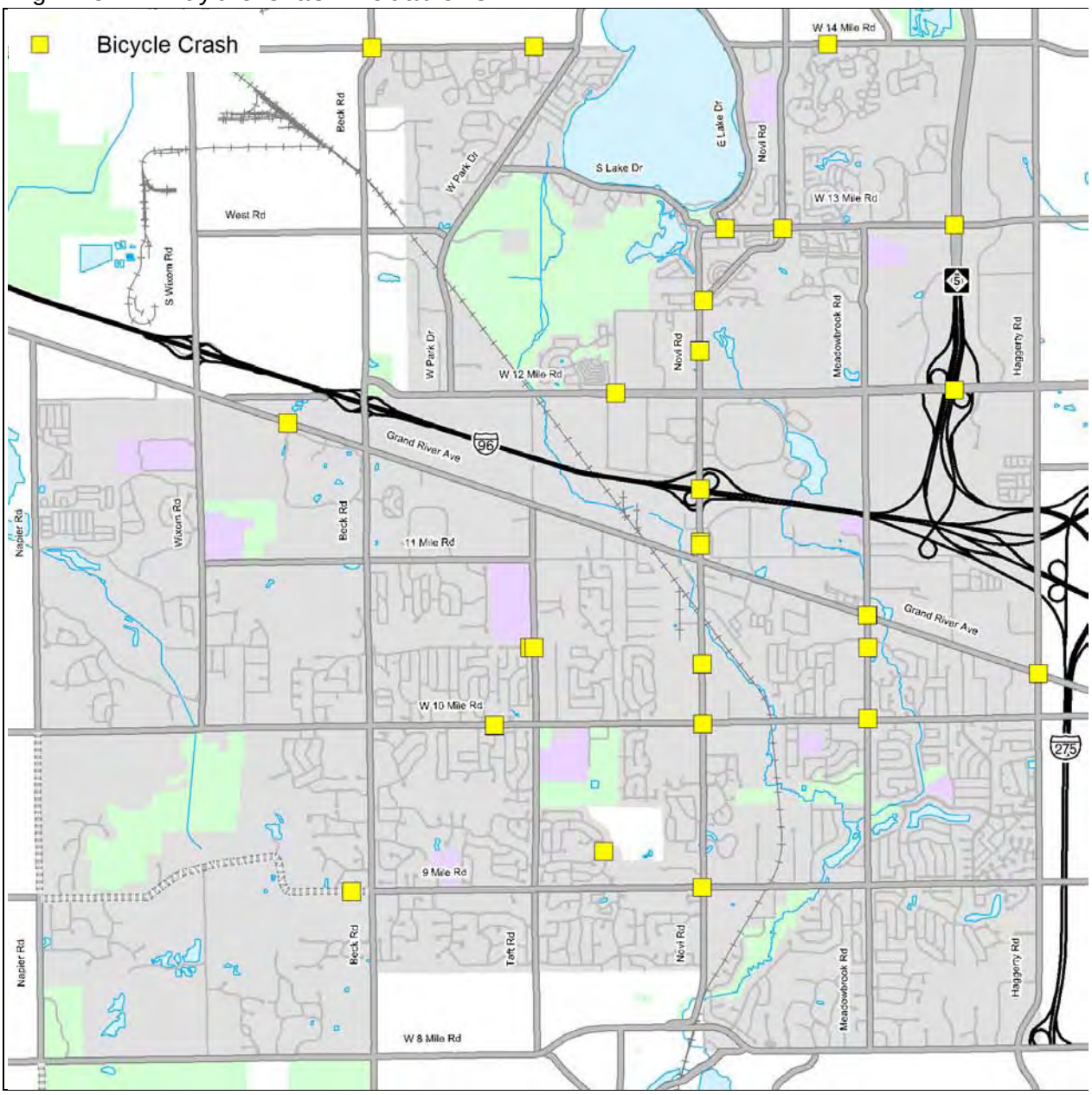
2.3 The Bicycling Environment

The approach to handling bicycles in the City is inconsistent and incomplete. Most of the efforts have been put toward the roadside pathways. There are a few short segments of existing bike lanes in the city. There is a one-way bike lane on South Lake Drive and a two-way bike lane on East Lake Drive with a short pathway connecting the two. There is also a bike lane on Taft Road south of 9 Mile Road. Currently the Pathways along the side of the arterial and collector roads function as the main bicycle facilities. However, this system is incomplete and many bicyclists may prefer to ride in the roadway when commuting across town. Even together, the on-road and off-road facilities do not make for a complete system and transfers between on-road and off-road facilities are not logical or convenient.

The following maps provide a general summary of the existing conditions in the City of Novi:

- Fig. 2.3A. Bicycle Crash Locations
- Fig. 2.3B. Bicycle Crash Data
- Fig. 2.3C. Roadside Pathway Conflicts
- Fig. 2.3D. In-Road Bicycling Quality Assessment

Fig. 2.3A. Bicycle Crash Locations



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

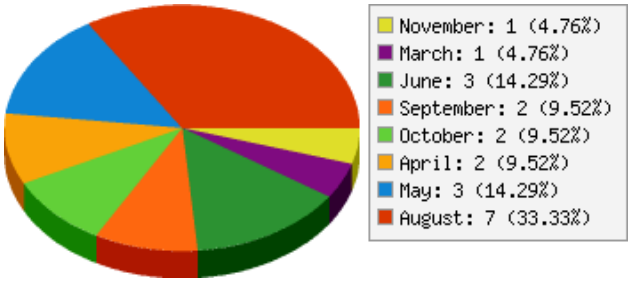
There were 31 bicycle involved crashes, none were fatal and six resulted in serious injury. Drinking or drug use was involved in 1 of the crashes. There was no traffic control at 38% of the crashes; a signal was present at 43% and a stop sign at 19% of the locations.

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

Fig. 2.3B. Bicycle Crash Data

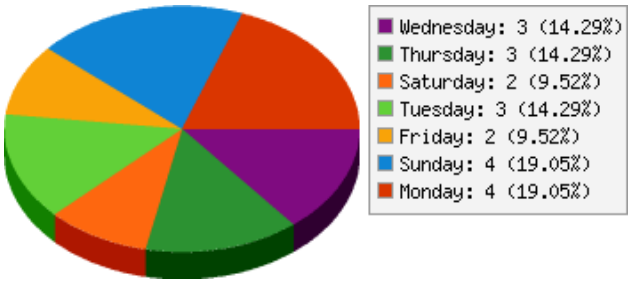
Month of Crash

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



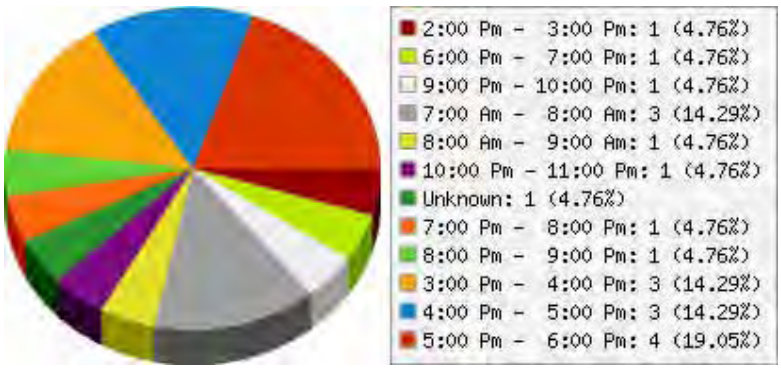
Day of Week

Crashes were evenly distributed throughout the week.



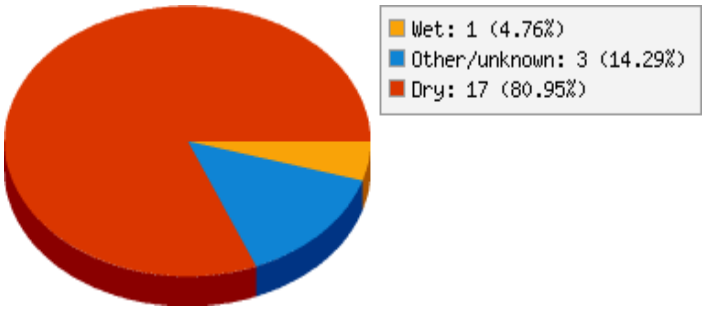
Time of Day

The crashes took place between 7:00 AM and 10 PM. 81% of the crashes took place in daylight, 5% at dusk and 10% took place when it was dark (9% were not coded).



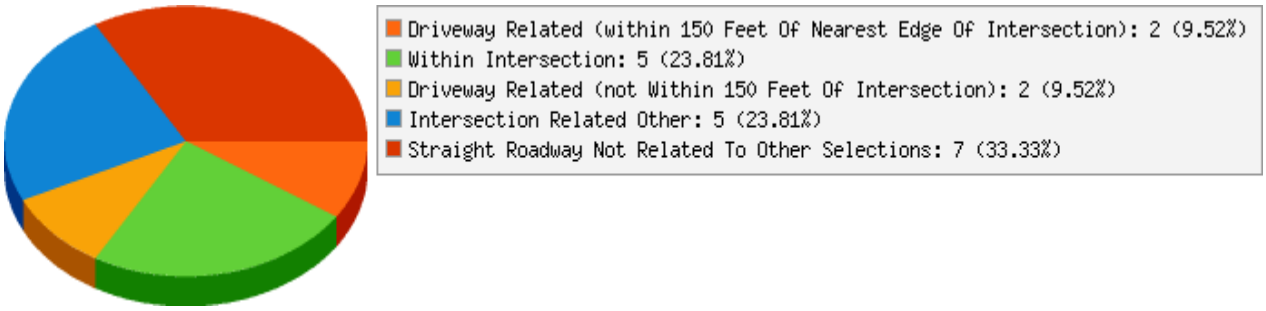
Road Conditions

The road was dry for 80% of the crashes.



Area of Road at Crash

67% of the crashes were related to a driveway or intersection.



Relation to Roadway

86% of the crashes took place in the roadway.

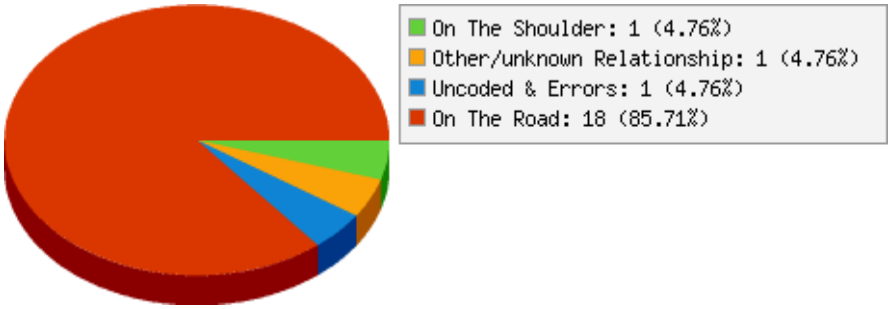
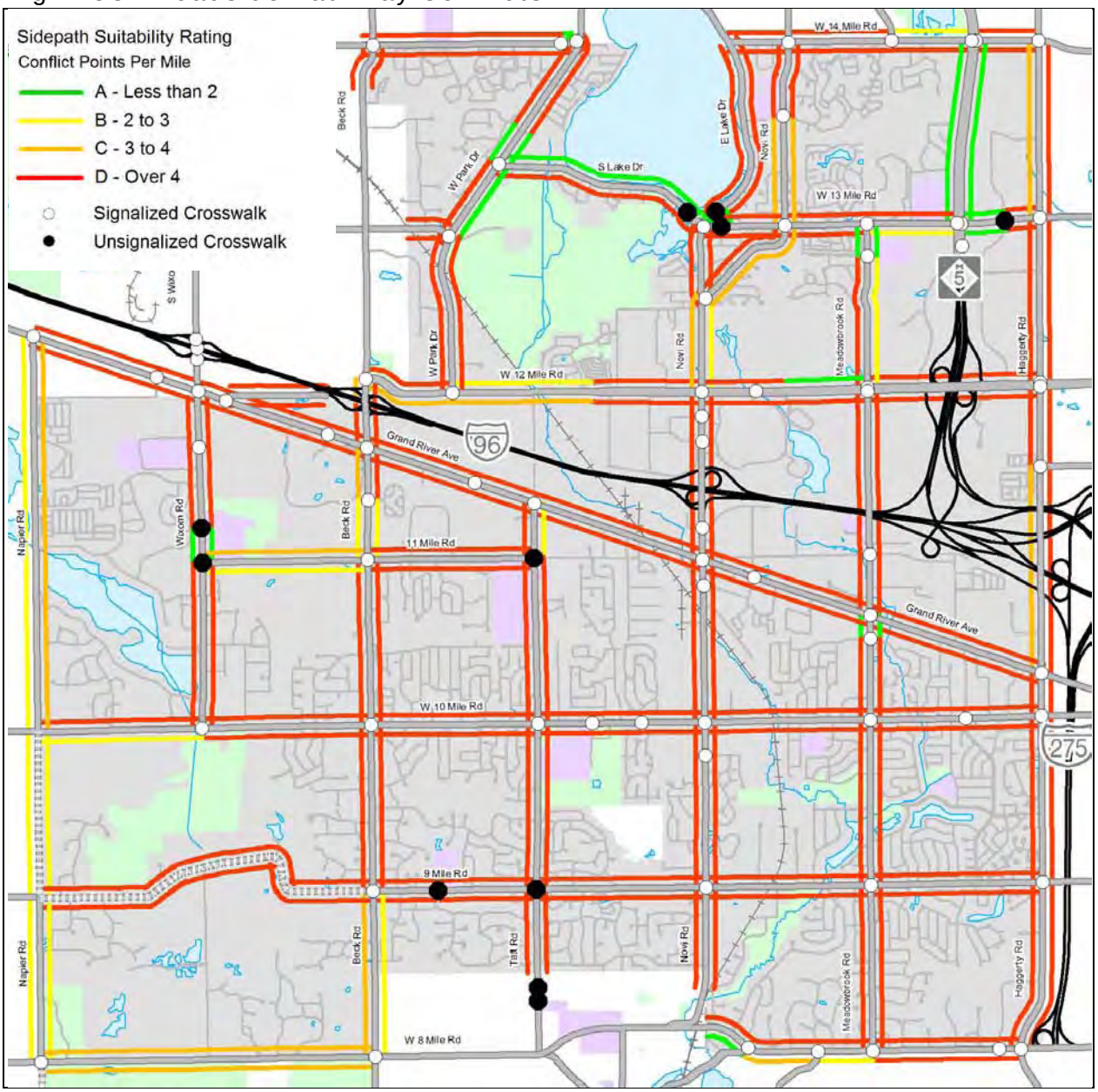


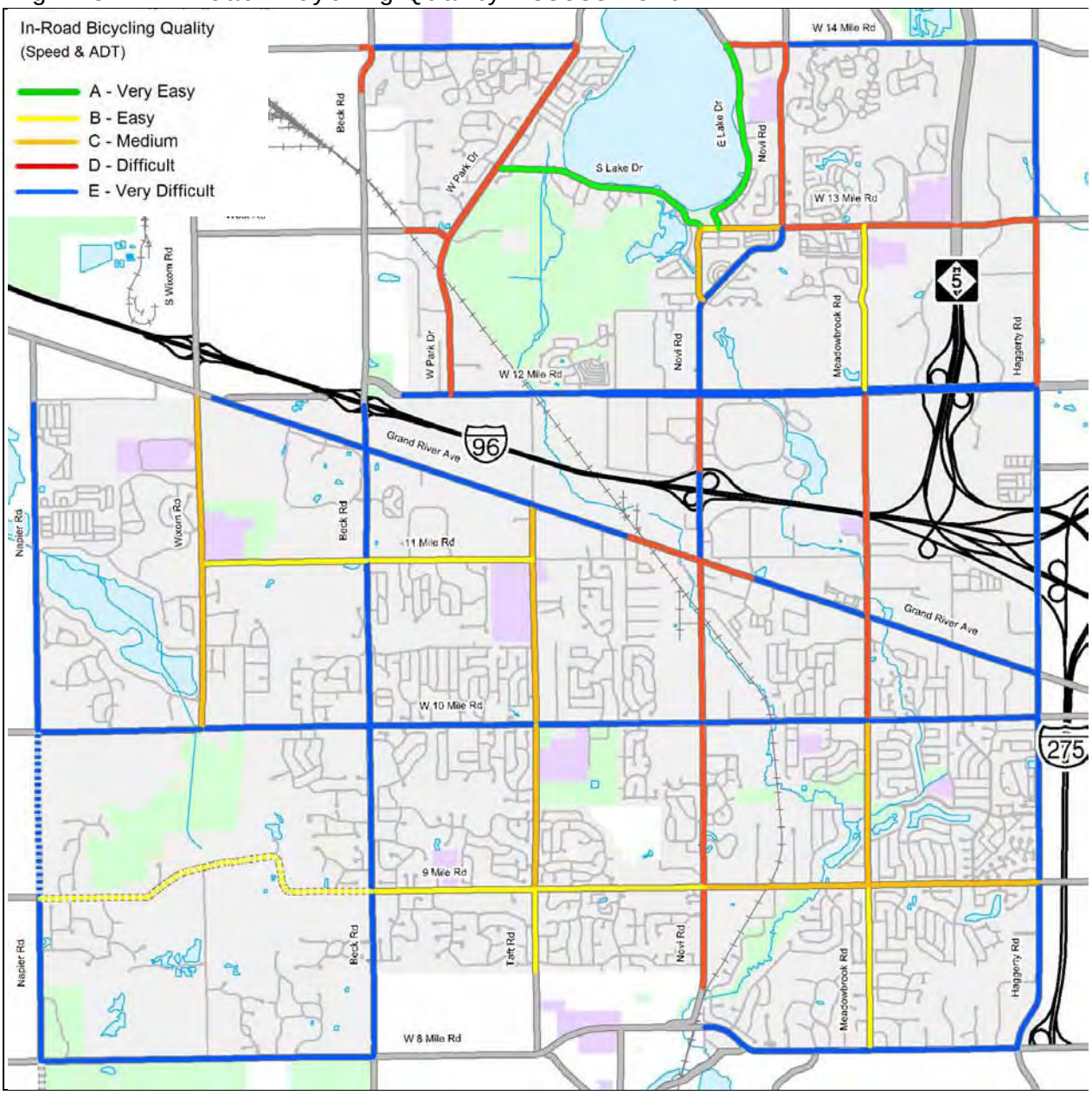
Fig. 2.3C. Roadside Pathway Conflicts



A conflict point is a local road or high traffic volume commercial driveway. For this analysis, each segment of sidewalk between two major roadways was given a rating from A to E based on the number of conflict points (see legend). Ten minor/residential driveways or one local road or high volume driveway was considered equal to one conflict point.

The AASHTO Guide for the Development of Bicycle Facilities generally considers sidewalks undesirable as shared-use paths. This is due to the inherent conflicts between bicycles and motorists where a pathway intersects with driveways and roads. Suitable sidepath locations are uninterrupted by driveways and roadways for long distances and provide safe and convenient road crossing opportunities to destinations on the other side of the road.

Fig. 2.3D. In-Road Bicycling Quality Assessment



In-road bicycling facilities improve the quality of the bicycling experience on busy roads. Quality of the in-road bike facilities is based on speed limit and daily traffic volumes. A road with an existing bike lane has a higher quality; however, there are few existing bike lanes in the city.

Without Bike Lane	With Bike Lane	ADT	Speed Limit
A	A	0 -5,000	25
B	A	5,000 – 10,000	30
C	B	10,000 – 15,000	35
D	C	15,000 – 20,000	40
E	C	20,000 – 25,000	45
E	D	Over 25,000	50

Quality of the in-road bike facilities is based on speed limit and daily traffic volumes. For example a road that has 12,000ADT and a posted speed limit of 40mph with no existing bike lane would get a D rating. An ADT of 12,000 puts the road in the C range, however the 40mph speed limit makes it a D rating because the most restrictive rating is applied (please refer to the chart above).

2.4 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[1]. 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.

Existing Commuter Mode-split

To understand Novi's potential to increase the number of people walking and bicycling, it is helpful to look at how Novi's current bicycling and walking trends compare to other communities. 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 surveys or census data. When looking at how Novi compares to other cities between 40,000 and 60,000 in population, its pedestrian and bicycle commute numbers are the second lowest. The percent who commute by bike, 0.2%, is the third lowest of its peers and well below the peer communities average of 0.4% and the national average of 0.5%. The percent who walk, 0.5%, is the second lowest of its peers and significantly below the peer city average of 3% and the national average of 2.8%. These numbers can likely be attributed to the dispersed land uses in the city which make biking to work a more realistic option than walking to work.

It is likely as Novi continues to develop its commercial core into a more pedestrian friendly environment surrounded by higher density residential development, its percentage of non-motorized trips will rise if appropriate non-motorized linkages are established. As noted earlier, the greatest increase in non-motorized trips will likely come from bicyclists given the land use patterns in the City of Novi.

[1] 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.

Table 2.4A Commute to Work Comparison

Peer Michigan Communities 40,000 to 60,000

			% of Commuters Who:				Percent
Rank	Place	Pop.	Bike	Walk	Use Transit	Don't Drive	Households W/O Car
1	East Lansing	46,704	3.1	22.0	4.4	29.4	10.0
2	Muskegon	40,136	0.5	2.9	1.3	4.7	14.0
3	Battle Creek	53,251	0.2	2.1	1.7	4.1	11.9
4	Midland	41,663	0.4	1.9	0.6	2.8	5.9
5	Lincoln Park	40,008	0.2	1.6	0.8	2.6	8.5
6	Roseville	48,129	0.2	1.1	1.0	2.3	7.1
7	Redford	51,622	0.1	1.1	0.6	1.8	5.8
8	Dearborn Heights	58,264	0.1	1.1	0.4	1.6	6.8
9	Kentwood	45,239	0.1	0.7	0.6	1.4	5.0
10	Portage	44,926	0.1	0.8	0.3	1.3	4.3
11	Novi	47,459	0.2	0.5	0.3	1.0	2.8
12	Bloomfield Township	43,027	0.0	0.29	0.2	0.5	2.2
	Averages	**46,702**	**0.4**	**3.0**	**1.0**	**4.5**	**7.0**

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.

It should be noted that the inclusion of East Lansing in the table as a peer city is may not be a fair comparison. University towns such as East Lansing have significantly higher rates of non-motorized trips than non-university town. But in 2000, East Lansing had very few bicycle and pedestrian facilities. In fact none of the peer communities had a significant number of bicycle facilities. Thus, the 3.1% of commuters who bike in East Lansing may not be an unrealistic target when Novi's physical, social and economic environments for walking and bicycling have improved substantially.

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. One key aspect in determining the percent of trips that may done by bicycle is the ratio of bicycle lane miles to arterial/freeway miles are used. If the ratio is less than 0.35% then a 0.65% bicycle mode share should be used. If 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, 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. Nationally, there has been a 42% increase in the number of bicycle commuters between 1990 and 2007.

Table 2.4B Existing to Proposed Condition Comparison

Existing Conditions		
Primary Motorized Routes		
Freeways	6	
Principal Arterials	18	
Minor Arterial	39	
Collectors	11	
Total	**74**	
Primary Pedestrian Routes		
Sidewalk / Roadside Path*	31	Total /2 (equivelent of sidewalk both sides)
Off-Road Trails	2	
Total	**33**	
Primary Bicycle Routes		
Bike Lanes	2	
Bike Routes	0	
Off-Road Trails	4	
Total	**6**	
Proposed Conditions		
Primary Pedestrian Routes		
Sidewalk / Roadside Path*	21	Total /2 (equivelent of sidewalk both sides)
Off-Road Trails	20	
	41	
Primary Bicycle Routes		
Bike Lanes	68	
On-Road Bike Routes	36	
Off-Road Trails	20	
	124	
Comparisons		
Pedestrian		
Existing Miles of Pedestrian Routes	45%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Ped. Routes	100%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Ped. Routes	224%	of Existing Miles of Pedestrian Routes
Bicycle		
Existing Miles of Bicycle Routes	8%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Bike Routes	176%	of Existing Miles of Motorized Routes
Proposed Miles of Bicycle Routes	2167%	of Existing Miles of Bicycle Routes

To determine the probable mode shift, a variation of the Caltrans approach has been used. Table 2.4B, Existing to Proposed Condition Comparison, shows the comparison between existing primary bicycle and pedestrian routes and primary motorized routes for both existing and proposed conditions. The primary routes do not take into account the local residential roadways unless they are part of a designated bicycle route.

The data shows that currently, primary pedestrian routes are about 45% of the total of primary motorized routes. When the system is completed, there will be a 1:1 ratio. When looking at peer cities, Midland, which has a more complete sidewalk system, has a walking mode share of 1.9% for commuters. Thus, a 2% walking mode share seems like a reasonable number.

Existing primary bicycle routes are 8% of the existing primary motorized routes. When completed the system 175% of the primary motorized routes. Even when the system is only partially completed, the change will be significant. Looking at the peer cities, Midland has a 0.4% and Muskegon has a 0.5% bicycle mode share for commuting. East Lansing, while a university town, at that time the data was collected it had few bicycle facilities, reports a 3.1% mode share. Thus the Caltrans approach of a 2% mode share once a bicycle system becomes substantially complete seems like a reasonable number.

Thus a 2% pedestrian and 2% bicycle mode share will be used for the targets. Typically, the pedestrian mode share would be greater than the bicycle mode share, but given the current facility build out ratios and Novi's land use patterns it make sense that they would be equal.

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.

To estimate the trip and related greenhouse gas reduction. An estimate of the % of trip type that may be done by walking or bicycling has been made with a rough average of 2% overall. Also, for each trip type reduced, an estimate of the miles for that trip type has been made.

The end result is that with a substantially complete system, Novi could expect to replace over 18,000 miles of automobile trips with bicycle or pedestrian trips. This would require on average for each person in the city to replace about a1/3 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 over 100 fewer barrels of oil being used and 9 tons less of CO2 being released into the environment each day – that translates into about 3,700 barrels of oil 3,300 tons of CO2 per year. The active transportation choices will also improve the resident's health in many other ways.

Table 2.4C Estimated Trip and Greenhouse Gas Reduction

Vehicle Miles Traveled							
	City of Novi Population	52,231	City Estimate				
	Daily Trips per Person	4.03	2010 National Household Travel Survey				
	Daily Total Number of Trips	210,491					
	Average Vehicle Trip Length	10.10	2010 National Household Travel Survey				
	Daily Total Vehicle Miles Traveled	527,533					
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	33,047	16%	2%	661	1	661
	Work Related Business	6,315	3%	0%	-	0.25	-
	Shopping	41,467	20%	1%	415	0.25	104
	All Other Family & Personal Business	50,728	24%	2%	1,015	0.5	507
	School/Church	20,628	10%	2%	413	0.5	206
	Social and Recreational	55,991	27%	3%	1,680	2	3,359
	Other	1,684	1%	0%	-	1	-
		209,859	100%		4,182		**4,838**
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	33,047	16%	2%	661	2	1,322
	Work Related Business	6,315	3%	0%	-	0.5	-
	Shopping	41,467	20%	1%	415	1	415
	All Other Family & Personal Business	50,728	24%	2%	1,015	1	1,015
	School/Church	20,628	10%	2%	413	1	413
	Social and Recreational	55,991	27%	3%	1,680	6	10,078
	Other	1,684	1%	0%	-	2	-
		209,859	100%		4,182		**13,242**
	Reduction in Vehicle Miles Traveled	18,080	Miles Per Day				
		3.4%	Total Reduction in VMT				
		0.35	Miles Per Person/Per Day				
		6,599,051	Total Reduction in VMT Per Year				
Projected CO2 Reductions							
	CO2 Emission Factor	454	Grams Per Mile				
	Daily CO2 Reduction	8,208,135	Grams				
	Daily CO2 Reduction	9.05	Tons				
	Yearly CO2 Reduction	3,302	Tons				
Projected Fuel Savings							
	Daily motor gasoline savings	891	Gallons of Motor Vehicle Gasoline				
	Daily Oil Savings	101	Barrels of Oil				
	Yearly Oil Savings	36,941	Barrels of Oil				

3. Proposed Facilities

Master Plan vs. Corridor Planning

The recommendations in this Section 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, a corridor level assessment should be done in order to fully evaluate the feasibility and appropriateness of any roadway modification and/or proposed bicycle or pedestrian facility.

Proposed Improvements Outside the City of Novi

On some of the illustrations, improvements are proposed for areas outside of the limits of the City of Novi. These should not be construed as detailed recommendations as they have not received the same level of evaluation as those facilities within the City. Rather, they show diagrammatically how non-motorized facilities within the City may interact with non-motorized facilities in the surrounding communities.

Some illustrations also show recommendations for improvements on roadways that are not under the jurisdiction of the City of Novi. Any modifications to roads owned by the state and managed by the Michigan Department of Transportation (MDOT), roads owned by the county road commissions, or privately-owned roads, must be coordinated with and approved by the appropriate agency. See Fig 2.1H Road Jurisdiction Map for road ownership.

Topics:

3.1 Non-Motorized Transportation Network

There is no such thing as a typical pedestrian or bicyclist. A single person's preferences for a walking or bicycle route may vary based on the type of trip. A person's daily commute route will likely favor directness of travel over a scenic route (but not always). An evening or weekend ride, walk or run for recreation and exercise will be based on an entirely different set of criteria. It will likely favor local roads and trails through parks and schools.

Individuals also vary greatly in their tolerance of traffic, hills, weather and numerous other factors. A child will likely choose to keep to local roadways on their way to school provided they have safe ways to cross busy streets. An adult who is just starting to bicycle again will likewise shy away from busy roadways, sticking to residential roads wherever possible. But an experienced bicyclist may choose the busy road for its directness of travel. The solution then is not one dimensional, but rather responds to the needs of the various users and trip types. By doing so the plan addresses the needs of the majority of the community's population, not simply a small interest group.

Bicycle and walking are not exclusive modes of travel either. Most bicycle trips will also include some time as pedestrian. Also, some bicycling and walking trips may be a part of a longer multi-modal journey. For example, someone may ride their bike to a bus and then walk from the bus to their final destination.

For all the reasons listed above, there needs to be a spectrum of non-motorized facilities available that gives the user the choice to choose the route that they feel most comfortable with. Off-road trails, neighborhood connector routes, sidewalks, roadside pathways and bike lanes are some of the most common facilities that make up the network.

The following illustrations demonstrate the different elements that go into creating a non-motorized network along with the proposed non-motorized transportation improvements:

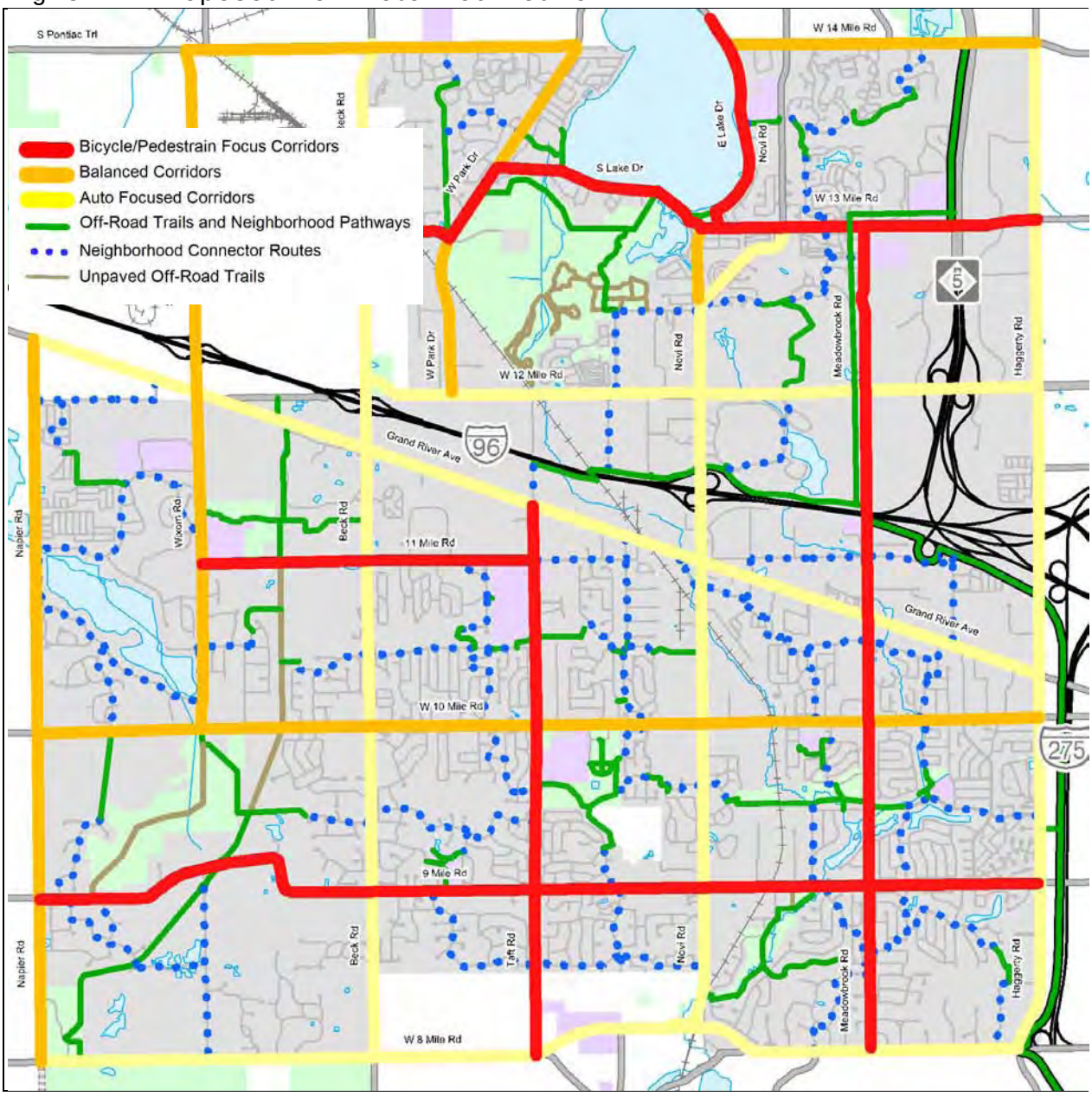
- Overview Map (this is a large fold out map that may be found in the back cover of the report)
- Fig. 3.1A. Spectrum of Non-motorized Routes
- Fig. 3.1B. Proposed Non-Motorized Network
- Fig. 3.1C. Bicycle/Pedestrian Focused Corridors
- Fig. 3.1D. Auto Focused Corridors
- Fig. 3.1E. Balanced Corridors
- Fig. 3.1F. Neighborhood Connectors
- Fig. 3.1G. Off-Road Trails
- Fig. 3.1H. Proposed Neighborhood Connectors and Trails
- Fig. 3.1I. Proposed Road Crossing Improvements
- Fig. 3.1J. Proposed Regional Trail Connections
- Fig. 3.1K. Proposed Regional Trail Connections in The City of Novi)
- Fig. 3.1L. Proposed Sidewalk/Roadside Pathway Improvements

Fig. 3.1A. Spectrum of Non-motorized Routes

A non-motorized system is made up of a variety of routes that provide options for the user to choose their most comfortable route.

PRIMARY LINKS	NEIGHBORHOOD CONNECTORS	OFF-ROAD TRAILS
		
TYPICAL FACILITY TYPES:		
Complete Streets that may include the following: • Bike Lanes & Sidewalks • Sidepaths • Paved Shoulders • Shared-use Arrows • Road Crossing Improvements	Complete Streets that may include the following: • Guided Routes • Named Routes • Bike and Pedestrian Boulevards • Neighborhood Greenways • Crossing Improvements Where Neighborhood Connectors Intersect Primary Roadways	• Foot Trails • Soft-surfaced Trails • Hard-surfaced Trails • Road Crossing Improvements Where Trails Intersect Primary Roadways
CONTEXT AREAS:		
• Urban Suburban and Rural Primary Roads (Arterials and Collectors) • Urban and Suburban roads typically have bike lanes or shared lane markings paired with sidewalks or sidepaths • Rural typically has paved shoulders	• Urban and Suburban Local and Residential Roads • Connecting Pathways Through Neighborhood Parks and Schools • Provide alternative routes to busy Primary Links	• Major Parks • Waterfronts • Abandoned Rail Corridors • Active Rail Corridors • Transmission Corridors
PRIMARY TRIP TYPES:		
• Daily Transportation to Work and Personal Business	• Mix of Daily Transportation, Safe Routes to School and Close to Home Recreation	• Use Depends on Location • Recreation Destination
TRIP CHARACTERISTCS:		
• Users Typically Segregated Into Mode Specific Facilities Such as Sidewalks and Bike Lanes • Exposure to High Speed and High Volumes of Motorized Vehicle Traffic • Just as Direct a Path of Travel as Using a Motor Vehicle	• More of a Shared Space, Sidewalks May or May Not Be Present • Moderate Exposure to Low Speed and Low Volumes of Motorized Vehicle Traffic • In Some Cases Trips Via Neighborhood Connectors May Be Longer Than the Same Trip Via Complete Streets	• Non-motorized Users Separated from Motorized Vehicle Traffic • Minimal Exposure to Motorized Traffic at Roadway Crossings • Directness of Travel Depends on the Route and What Resources It Connects

Fig. 3.1B. Proposed Non-Motorized Network



The proposed Non-Motorized Network recognizes that pedestrians and bicyclists are a diverse population and that no one solution will apply to all bicyclists or all pedestrians. Thus bike lanes and sidewalks / roadside pathways have been proposed along all the primary roads in the City. Some of these roads are more oriented to bicyclists and pedestrians than others as they carry fewer motor vehicles and will be designed such to keep motor vehicle speeds in the 30 to 35 mph range. Complementing the primary road system will be a network of neighborhood connectors and off-road trails that provide access to key destinations in the City while minimizing exposure to a large volume of high speed motor vehicles.

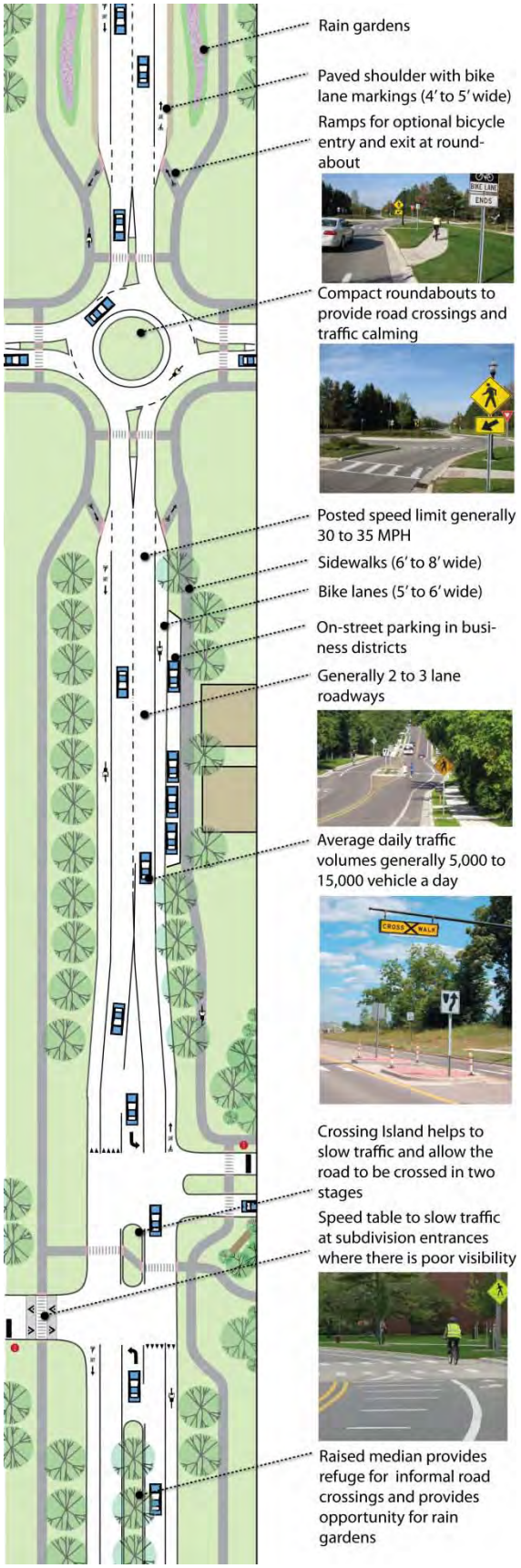


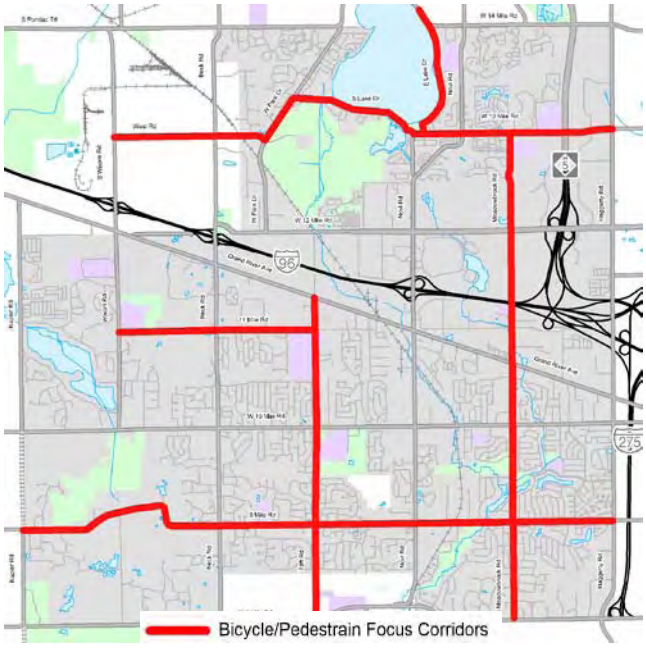
Fig. 3.1C. Bicycle/Pedestrian Focused Corridors

Bicycle/pedestrian focused corridors are roadways where an emphasis will be placed on the needs of the non-motorized user. The roadway will have design elements such as frequent mid-block crossings, mini-roundabouts, medians and street trees that will result in motorists naturally driving the roadway at 30 to 35 mph.

The result is that the road will be a much more comfortable environment to walk along and many bicyclists will be comfortable using bike lanes on these roads.

Bicycle/Pedestrian Corridors include:

- East Lake Drive
- South Lake Drive
- West 13 Mile Road
- West Park Drive (Segment)
- West Road
- Meadowbrook Road
- Taft Road
- 11 Mile Road
- W 9 Mile Road



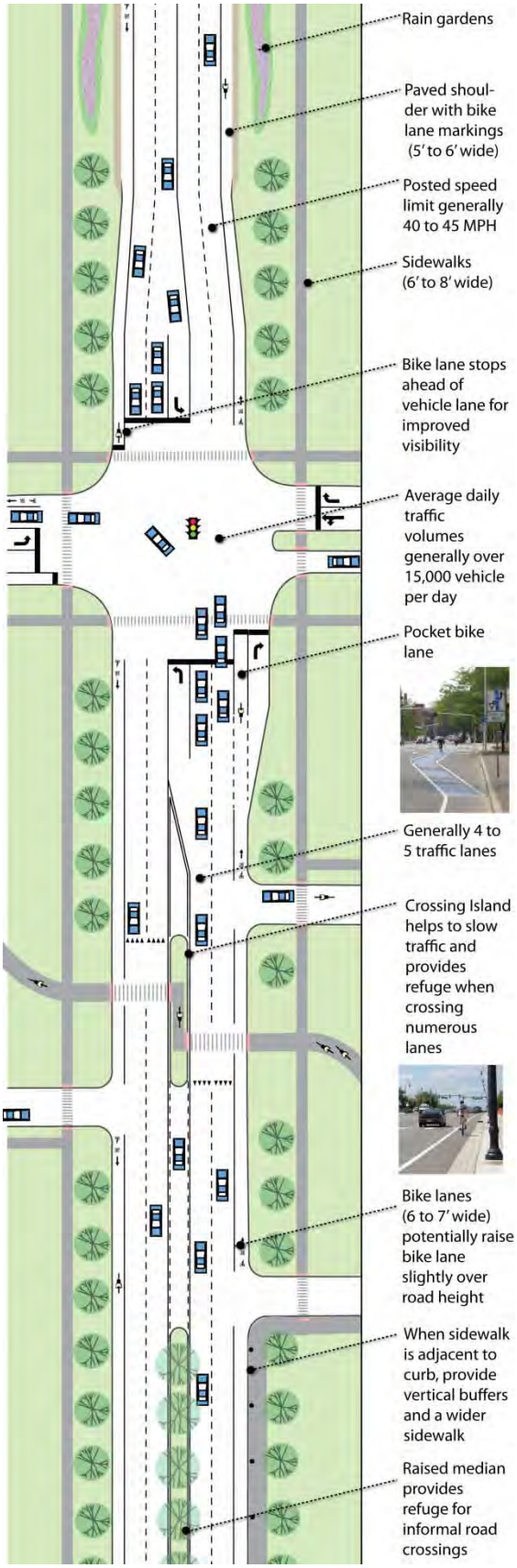


Fig. 3.1D. Auto Focused Corridors

Auto focused corridors recognize that some roads in the City need to carry large volumes of motor vehicles at higher speeds. But even for these roads, bicycle facilities will be provided for non-motorized users commuting to work. Safe road crossing will also be provided between signals where there is demand.

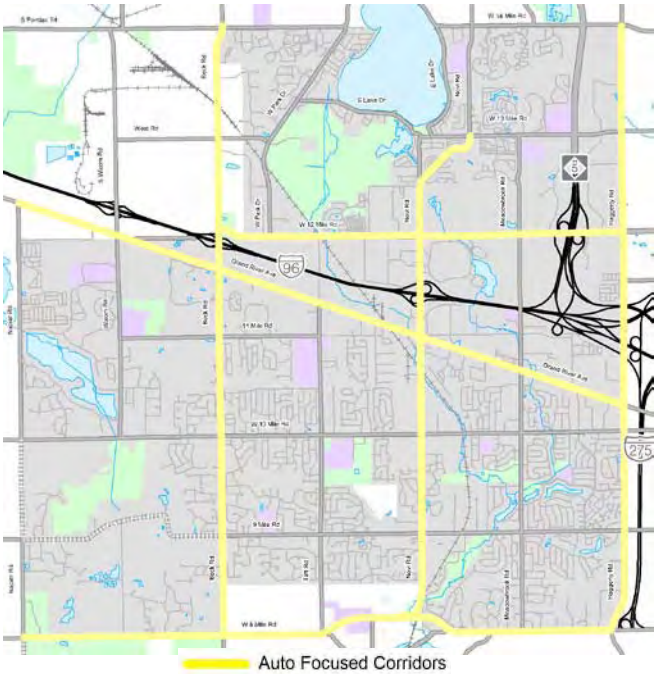
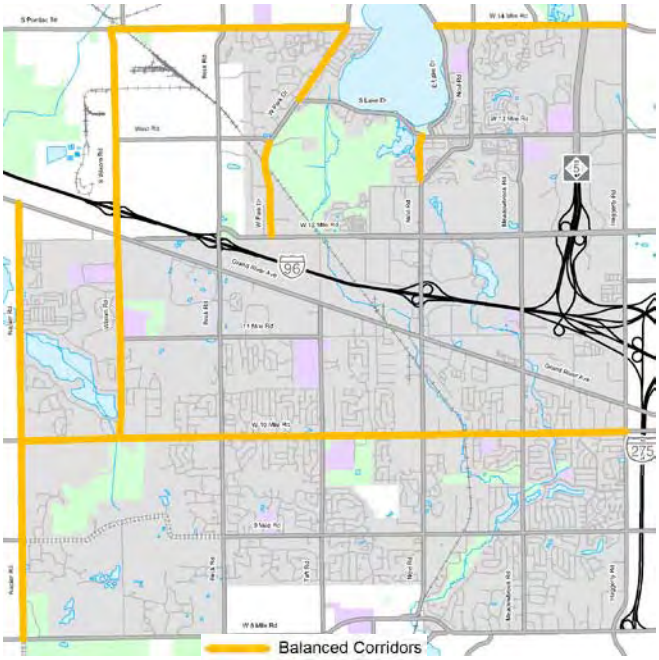


Fig. 3.1E. Balanced Corridors

Balanced corridors try to balance the needs of both non-motorized and motorized users.



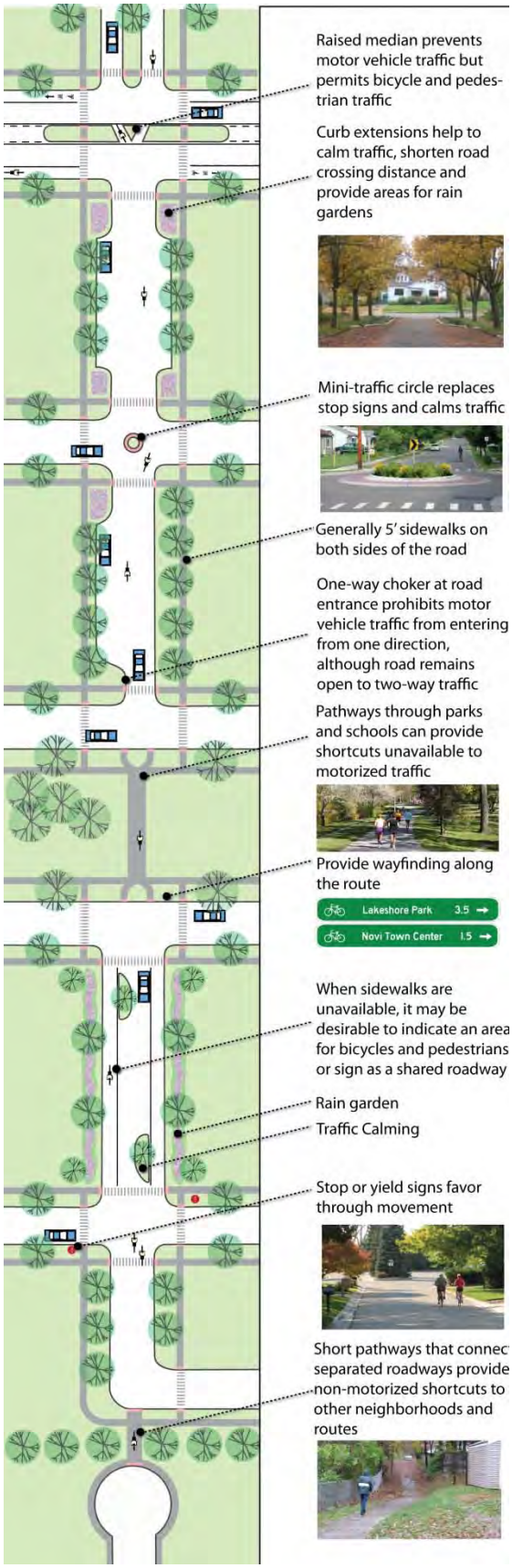


Fig. 3.1F. Neighborhood Connector

Neighborhood connector routes are primarily located on low speed, low traffic volume local roads and connecting pathways. They link neighborhoods to parks, schools and downtowns. Signs provide wayfinding by noting direction and distance to key destinations. Elements such as traffic calming, public art, rain gardens and historic features can be added to enhance the routes.

The local roads in the City of Novi provide great opportunities for neighborhood connector routes, especially for people who prefer to not be along a major arterial or collector road. By incorporating short connecting pathways through schools, parks, and between neighborhoods a tighter network is produced, making it easier for bicyclists and pedestrians to travel through the city.

The connecting pathways are the most critical links in the system, but can also be the hardest to obtain, especially if they pass through private property. It is important to work with the private land owners to obtain easements through these areas.

This plan seeks to provide alternatives and options if it is determined to be impractical to provide the precise route shown.

Fig. 3.1G. Major Off-Road Trail

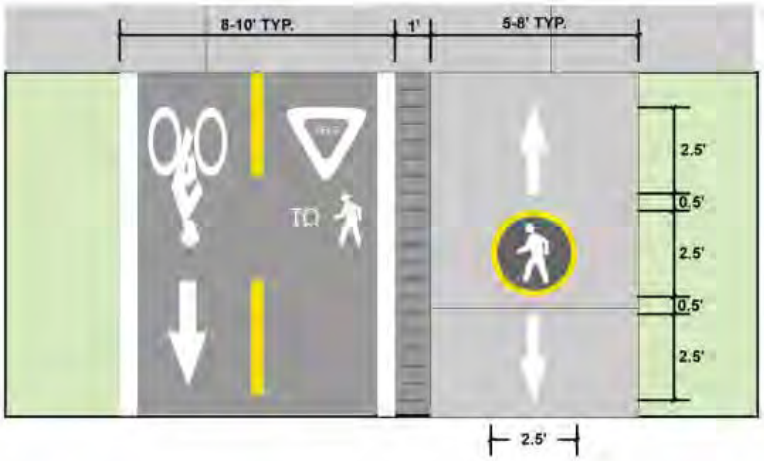
Off-road trails are generally very desirable because they are separated from motorized vehicle traffic. However, they are opportunity-based and unless there is an abandoned rail corridor, existing right-of-way or utility corridor they can be difficult to incorporate into a community.

The City currently has two existing off-road trails, the M-5 Metro Trail and the I-275 Metro Trail. The City also may have a few opportunities to develop off-road trails within the city. They include the following:

- ITC Corridor
- CSX Railroad Corridor
- I-96 Expressway Right-of-way
- City Owned Parks (e.g. Lakeshore Park, ITC Sports Center & Core Habitat Area)

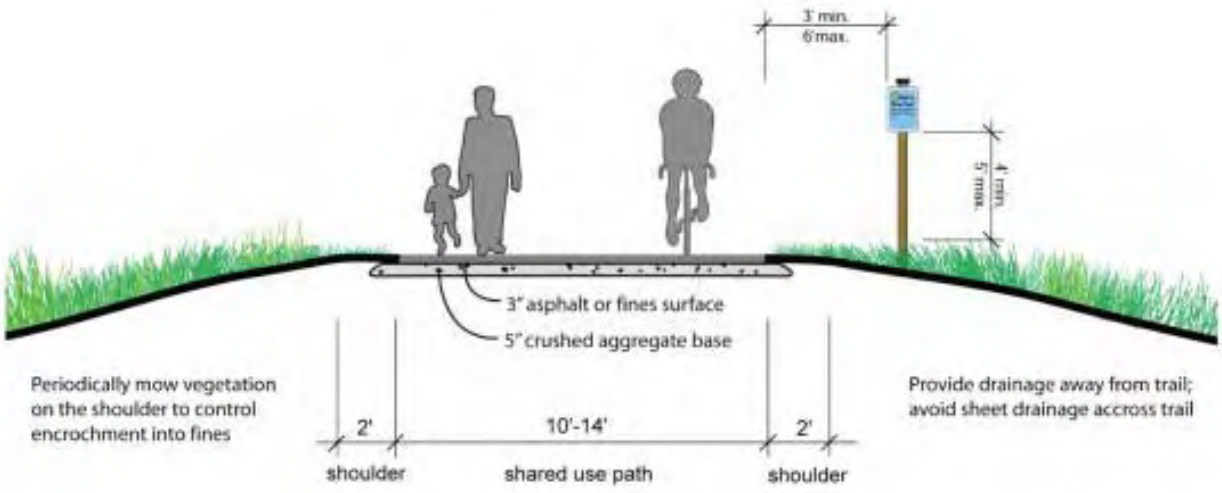
Separated-Use Pathway:

Potential application – areas with high bicycle and pedestrian traffic



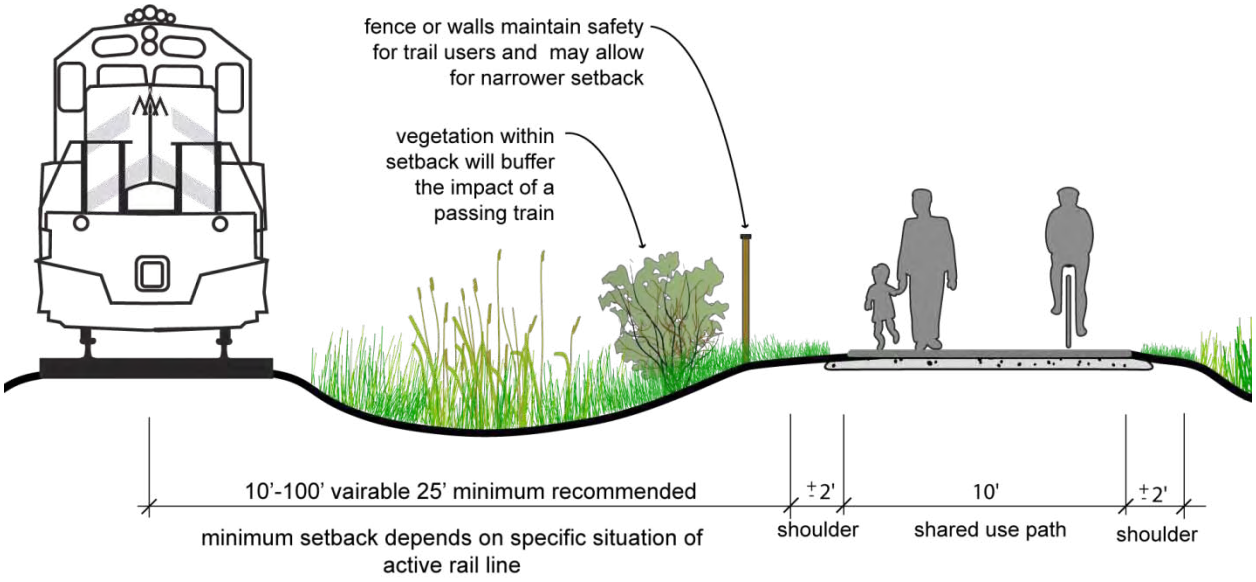
Shared-Use Pathway:

Potential application – Trail through Lakeshore Park



Rail with Trail:

Potential application – CSX Railroad



Shared-Use Pathway:

Potential application – ITC Corridor

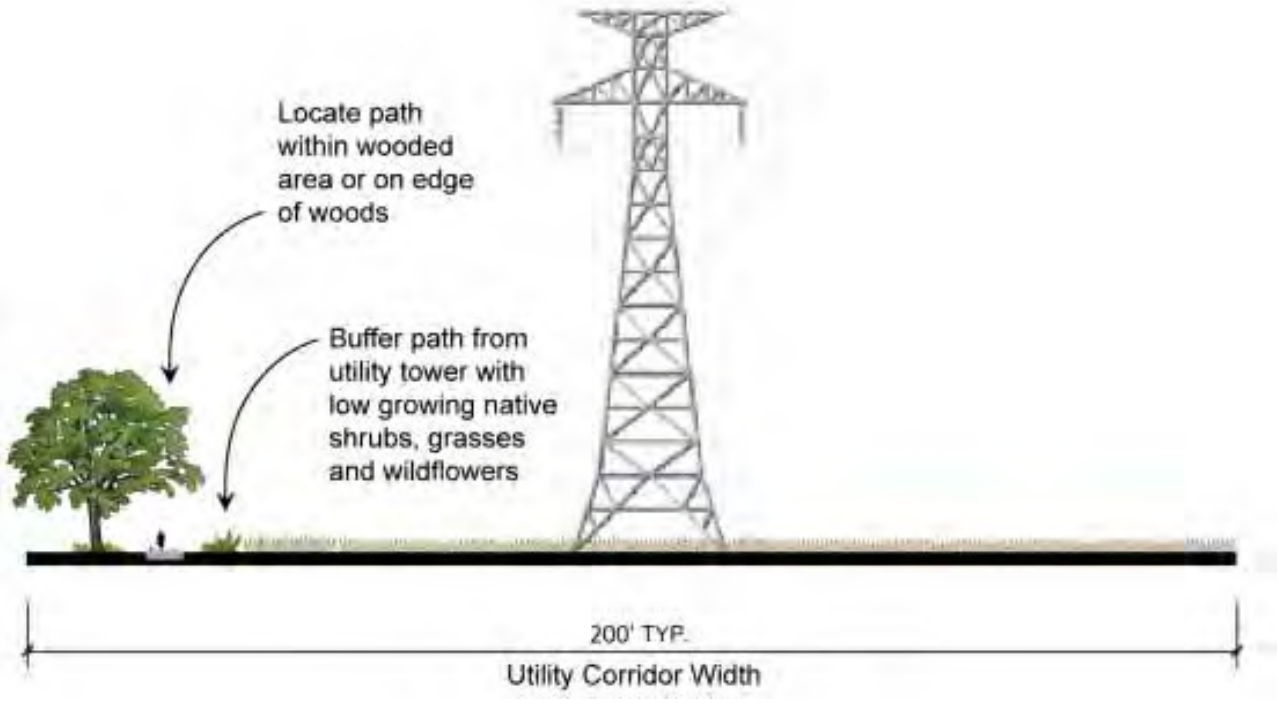
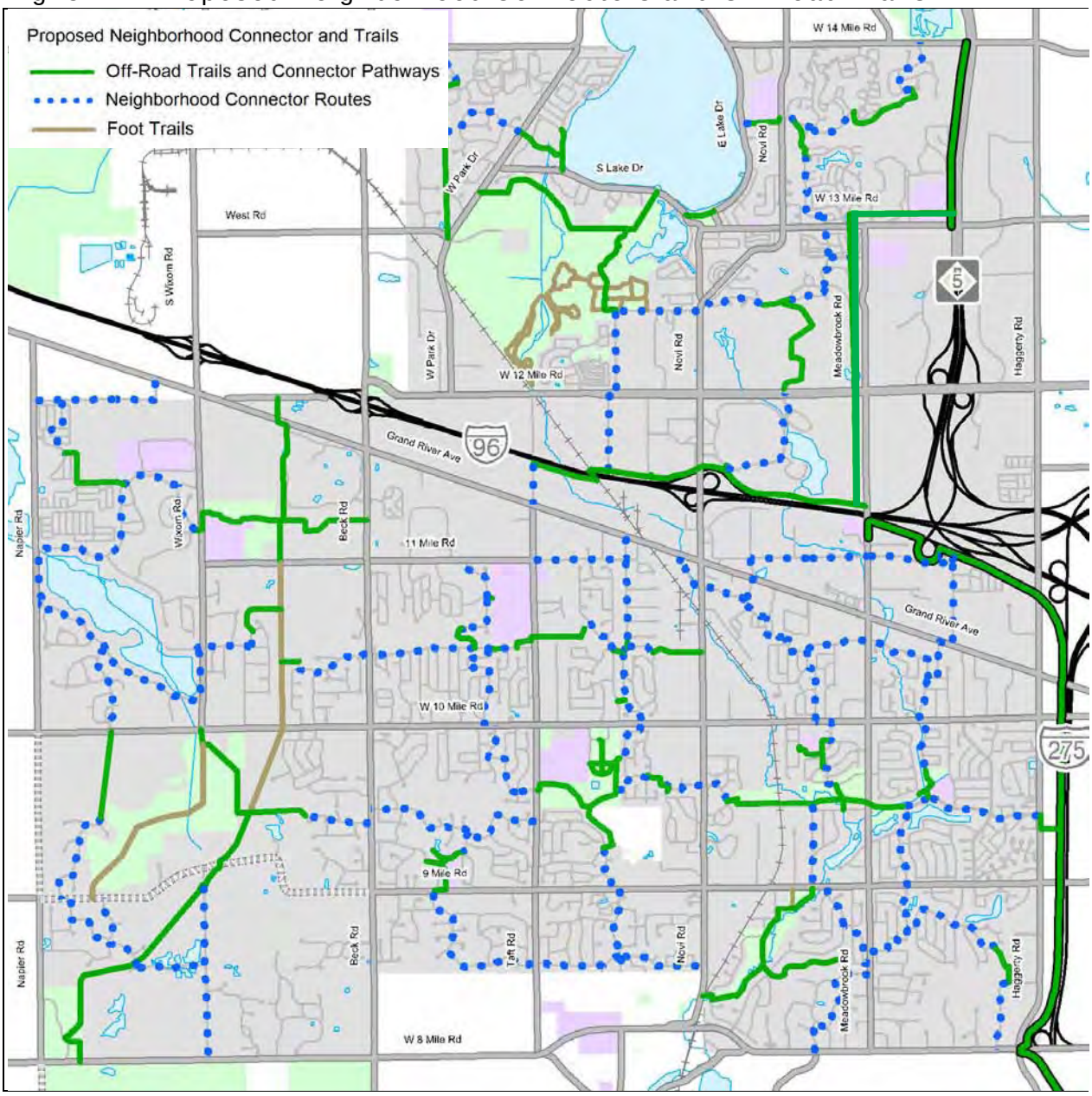


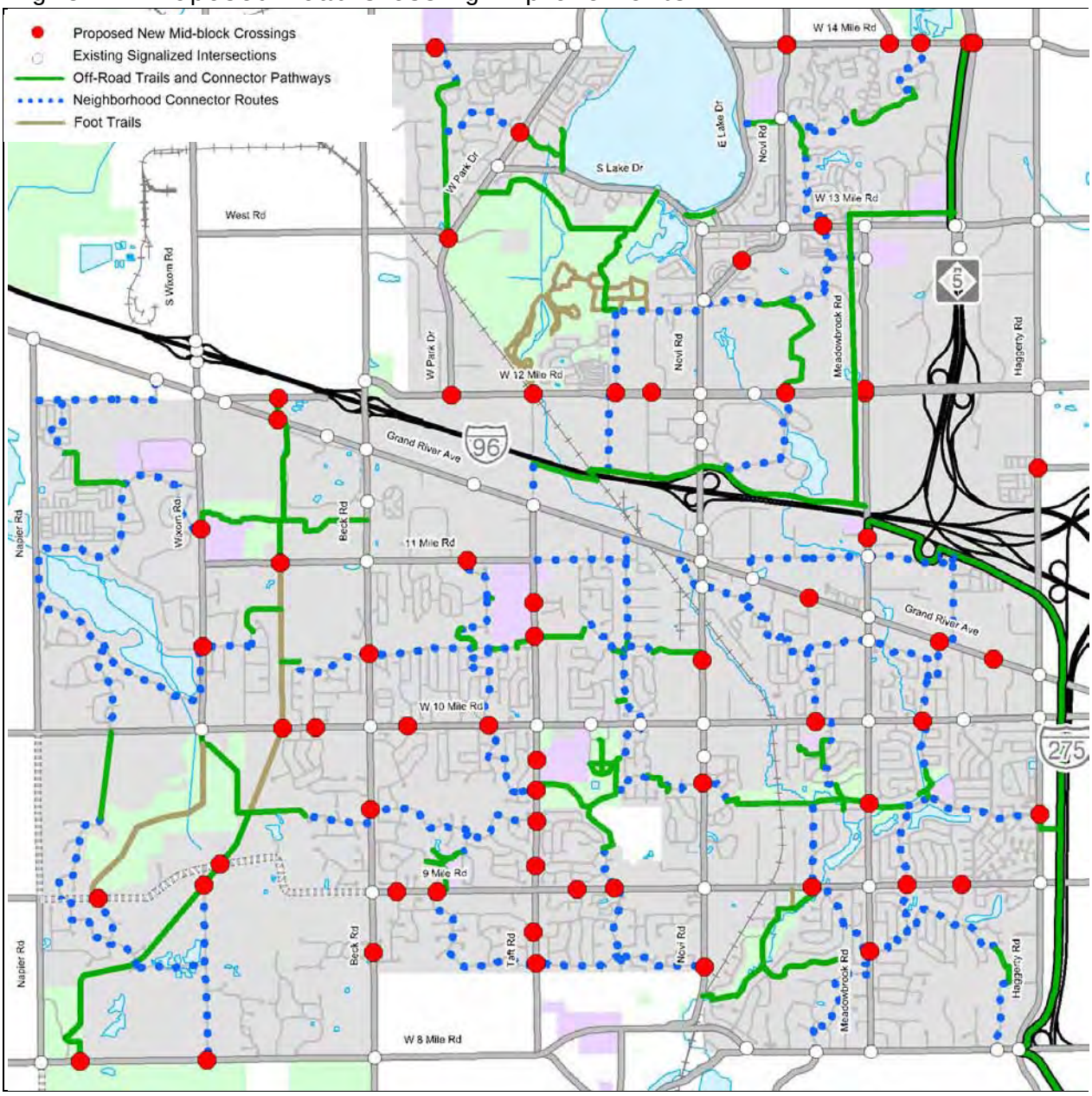
Fig. 3.1H. Proposed Neighborhood Connectors and Off-Road Trails



The neighborhood connector routes and trails provide connectivity between destinations around the city for bicyclists who would not be comfortable bicycling on the primary road system, even if bicycle lanes were present.

Please note that neighborhood connectors are not just restricted to the routes highlighted above. If desired elements of neighborhood connectors are desired, they could be used elswhere in the city as a means to calm traffic, provide non-motorized links and enhance a streetscape.

Fig. 3.1l. Proposed Road Crossing Improvements



Road Crossing Improvements are needed in areas where there is a high demand to cross. These areas occur where a bike route crosses a collector or arterial road, a major bus stop or bus shelter is present, there is a long distance between crosswalks, or there is a high demand based on land use and population density.

This map illustrates where mid-block crossing improvements are needed. Many of these crossings are addressed in the implementation plan with the neighborhood connector routes and major corriodor developments. However, if demand is present they can be implemented sooner. Please note that these are initial recommendations and they need to be studied further prior to implementation.

Fig. 3.1J. Proposed Regional Trail Connections

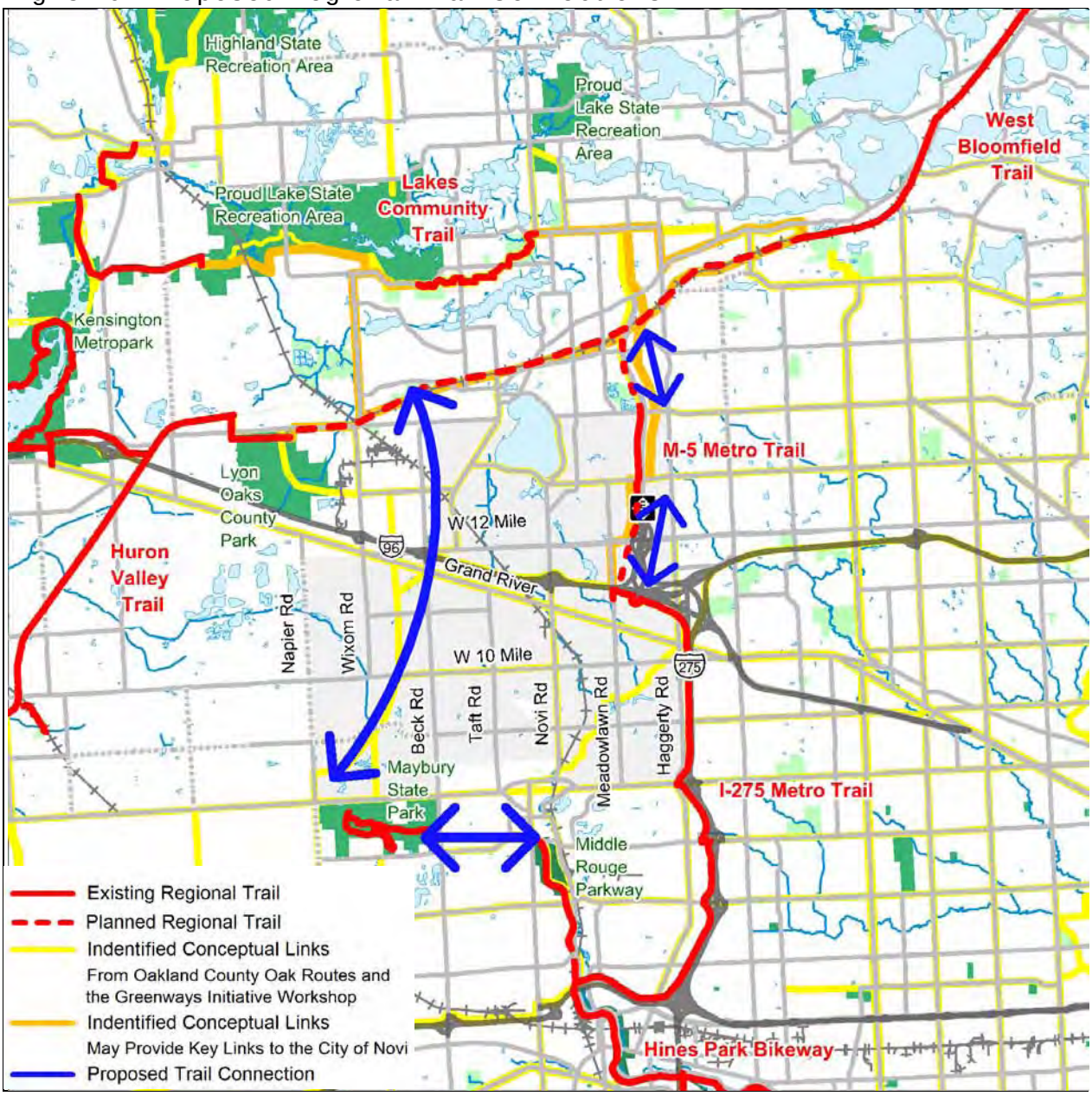
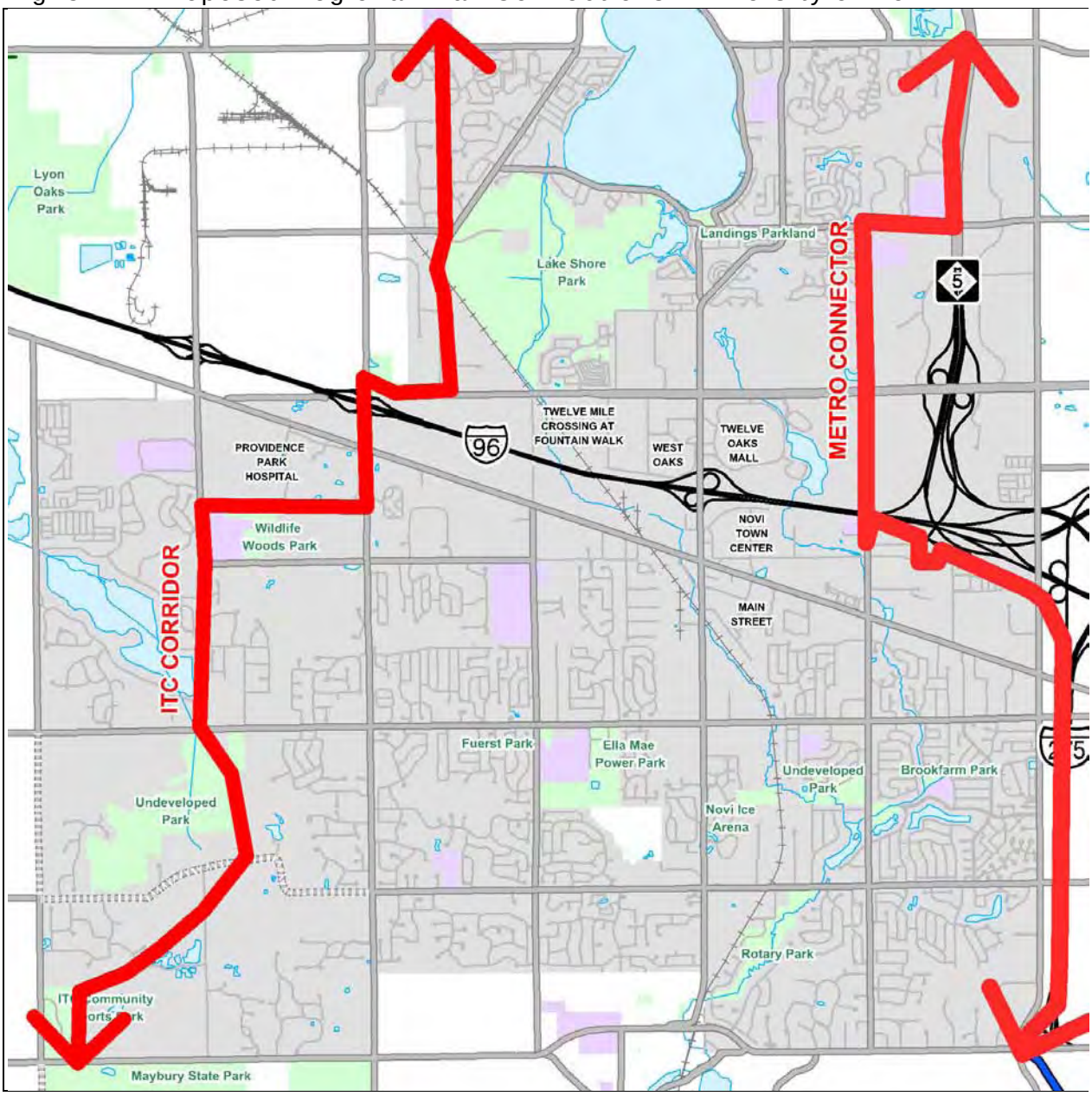
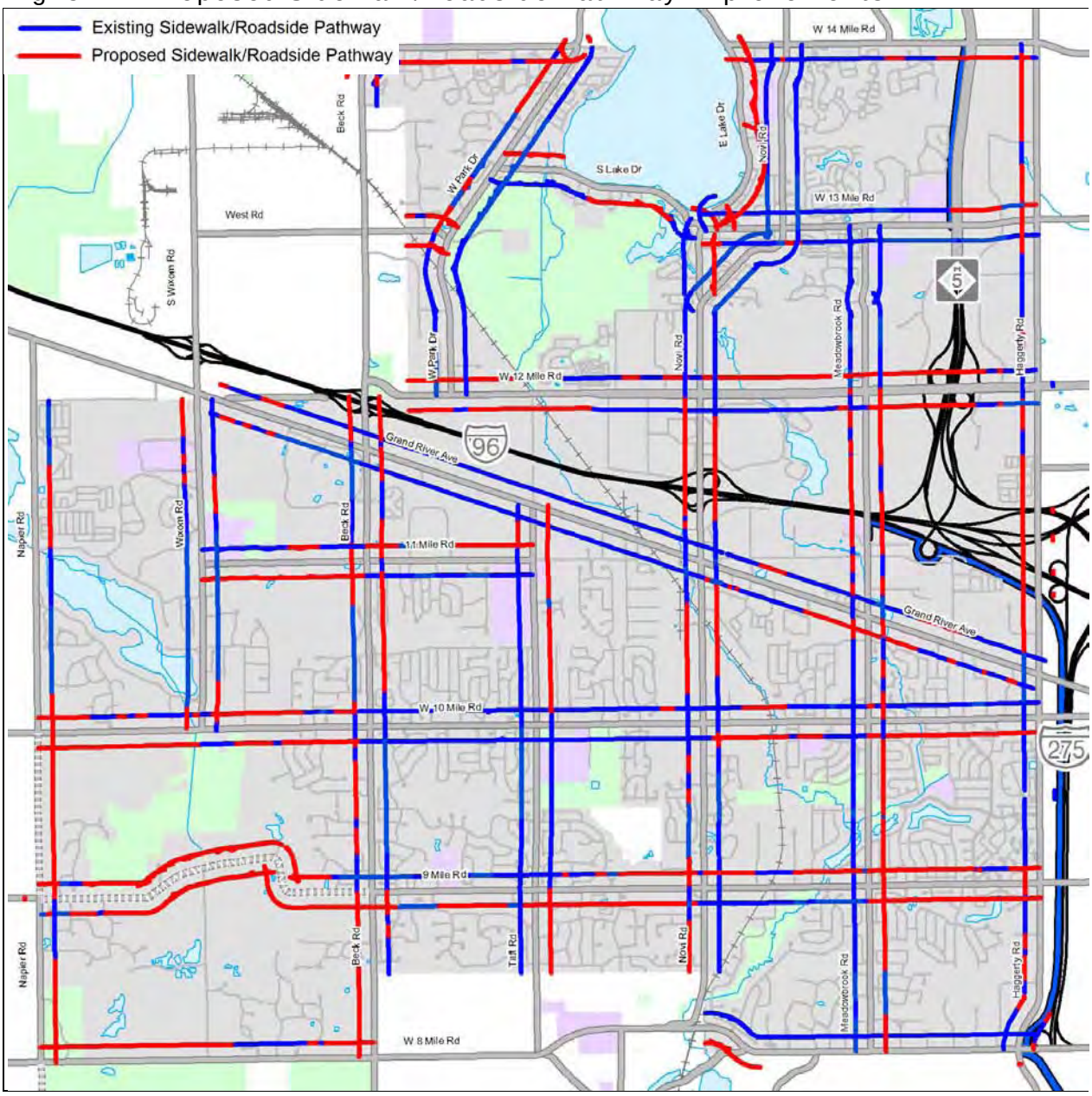


Fig. 3.1K. Proposed Regional Trail Connections in The City of Novi



The proposed ITC Corridor and Metro Connector provide two major regional connections across the City of Novi. The Metro Connector route would consist of a roadside pathway along Meadowbrook Road and 13 Mile. The ITC Corridor is a combination of off-road trails and roadside pathways.

Fig. 3.1L. Proposed Sidewalk/Roadside Pathway Improvements



Ideally, all roads should have sidewalks on both sides of the street. The city currently has 5' sidewalks and 8' roadside pathways. In the future, it would be ideal for sidewalks along major collector and arterial roads to have a minimum width of 6' with a buffer zone and vertical elements such as trees between the sidewalk and road. Please refer to Section 5.1 and 5.4 for more details.

3.2 Implementation Plan

The proposed improvements fall into five tasks. The first task is Initial Investments. This task includes projects that should be done immediately because they complete critical gaps and address safety concerns.

Initial Investments

- Mostly locally funded projects
- Addresses critical gaps in the system
- Addresses safety concerns

After the Initial Investments are completed, the following four tasks should be implemented concurrently as opportunities and funding become available. The four parallel tasks include, Major Corridor Development, Neighborhood Connectors, Sidewalk Gaps, and Construction Integration. Major Corridor Development includes systematic projects that are capital intensive and are of a regional and/or cross community/county significance. Neighborhood Connectors, and Sidewalk Gaps are projects of a local significance that may or may not be as capital intensive and may have some near-term and mid-term solutions. Construction Integration projects include projects that will probably not be done on their own, but will be integrated as part of a larger construction project.

Major Corridor Development

- Cross city bike/pedestrian focused corridors most of which have either regional significance or are important to neighboring communities as well
- High capital investment projects likely supported by federal and state grants
- Generally involve multiple agencies

Neighborhood Connectors

- Locally funded projects
- Low capital investment projects
- Intra-city network oriented

Sidewalk Gaps

- Locally funded projects
- Prioritized to have the most impact for the investment and to respond to public demand
- Extension of the city's current sidewalk prioritization process

Construction Integration

- Projects that can be integrated as part of a larger construction project, such as bike lanes when a road is resurfaced

Some of the improvements include relatively modest changes such as road conversions and signage and others may take longer based on opportunities and available funding. Each task may take multiple years to implement. The speed of the implementation depends on the amount of money the city dedicates to the implementation along with the success of obtaining outside funding.

These tasks were determined based on public input, existing conditions, existing sidewalk and pathway prioritization plan, regional trail plans, geographic distribution and desire to create key cross-community connections. A relative demand analysis was also done to help identify areas where there is the most potential for non-motorized activity.

Cost Estimate Introduction

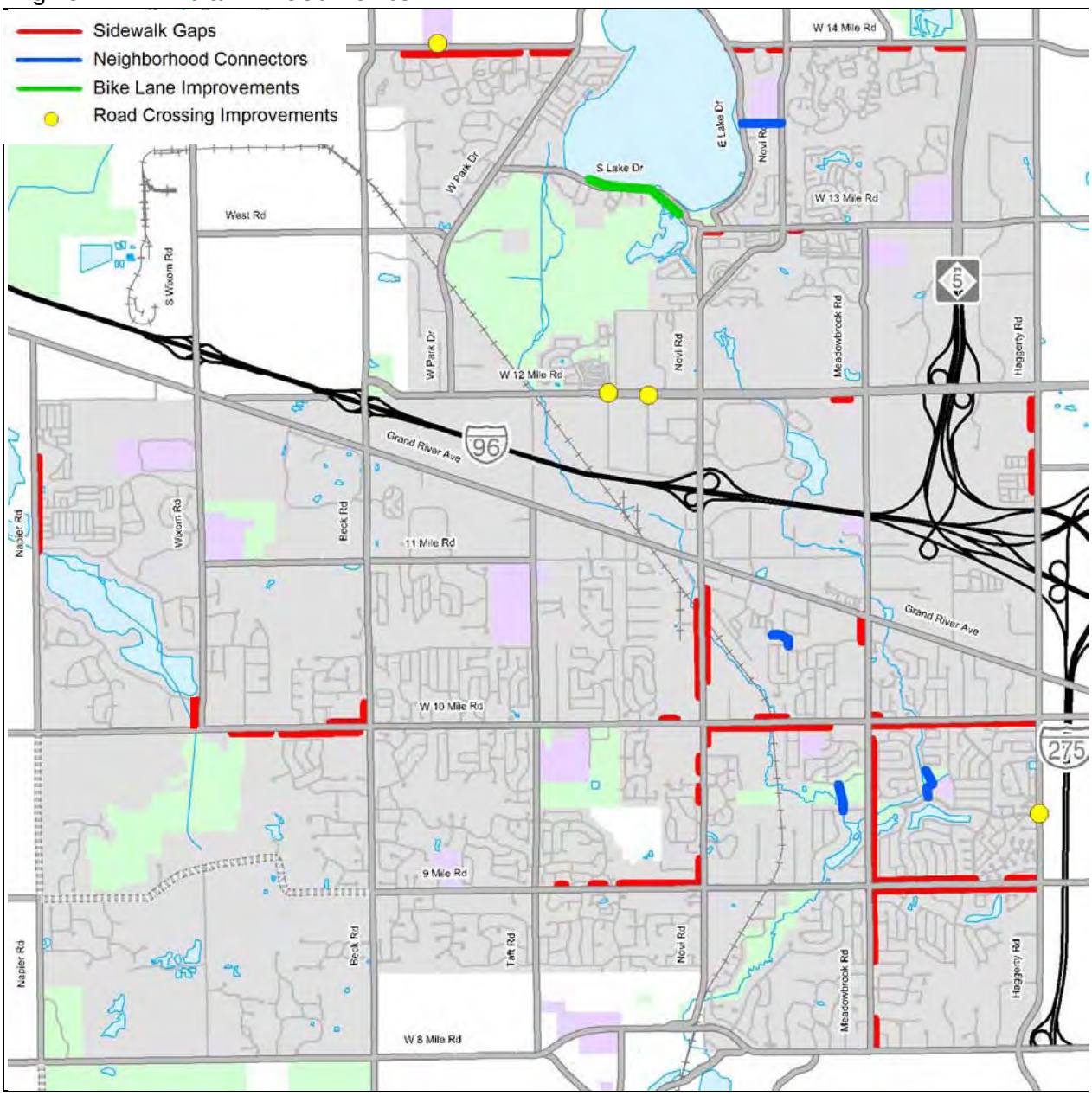
In order to illustrate magnitude of costs and begin planning and budgeting for implementation, planning level cost estimates have been completed for the improvements proposed in the Initial Improvements category as well as the top 3 Major Corridor Development projects. In addition, cost estimates for a handful of "typical" treatments have been developed so that staff can consider these treatments in other areas of the City if so desired.

It should be noted that these estimates are based on concepts only, and while they include healthy (20%) contingencies, they are not based on detailed designs. Quantities were derived from GIS data and aerial imagery. If the City moves forward with implementation, detailed design will be completed and construction cost estimates recalculated at that time.

Acquiring Right –of-Way

Please note that acquiring easements and right-of-way will add to the financial burden of implementation, and can sometimes be as much as the project cost itself. Please refer to the appendix for a detailed breakdown of the cost estimate for the initial investments and top three major corridors where easement issues are reflected.

Fig. 3.2A. Initial Investments



This task focuses on the top sidewalk and pathway gaps and other critical links and safety concerns.

Initial Investments

Complete Sidewalk Gaps
The City of Novi has an existing sidewalk and pathway prioritization process that prioritizes all of the sidewalk gaps in the city. The initial investments include the top 20 sidewalk gaps that are listed in this report.

In addition to the City's top 20 gap improvements, the following additional sidewalk gap improvements should be made to help establish long segments of sidewalk and to connect isolated neighborhoods to the system:

- 14 Mile between Novi Road and M-5 Trail
- Napier Road, build sidewalk on the east side of street between Old Dutch Farms Mobile Home Park and Island Lake
- 12 Mile on the south side of the street build missing sidewalk gap just to the west of Meadowbrook
- Wixom Road on the west side between 10 Mile Road and Island Lake
- 13 Mile on the south side of road build missing sidewalk gaps between Old Novi Road and Meadowbrook Road

Safety Concerns
Road Crossing improvements are needed where there are existing signals with no pedestrian crossing.

- The half-signals along the boulevard portion of 12 Mile Road west of Novi Road
- The intersection of Haggerty and Village Wood Drive
- South Side of Pontiac Trail at Geisler Middle School

The other safety concern that will be addressed is modifying the bicycle and pedestrian pavement markings on South Lake Drive. The existing one-way bike lane on a two-way road presents safety concerns because bicyclists tend to travel the wrong direction in the bike lane, riding against the flow of traffic. There is also a significant amount of pedestrian traffic that uses the shoulder. To address this situation, the paved shoulder will be designated for pedestrian use. Bicyclists will be encouraged to ride in the road with the flow of traffic through the use of Shared-Use Arrows and Share the Road Signage.

Critical Links
Short connecting pathways are important to help link people to nearby neighborhoods, parks and schools. The following short connector pathways should be constructed. Please note that easements may need to be obtained across school property and where conservation easements are located. Each has been labeled as Neighborhood Connector (NC) 1 through 4 to correspond with the cost estimates.

- Link through Hickory Woods Elementary between Novi Road and East Lake Drive (NC-1). Please note that this segment follows the existing right-of-way and would require access across the school property.
- Link connecting the neighborhood to the north through Brookfarm Park to Village Oaks Elementary (NC-2). Please note that this route would utilize the existing bridge over the creek between Brookfarm Park and Village Oaks Elementary and would connect to the existing walkway at Brookfarm Elementary School.
- Link through Undeveloped Park near Meadowbrook Road and Malott Drive connecting the neighborhood to the north to the neighborhood to the south (NC-3). Please note that there is a

conservation easement in this park that prohibits trail and pathway development in this park, and will require additional review to determine feasibility for a future link location.

- Link connecting subdivision to residential development west of Meadowbrook between 10 Mile Road and Grand River Avenue (NC-4). Please note that there is an existing connection between these neighborhoods, however the city would need to obtain access through the private development.

Initial Investments Costs Estimates

Planning level cost estimates for the "Initial Investments" category are summarized in the following table. Details of each estimate can be found in the appendices. Costs are associated with each Segment ID (previously assigned by the City). These are estimates that primarily focus on sidewalk gaps as well as 4 neighborhood connectors identified as priorities during the planning process. Each estimate includes:

- 5% for mobilization
- 20% contingency
- 25% professional fees (design, legal, construction administration)
- For those segments where easements are anticipated in order to construct, an approximate easement size, in square feet, is estimated (included in the appendices). The cost associated with easements will likely differ in each case but must be considered as it will impact the final cost.

As is depicted in Figure 3.2B., there are 25 sidewalk/path segments included in the Initial Investment Phase with an estimated design and construction cost of $4.88 million. In addition, there are 4 Neighborhood Connector segments proposed in the Initial Investment phase with an estimated design and construction cost of $260,000.

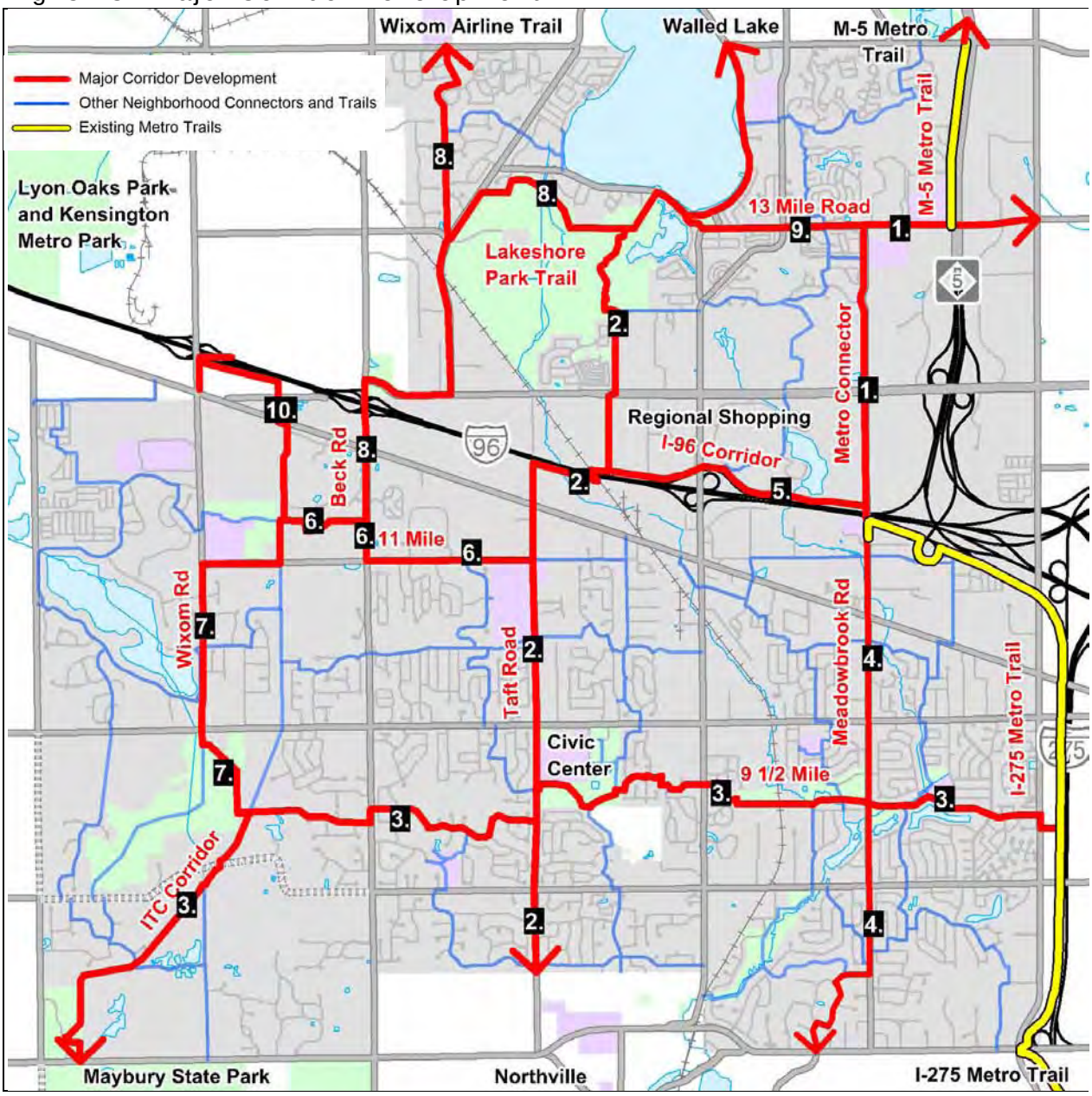
TOTAL INITIAL INVESTMENTS COST ESTIMATE = $5.14 million in addition to the cost of easements

Fig. 3.2B. Initial Investments Cost Estimate Summary

Segment	Priority	Location Description		Cost Estimate
Neighborhood Connectors				
	NC 1	East Lake Dr to Novi Rd		$68,667.97
	NC 2	Brookfarm Park		$30,214.84
	NC 3	West of Meadowbrook between Nine Mile and Ten Mile		$111,816.02
	NC 4	West of Meadowbrook between 10 Mile and Grand River		$49,321.88
			TOTAL NEIGHBORHOOD CONNECTORS	**$260,020.70**
Road Crossing Improvements				
	#1	12 Mile at Caberet Dr.		$197,459.38
	#6	12 Mile at Carlton Way		$306,709.38
		Haggerty at Village Wood Drive		$72,656.25
		Pontiac Trail at Geisler Middle School		$23,765.63
			TOTAL ROAD CROSSINGS	**$600,590.64**

Segment	Priority	Location Description			Cost Estimate
Sidewalk/Path Gaps					
121	19	Nine Mile	South	Between Haggerty and Meadowbrook	$340,755.86
119	13	Meadowbrook	East	Between Eight Mile and Nine Mile	$274,638.28
83	1	Nine Mile	North	Between Haggerty and Meadowbrook	$301,787.50
84	20	Meadowbrook	East	Between Nine and Ten Mile	$604,261.72
81	6	Ten Mile	South	Between Haggerty and Meadowbrook	$625,854.30
80B	10	Ten Mile	North	East of Meadowbrook	$13,681.64
90	8	Ten Mile	South	Between Meadowbrook and Novi Rd	$450,487.11
89	11	Novi Rd	East	Between Ten Mile and Ice Arena	$139,187.50
92	5	Novi Rd	West	Between Nine and Ten Mile	$238,716.80
93	12	Nine Mile	North	Between Novi and Taft	$173,249.22
62	14	Ten Mile	North	Between Novi and Taft	$83,462.89
25	90	Haggerty Rd	West	Between Twelve Mile and I-696	$149,022.66
129	50	Fourteen Mile	South	Between two subdivisions	$101,885.94
1b	71	Fourteen Mile	South	Just west of M-5	$73,396.88
4	39	Fourteen Mile	South	Just west of Novi Rd	$15,052.73
5	54	Fourteen Mile	South	Just east of East Lake Dr	$37,841.80
9	9	Pontiac Trail	South	West of West Park Dr	$302,424.61
55	15	Beck Rd	West	Just north of Ten Mile	$66,323.83
54	15	Ten Mile	North	Just west of Beck	$92,660.16
99	17	Ten Mile	South	Between Beck and Wixom Rd	$304,843.36
44	78	Napier Rd	East	Between Twelve Mile and Island Lake Dr	$379,062.11
29		Twelve Mile Rd	South	Between Meadowbrook and Twelve Oaks Mall	$29,084.38
15		13 Mile Rd	South	Between Old Novi Rd and Martin Avenue	$20,009.77
16b		13 Mile Rd	South	Between Novi Rd and Holmes Rd	$22,010.55
48		Wixom Rd	West	Between Ten Mile and Island Lake	$37,585.55
144		Meadowbrook	West	Between Grand River and Ten Mile Rd	$56,835.94
				TOTAL SIDEWALK/PATH GAPS	**$4,934,123.08**
				TOTAL INITIAL INVESTMENTS	**$5,794,734.43**

Fig. 3.2C. Major Corridor Development



Major regional, city and countywide connections across the city that provide a backbone to the non-mototrized system.

Major Corridor Development

The following improvements are listed in order of implementation. The order of implementation was developed based on public input, near-term opportunities, demand and where the majority of the population would be served. These are large multi-year projects that may be implemented in pieces based on opportunities and funding. Overall, they will provide the framework for the non-motorized system. If opportunities arise for projects lower on the list those projects should be completed first.

1) Metro Connector (See Figure 3.2C.)

Provide connection between the existing I-275 Metro Trail and existing M-5 Trail.

- Extend I-275 Metro Trail south (using 10' wide asphalt) to Bridge Street and provide crossing island on Meadowbrook Road
- Construct 10' wide asphalt path along the west side of Meadowbrook Road between 11 Mile Road and 13 Mile Road.
- Construct 10' wide asphalt path along the north side of 13 Mile Road between Meadowbrook and the M-5 Metro Trail
- Narrow the travel lanes to 11', pave 5-6' shoulder, and strip for bike lanes on Meadowbrook Road between 11 and 12 Mile Roads
- Add temporary shared lane markings and shared the road signs to Meadowbrook Road between 12 Mile Road and 13 Mile Road until road is reconstructed and bike lanes are added
- Improve pedestrian crossing at 12 Mile and Meadowbrook Road intersection
- Provide wayfinding signage to direct users from the M-5 Metro Trail to the I-275 Trail

2) Taft Road Corridor (See Figure 3.2C.)

Provide connection along Taft Road Corridor connecting to Northville to the south and Walled Lake to the north.

- Completion of the sidewalk/path system
- Addition of bike lanes along Taft Road by paving 5-6' wide shoulders and striping/signing
- Improve the following intersections to provide for safe crossings and room for bike lanes. Refer to section 5.4 Subdivision Entrances for more details.
    - Galaway Drive – Subdivision Intersection Design (Figure 5.4AB)
    - Princeton/Byrne – Mid-Block Crossing and Rectangular Rapid Flash Beacon
    - Dunbarton Dr – Subdivision Intersection Design (Figure 5.4AB)
    - White Pine Dr –Subdivision Compact Roundabout (Figure 5.4AD)
    - Addington Lane – Subdivision T-Intersection Design (Figure 5.4AC)
    - Novi High School Entrances – Subdivision T-Intersection Design (Figure 5.4AC)
    - Emerald Forest Blvd – Subdivision T-Intersection Design (Figure 5.4AC)
    - Between Jacob Drive and the entrances to Novi Woods Elementary, Meadows School, and Parkview Elementary – Subdivision T-Intersection Design (Figure 5.4AC)
- Construct 10' wide asphalt trail along Taft Road north of Grand River Avenue

- Construct 10' wide asphalt trail along south side of I-96 corridor, utilize the existing CSX underpass to get under I-96, cross over the CSX railroad, and continue the trail along the north side of I-96 along the ITC property connecting to Fountain Walk Drive
- Extend sidewalk south along Cabaret Drive to connect into proposed trail
- Provide on-street bike route on Cabaret Drive and Dixon Road
- Include a Pedestrian Hybrid Beacon (HAWK) at 12 Mile Road/Cabaret Drive Intersection
- Construct 10' wide asphalt trail through Lakeshore Park to connect to Lakeshore Drive (remain on high ground and avoid existing mountain bike trails as much as possible)
- Include wayfinding signage along route to direct users

Crossing I-96 at the Railroad tunnel may present some challenges. If that is the case evaluate providing a separate non-motorized crossing at Taft Road and the I-96 expressway.

3) 9 ½ Mile Neighborhood Greenway (See Figure 3.2C.)
Provide a connection that parallels 9 and 10 Mile Road along the local roadways using short connecting pathways through schools, parks and undeveloped open space.

- Include road crossing improvements where the proposed route crosses a collector or arterial street including:
  - Novi Road –Compact Roundabout (Figure 5.4AD)
  - Meadowbrook Road – Crossing Island
  - Taft Road - Compact Roundabout (Figure 5.4AD) (also included in Taft Road Corridor Project)
  - Beck Road - Subdivision T-Intersection Design (Figure 5.4AC)
- Provide crossing of railroad near Novi Ice Arena. If crossing is unattainable, provide alternate route on 10 Mile Road by completing sidewalk gaps and providing at-grade railroad crossing..
- Obtain easements and build short connector pathways (10' wide asphalt)
- Provide traffic calming techniques on local neighborhood streets
- Construct the south extension ITC Corridor Trail connecting 9 ½ Mile Neighborhood Greenway South to ITC Park and Maybury State Park
- Include wayfinding signage along route to direct users

4) Meadowbrook Road South of I-96
Provide connection along Meadowbrook Road Corridor.

- Completion of the sidewalk/path system
- Addition of bike lanes along Meadowbrook Road by paving 5-6' wide shoulders and striping/signing
- Improve the following intersections to provide for safe crossings and room for bike lanes. Refer to section 5.4 Subdivision Entrances for more details.
  - Chattman Drive - Subdivision T-Intersection Design (Figure 5.4AC)
- Marks Drive/Fawn Trail – Midblock Crossing Island between both streets

- Implement neighborhood connector route and include wayfinding signage along route to direct users

5) I-96 Corridor (See Figure 3.2C.)

Provide a connection that parallels the north side of the I-96 expressway and connectos Taft Road and Meadowbrook Road to the Regional Shopping Centers.

- Build trail along north side of I-96 Expressway utilizing MDOT and ITC property
- Provide trail crossing at Novi Road by improving existing intersection
- Work with the adjacent landowners to provide access from the trail to the shopping centers

Long-term:

- Provide trail crossing on Meadowbrook Road when sidewalk gaps along the west side of the road are complete

6) 11 Mile/Beck Road/Providence Park Hospital/ Wild Woods Park (See Figure 3.2C.)

11 Mile Road:

- Complete Sidewalk and Pathway Gaps along 11 Mile Road
- Provide Mid-block Crossings on 11 Mile Road where proposed neighborhood connector route intersection with 11 Mile Road
- Add Shared-use arrows on 11 Mile Road in the near-term until the shoulders are paved and bike lanes can be included

Beck Road:

- Complete Sidewalk and Pathway Gaps along roadway
- Provide Mid-block Crossings

Providence Park Hospital

- Obtain easements to construct pathway between Wixom Road and Beck Road

7) Wixom Road/Undeveloped Park (See Figure 3.2C.)

Wixom Road:

- Complete Sidewalk and Pathway Gaps along roadway
- Provide Mid-block Crossings

8) Beck Road/West 12 Mile Road/West Park Dr/Off-road Trail (See Figure 3.2C.)

Beck Road

- Complete Sidewalk and Pathway Gaps on west side of road
- Add sidewalks to both sides of I-96 overpass (see Figure 3.3C.)
- Improve road crossing at Beck Road and W 12 Mile

12 Mile Road

- Complete Sidewalk and Pathway Gaps along north side of W 12 Mile Road

W Park Dr Off-road Trail Extension

- Improve road crossing at West Park Drive and West Road
- Building 10’ shared use path along city owned property north of West Road
- Provide bike route along Portside Drive to connect trail to South Pontiac Trail

9) Lakeshore Park/13 Mile Road (See Figure 3.2C.)

Lakeshore Park

- Add 10’ shared use path through north side of Lakeshore Park paralleling South Lake Road

W 13 Mile Road Corridor

- Complete Sidewalk and Pathway Gaps
- Add Bike Lanes to West 13 Mile Road through road conversions and paving the shoulders

10) ITC Corridor– North Extension (See Figure 3.2C.)

- Obtain easement and construct off-road trail along ITC corridor
- Obtain easement to construct off-road trail along the west edge of Providence Park Hospital where ITC property stops
- Improve road crossing on Grand River Avenue
- Work with Wixom to continue trail extension northwest through the Beck Road/I-96 Interchange and over to Lyon Oaks Park (See Figure 3.3D.)

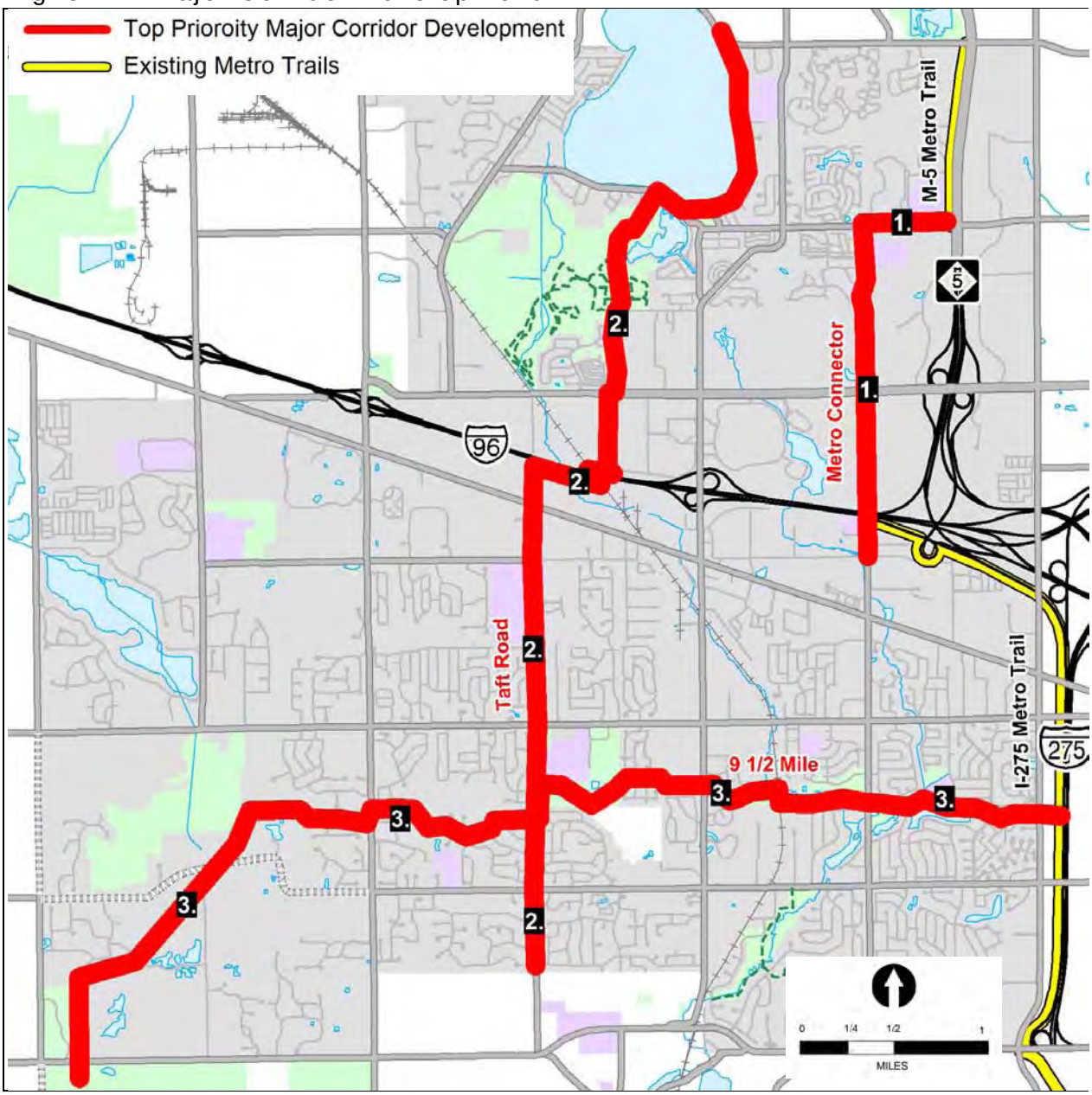
Major Corridor Development Cost Estimates

A number of projects were identified and categorized as a “Major Corridor Development”. However, 3 are considered top priority projects (Figure 3.2D.) based on input during the planning process, connecting regional systems, and potential for outside funding assistance.

1. Metro Connector
2. Taft Road Corridor
3. 9 1/2 Mile Neighborhood Connector

The following describes the routes and proposed improvements in more detail and provides a planning level cost estimate. More detail of the planning level cost estimate can be found in the Appendix.

Fig. 3.2D. Major Corridor Development



Metro Connector

The Metro Connector is a high priority project to connect the existing 40+ mile I-275 Metro Trail and the existing M-5 Metro Trail. The proposed connector route is along Meadowbrook Road and 13 Mile Road.

TOTAL METRO CONNECTOR COST ESTIMATE = $886,000 in addition to the cost of easements

This is a good candidate project (or at least parts of it) for outside funding assistance. If a Transportation Enhancement grand application is submitted, a discussion should take place with MDOT regarding the options of concrete removal and replacement with new 10' wide asphalt (as estimated) versus adding additional concrete width to existing paths to meet AASHTO standard of 10' wide. Potential funding sources include the MDOT Enhancement Program, the MDNRE Trust Fund, and CMAQ.

Taft Road Corridor

The Taft Road Corridor project is intended to showcase a truly "complete street" within the City of Novi with considerable improvements made to more safely accommodate pedestrians and bicyclists as well as reduce vehicular travel speeds. The Taft Road Corridor has been identified as a "Bicycle/Pedestrian Focused Corridor" and has the potential to serve as a major north-south non-motorized route within the City as well as to Northville and Walled Lake.

TOTAL TAFT ROAD CORRIDOR COST ESTIMATE = $5.05 million in addition to the cost of easements

Due to size and cost, this project would most likely be implemented in phases. This is a good candidate project (or at least parts of it) for outside funding assistance. If grant funds are used, it's anticipated they would be used to construct particular segments of the proposed improvement such as the intersection improvements, the I-96/RR crossing, and/or the addition of bike lanes along Taft Road. The planning level cost estimate includes a $1 million allowance for the I-96/RR crossing. This area will require more detailed analysis and coordination with MDOT, ITC, and CSX before being able to develop a more accurate cost estimate. Potential funding sources for portions of the Taft Road Corridor improvements include MDOT Enhancement, Safe Routes to School, MDNRE Trust Fund, and CMAQ.

9 ½ Mile Neighborhood Connector

Providing a significant east-west non-motorized route between 9 Mile and 10 Mile Roads was discussed, refined, and moved up as a priority during the planning process. The route is desirable as it includes the potential to connect a number of parks, schools, neighborhoods, and undeveloped open space. Portions of the 9 ½ Mile Neighborhood Connector are proposed to follow existing residential streets, with traffic calming measures proposed. The route is also intriguing for its potential to serve as a demonstration of an urban greenway.

TOTAL 9 ½ MILE NEIGHBORHOOD CONNECTOR COST ESTIMATE = $4.97 million in addition to the cost of easements

Due to size and cost, this project would most likely be implemented in phases. This is a good candidate project (or at least parts of it) for outside funding assistance. If grant funds are used, it's anticipated they would be used to construct particular segments of the proposed improvement such as the ITC/Maybury connector or the traffic calming improvements. The planning level cost estimate includes a $500,000 allowance to cross the railroad including approach ramps to meet ADA requirements. The estimate also includes a $400,000 allowance to implement a variety of traffic calming techniques along the local residential streets and $150,000 allowance to develop a coordinated wayfinding system along the entire route. There is a considerable amount of boardwalk anticipated (over 4150 feet). This is a high cost item

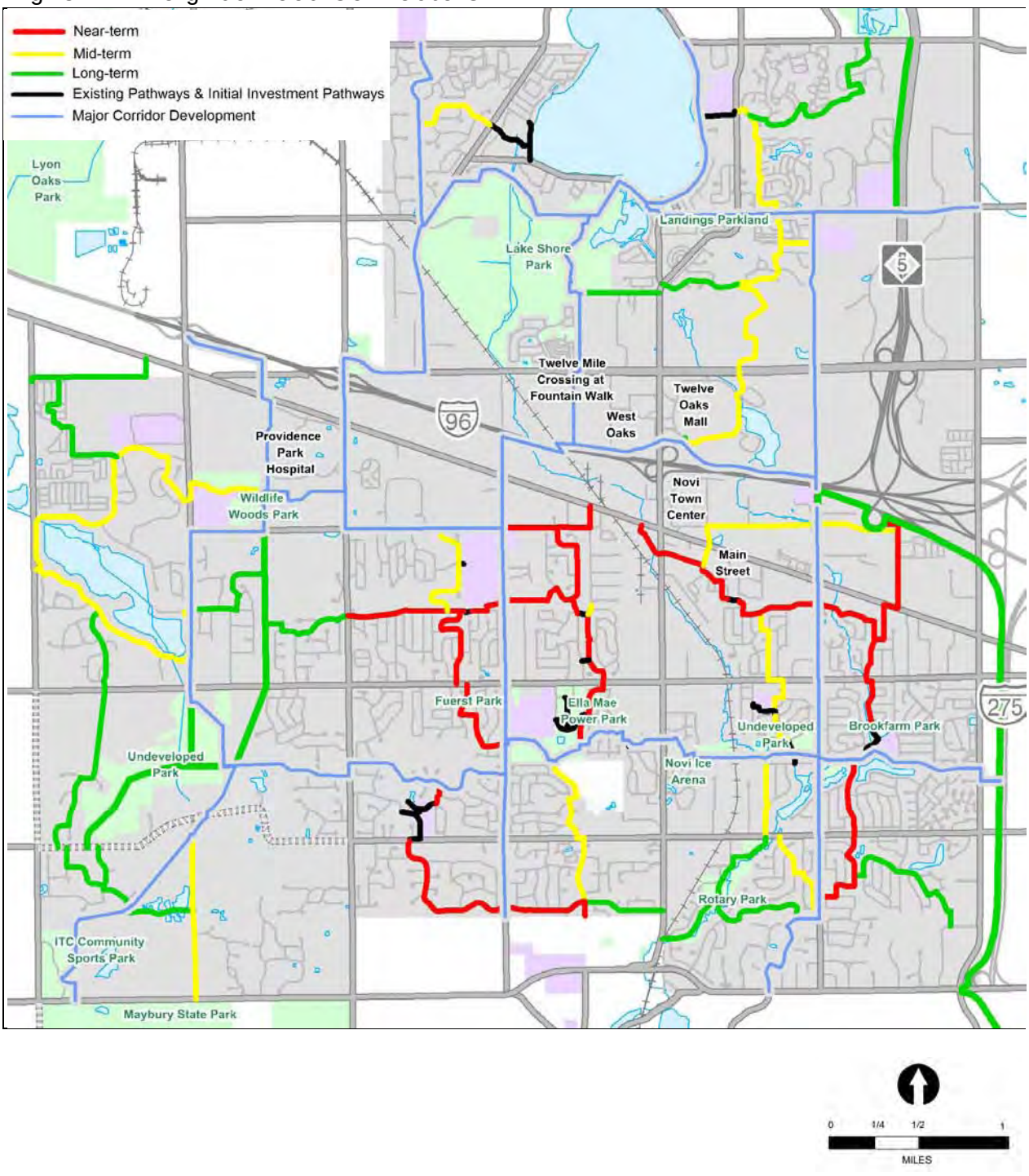
and has been estimated utilizing the City's standard 8' wide section. If grant funding is sought for this improvement, a 14' wide boardwalk will likely be required, increasing the overall cost. Potential funding sources for portions of the 9 ½ Mile Neighborhood Connector improvements include MDOT Enhancement, Safe Routes to School, MDNRE Trust Fund, and CMAQ.

The following table summarizes the top 3 priority Major Corridor Development projects. The table includes the approximate length of the entire project, a planning level cost estimate, as well as potential funding sources. It should be noted that if the City seeks, for example, MDOT Enhancement funds to complete the Metro Connector project, it may not be as likely that the City would receive additional dollars for the other two projects. Estimates of the possible percentage of funds that the City may be able to seek and obtain for implementation has also been identified based on typical award amounts. In addition, with the City's recent award of MDNRE Trust Fund dollars for the Landings Park project, it may be a few years (2 or 3) before the City can be successful in approaching the Trust Fund again for additional projects. Like most funding sources, the Trust Fund like to geographically disperse their dollars. Typically, the Trust Fund looks for a community to finish and close out one Trust Fund project before applying for another. This is not a hard fast policy, but has been a historical pattern.

Fig 3.2E. Major Corridor Development Projects (Top 3) Summary

	Length	Planning Level Cost Estimate	Potential Funding Source(s)
Metro Connector	2.5 miles	$886,000	MDOT Enhancement (65%) City of Novi (35%)
Taft Road Corridor	8 miles	$5.03 M	MDOT Enhancement (8%) MDNRE Trust Fund (5%) CMAQ (5%) Safe Routes to School (1%) City of Novi (81%)
9 ½ Mile Neighborhood Connector	7 miles	$4.87 M	MDOT Enhancement (10%) MDNRE Trust Fund (6%) Safe Routes to School (1%) CMAQ (5%) City of Novi (78%)

Fig. 3.2F. Neighborhood Connectors



Neighborhood Connectors

Please note that neighborhood connectors are not just restricted to the routes highlighted above. If desired elements of neighborhood connectors are desired, they could be used elswhere in the city as a means to calm traffic, provide non-motorized links and enhance a streetscape.

Near-term Neighborhood Connectors

- Build short connector pathways through existing right-of-way and city owned property
- Provide wayfinding and signage along near-term routes
- Implement traffic calming elements along near-term routes
- Implement road crossing improvements where near-term neighborhood connector routes cross a major roadway

Mid-term Neighborhood Connectors

- Build short connector pathways through existing right-of-way city owned property
- Obtain easements to build short connector pathways through private owned property
- Provide wayfinding and signage along mid-term routes
- Implement traffic calming elements along mid-term routes
- Implement road crossing improvements where mid-term neighborhood connector routes cross a major roadway

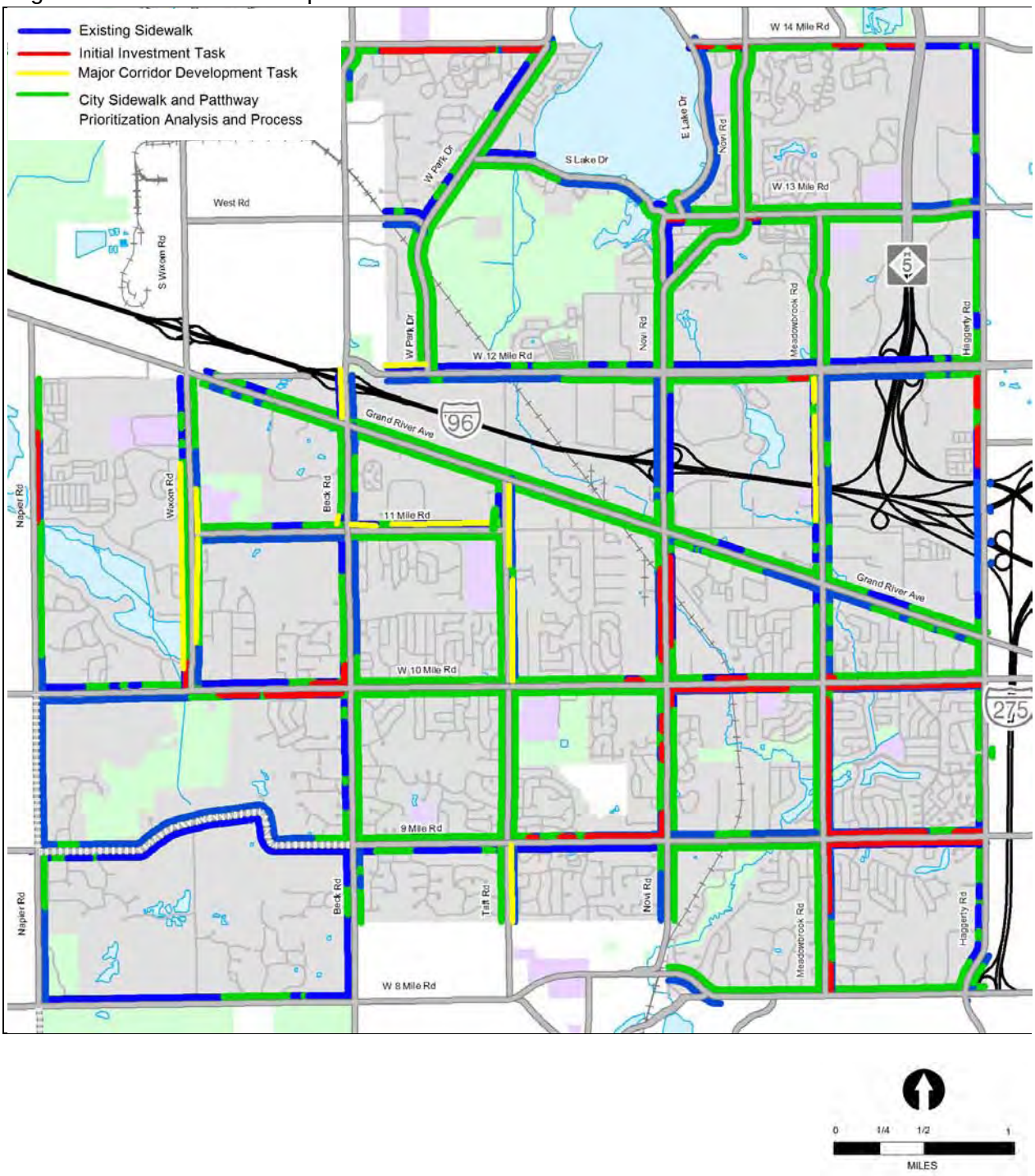
Long-term Neighborhood Connectors

- Obtain easements to build short connector pathways through private owned property
- Provide wayfinding and signage along long-term routes
- Implement traffic calming elements along long-term routes
- Implement road crossing improvements where long-term neighborhood connector routes cross a major roadway
- If there is enough demand consider paving the pathways through Rotary Park
- Build unpaved pathway along ITC corridor if allowable and eventually if there is demand consider paving the trail

Sidewalk/Roadside Pathway Gaps

Many of the sidewalk gaps are addressed through the Major Corridors task and the Initial Investments task. The remaining sidewalk gaps that are not addressed by other tasks should be put into the City of Novi's Sidewalk and Pathway Prioritization Analysis and Process to determine when they should be implemented.

Fig. 3.2F. Sidewalk Gaps



Construction Integration

The costs to undertake some 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, construction integration improvements:

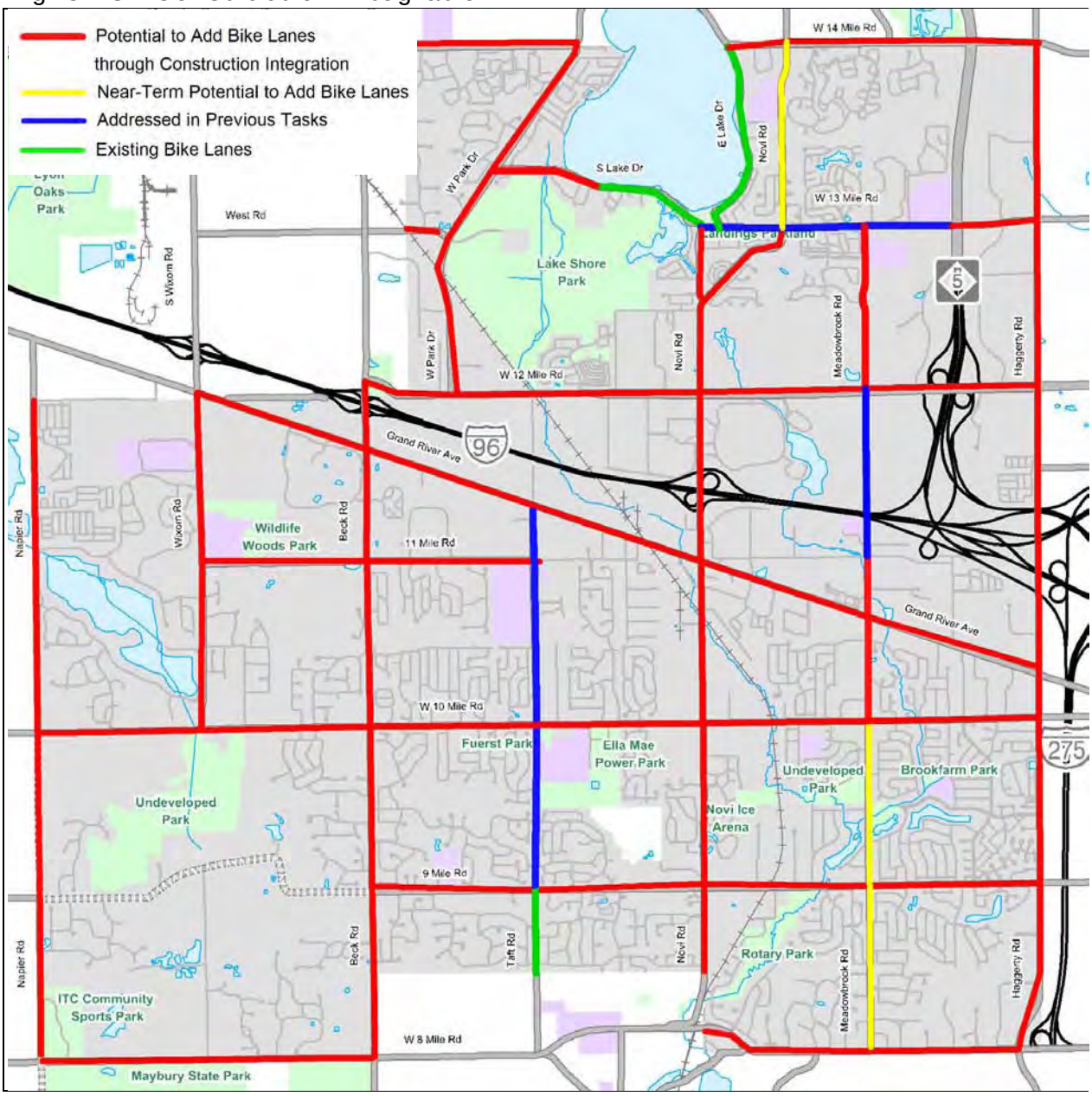
- Are generally implemented when a new road is built or an existing road is completely reconstructed. Reconstruction projects typically include new curb and gutter as well as storm water systems.
- Generally require that a road be widened to accommodate the minimal lane width requirements for all users 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.

This report does not define the ideal long-term cross section for every primary road in the City. Rather it defines what improvements should be included and provides guidelines for a wide variety of road and right-of-way scenarios. Construction integration projects are very important; however they can be very capital intensive and should be prioritized after the initial investments are made. With the City's adoption of complete streets guidelines, is it assumed that bicycle and pedestrians improvements will be incorporated into all projects as a matter of course.

Construction integration tasks include:

- Add bike lanes along arterial and collector roads that were not addressed in the previous tasks. Many of the roads have potential to add a paved shoulder to obtain bike lanes, however, due to the fluctuation in the number of lanes at intersections and curbs that occur in numerous places along the roadway a simple paving of the shoulder may not be as simple as it seems and it may be more feasible to wait until the road is reconstructed to pave the shoulders and add bike lanes.
- Meadowbrook Road between W 10 Mile Road and W 8 Mile Road may be the best candidate to attempt a near-term bike lane conversion by paving the shoulder and narrowing the traffic lanes and improving the subdivision entrances similar to Taft Road.
- Novi Road between W 13 Mile Road and W 14 Mile may be a candidate for a near-term bike lane by converting it to a three lane road with a median where there are no turning movements.
- Add sidewalks and bike lanes to Novi Road/I-96 interchange(refer to Figure 3.3A for proposed improvements)
- Add bike lanes to Beck Road/I-96 interchange
- If CSX railroad becomes abandoned there may be potential to build a rail-trail along corridor.

Fig. 3.2G. Construction Integration



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 and projects must meet the goals of the Novi Parks and Recreation Master Plan. In addition, with the City's recent award of MDNRE Trust

Fund dollars for the Landings Park project, it may be a few years (2 to 3) before the City can be successful in approaching the Trust Fund again for additional projects. This is due to the Trust Funds historical pattern of dispersing their dollars geographically.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)
The CMAQ program was created to reduce congestion on local streets and improve air quality. Funds are available to urban communities designated as "non-attainment" areas for air quality. Pedestrian and bicycle projects are eligible for CMAQ funding where they can be shown to divert motor vehicle commuting traffic that would otherwise take place. CMAQ projects on roads must be on federal-aid eligible roads. There is typically a 20% local match requirement. SEMCOG issues a call for applications each year (typically spring) and distributes the funds after review. In 2011, there was approximately $17.4 million available in the SEMCOG region.

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.

3.3 Specific Area Concept Plans

The following concept plans were prepared to show how some of the ideas of the Non-motorized Plan may be applied to specific areas. These concept plans should not be taken as completely developed designs. Rather, they are to illustrate a design idea. The areas shown will require separate design studies that may involve a more detailed investigation of the site conditions including public input and the development of alternatives and draft preliminary plans.

Crossing I-96

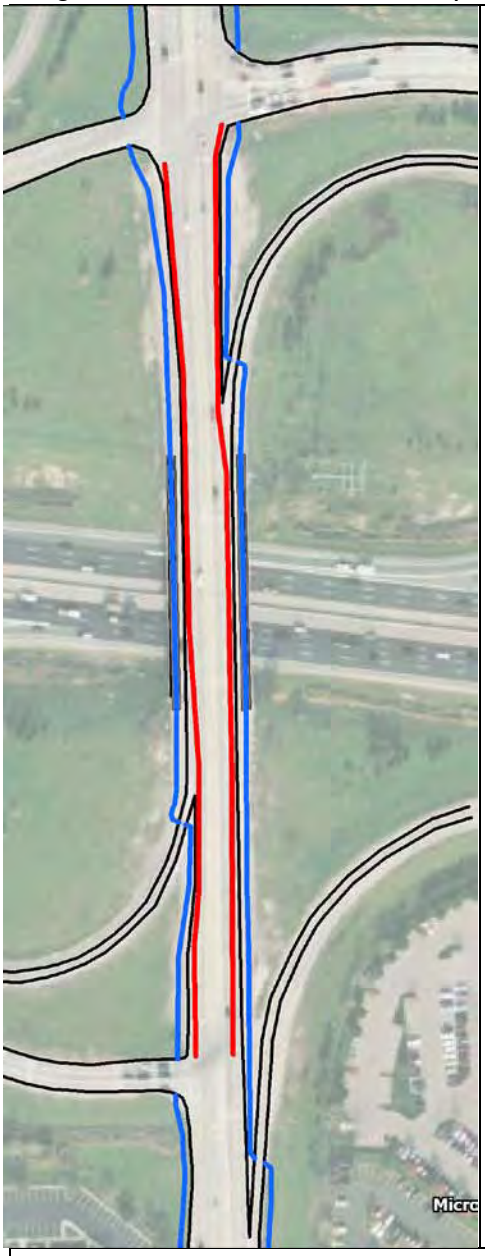
The I-96 expressway creates a significant barrier across the City with only one pedestrian crossing along Wixom Road which is outside of the City limits. Novi Road, Taft Road and Meadowbrook Road were identified as major areas of concern for pedestrians and bicyclist who want to cross the expressway and access commercial and recreational destinations on both sides of the expressway. Currently, Novi Road, Beck Road and Meadowbrook Road overpasses do not have any non-motorized facilities and Novi Road and Beck Road are difficult to cross as a pedestrian or bicyclist due to the heavy traffic and free-flowing ramps.

Free-flow ramps pose many dangers to bicyclists and pedestrians. Motor vehicle speeds are high and there are many merging operations taking place commanding the attention of motorists. The I-96 freeway interchanges were all recently rebuilt, so it may be a while until improvements are made at these crossings. When the interchanges are reconstructed, a general design principal, consistent with non-motorized travel, would be to bring all ramps perpendicular to the roadway to reduce speeds at crosswalk locations and establish more appropriate intersections for urban and suburban crossings.

The following illustrations demonstrate potential ways to retro-fit the existing expressway crossings to include non-motorized facilities. Please note that these illustrations were developed in coordination with the MDOT Novi Transportation Improvement Study:

- Fig. 3.3A. Novi Road Overpass
- Fig. 3.3B. Meadowbrook Road Overpass
- Fig. 3.3C. Beck Road Overpass
- Fig. 3.3D. Wixom Road Overpass
- Fig. 3.3E. CSX Underpass

Fig. 3.3A. Novi Road Overpass Retro-fit Cross Section



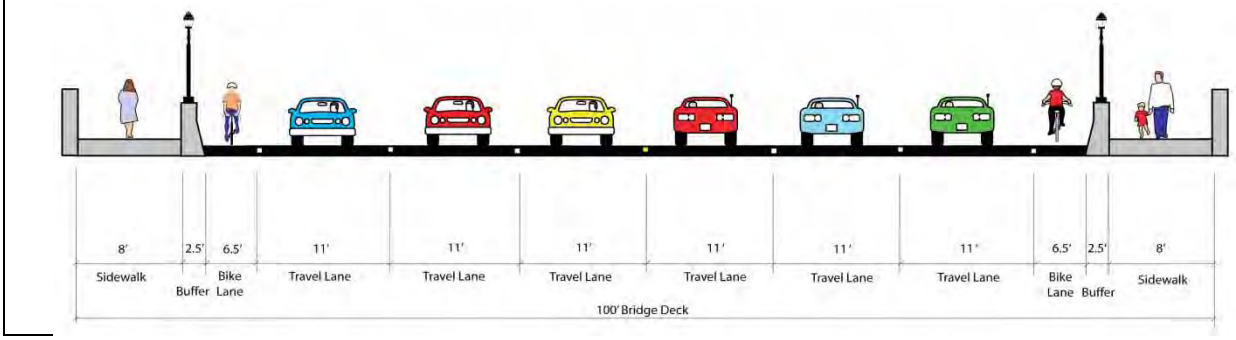
The Novi Road interchange is a daunting environment for bicyclists and pedestrians. But it is a key link between the City's major commercial centers and despite its lack of facilities, pedestrians and bicyclists still use the overpass.

The bridge deck is 100' wide with a large recovery area on the outside and an unused center lane. This provided an opportunity to reallocate space on the bridge deck to accommodate bicycle and pedestrian facilities.

The following list describes basic improvements that could be made to improve bicycle and pedestrians facilities on the bridge:

- Add sidewalk to bridge deck by removing center median and reducing the travel lanes to 11' wide. Please note that due to the existing grade some earthwork would be required to build the sidewalks approaching the bridge deck.
- Until bike lanes can be implemented north and south of the bridge deck on Novi Road provide a 6.5' paved shoulder and allow bicycles to cross the bridge as a pedestrian using the sidewalk.
- Provide high visibility crosswalks at all free-flowing ramps by using the rectangular rapid flash beacon with an advanced warning flash beacon.
- In the future, when the interchange is reconstructed, bring all ramps perpendicular to the roadway to provide a safer crossing environment for pedestrians and bicyclists.

Potential Cross Section:



The City should consider going beyond providing just basic accommodations for bicyclists and pedestrians. The Novi Road interchange is a gateway to the city. It is a major connection between two regional shopping centers and one of the first things (and sometimes the only thing) many people experience when visiting the City of Novi.

Currently the interchange is utilitarian in nature. However, there is potential to enhance the interchange to create a signature corridor that reflects the character of the city and provides a memorable first impression of the community while simultaneously addressing important bicycle and pedestrian safety concerns.

Many communities have created landmark bridges that are an important part of their identity. Numerous improvements have been completed or are underway on Novi Road north and south of the interchange. Upgrading the bridge would establish a hallmark corridor through the heart of the city that also bears the city's name.

Wabasha Street Bridge in St. Paul Minneapolis

Existing conditions for the Novi Street overpass

Fig. 3.3B. Meadowbrook Road Overpass Retro-fit Cross Section

Meadowbrook Road provides the best opportunity to add bicycle facilities to an existing crossing of I-96. Beck Road and Novi road are interchanges and Haggerty Road is comprised of multiple bridges. It also provides a connection between the I-275 Metro Trail and the M-5 Metro Trail.

The following list describes basic improvements that could be made to improve bicycle and pedestrian facilities on the bridge:

- Add 9' bike lanes to both side of the road by paving the shoulder and reducing the travel lanes to 11' wide. The wide paved shoulder will also allow room for pedestrians walking against the flow of traffic over the bridge.
- Provide a crossing island on Meadowbrook just north of Bridge Street by utilizing the existing center turn lane.
- Since Meadowbrook Road provides both a regional trail connection and an everyday commuter connection, when the overpass is reconstructed, there should be a 6' bike lane on both sides of the road and a 10' shared use path should be constructed on the west side of the road..

Bike Lanes

Potential Cross Section:

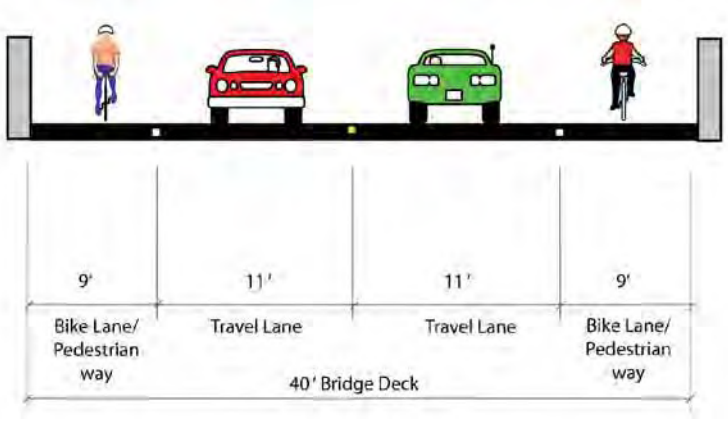
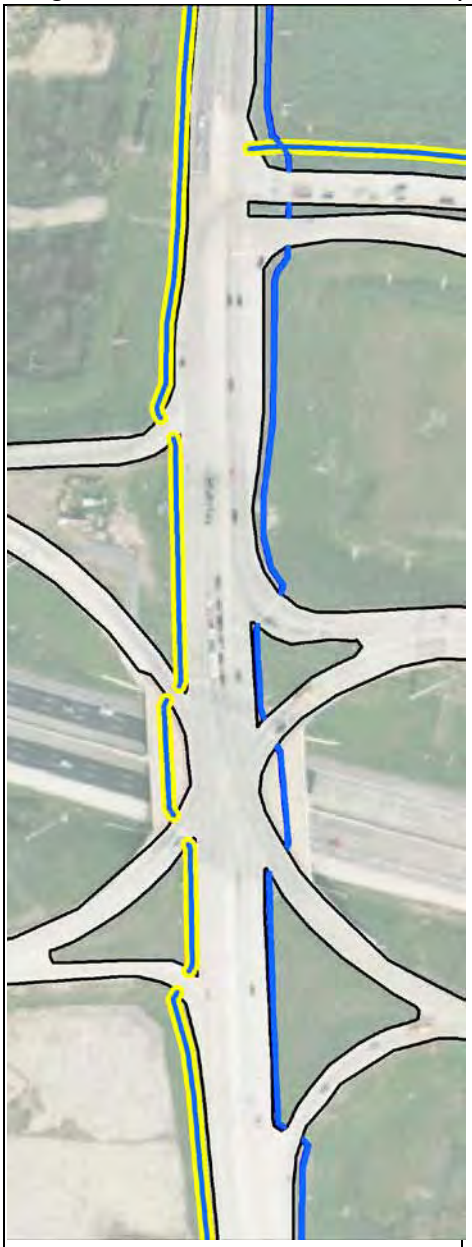


Fig. 3.3C. Beck Road Overpass Retro-fit Cross Section



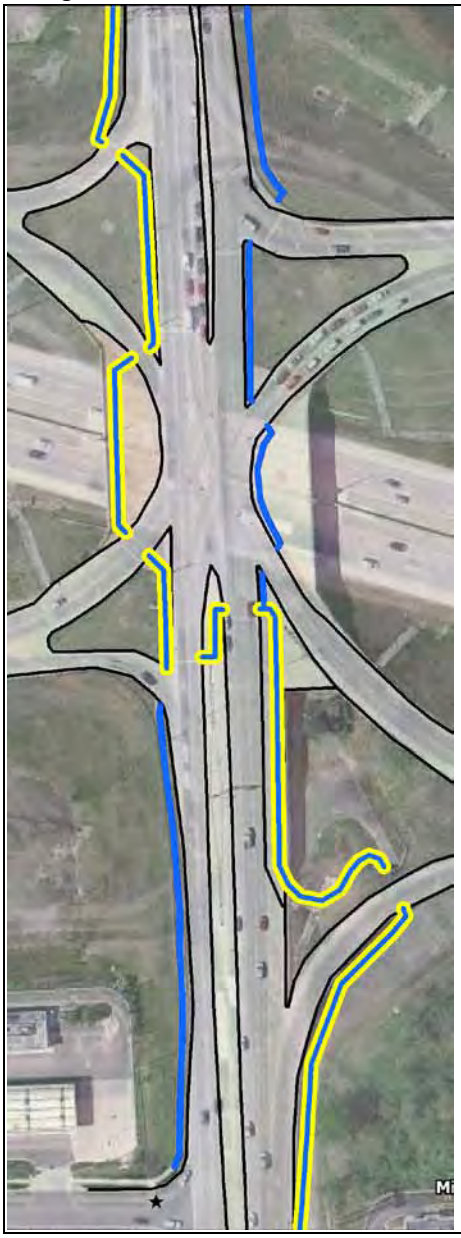
Beck Road was reconstructed in 2005 into a Single Point Urban Interchange and has no bicycle or pedestrian facilities.

The following list describes basic improvements that could be made to improve bicycle and pedestrians facilities on the bridge:

- Add 10' Shared use path to provide a regional trail connection on the west side of Beck Road. Please note that due to the existing grade some earthwork would be required to build the sidewalks approaching the bridge deck.
- Provide high visibility crosswalks at all free-flowing ramps by using the rectangular rapid flash beacon with an advanced warning flash beacon.
- The 10' Shared use path will probably be the only non-motorized connection on this bridge for quite some time, as bike lanes are difficult to add to the existing geometry and it may be a while until there is sufficient demand for a sidewalk on the east side of the road.

Sidewalk
Regional Trail Connections

Fig. 3.3D. Wixom Road Overpass Retro-fit Cross Section



Wixom Road was reconstructed in 2007 into a Single Point Urban Interchange and has a 6' sidewalk on the west side. This is the only interchange that provides a pedestrian crossing over the freeway, however it is not in the City of Novi's jurisdiction.

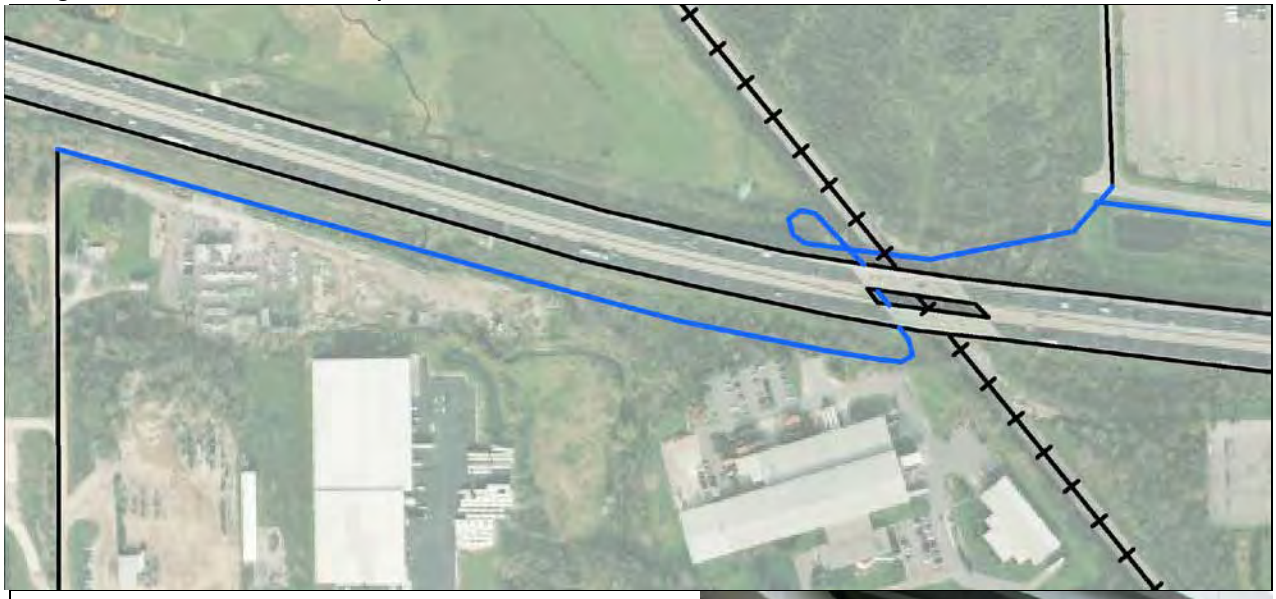
The following list describes basic improvements that could be made to improve bicycle and pedestrians facilities on the bridge:

- Provide high visibility crosswalks on existing sidewalk at all free-flowing ramps by using the rectangular rapid flash beacon with an advanced warning flash beacon.
- When the regional trail connection is implemented utilize the existing tunnel under the I-96 east-bound on-ramp and ramp the pathway up to the bridge deck. Provide a road crossing across Wixom Road using the existing signals and median to link to the existing sidewalk. Then widen the existing sidewalk on the west side of the road to a 10' Shared use path where it provides a regional trail connection.

The recommendations for this overpass were developed from the I-96 Corridor Study.

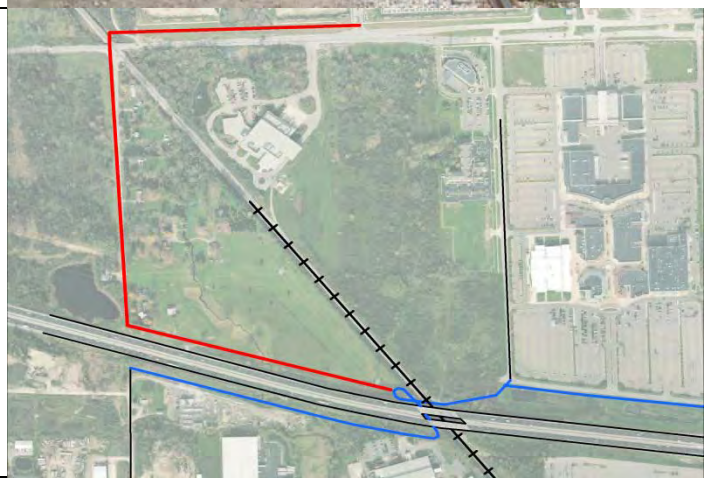
Sidewalk
Regional Trail Connections

Fig. 3.3E. CSX Underpass Retro-fit



Utilize the existing CSX railroad underpass to build a trail along the west side of the railroad. By working with the existing bridge deck or building a separate facility, build a bridge over the railroad to provide a trail crossing to the east to connect to the regional shopping centers.

The alternative route to building a bridge over the railroad would be to take the trail to the west and connect to Taft Road, go north along Taft Road to 12 Mile Road and provide an at-grade railroad crossing along 12 Mile Road. At this point it may be worth exploring the option of building a separate non-motorized bridge over I-96 connecting Taft Road to avoid the CSX railroad altogether.



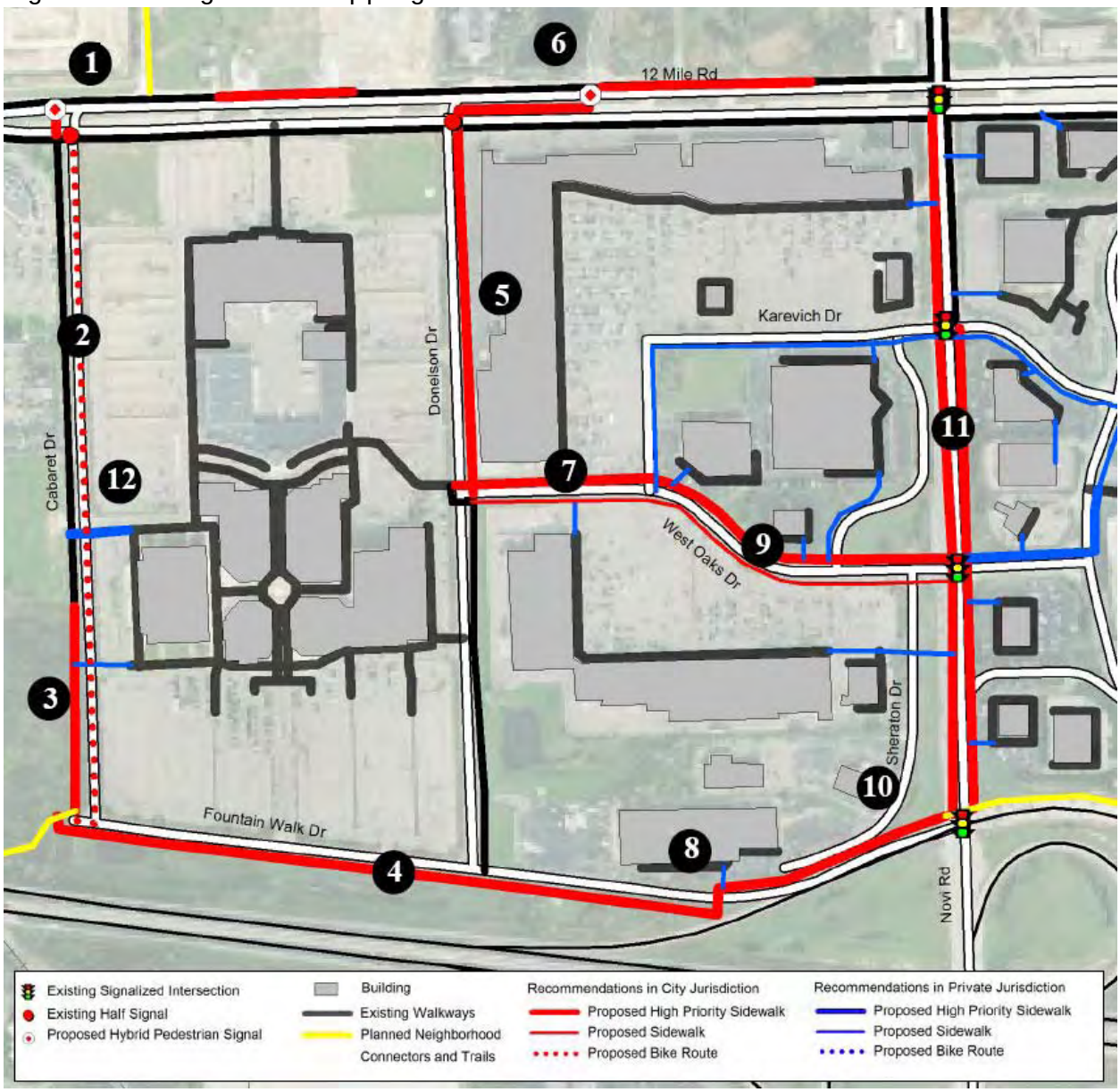
Regional Shopping Center

The regional shopping center is a major destination in the City of Novi and an area that many people refer to as "Downtown Novi". From a non-motorized standpoint it is important to make connections to this destination and to make connections within the shopping center. It is recommended that the private and public entities work together to try and make this area more bicycle and pedestrian friendly.

The following illustrations demonstrate potential ways to incorporate non-motorized facilities within the regional shopping center:

- Fig. 3.3D. Regional Shopping Center West of Novi Road
- Fig. 3.3E. Regional Shopping Center East of Novi Road

Fig. 3.3D. Regional Shopping Center West of Novi Road



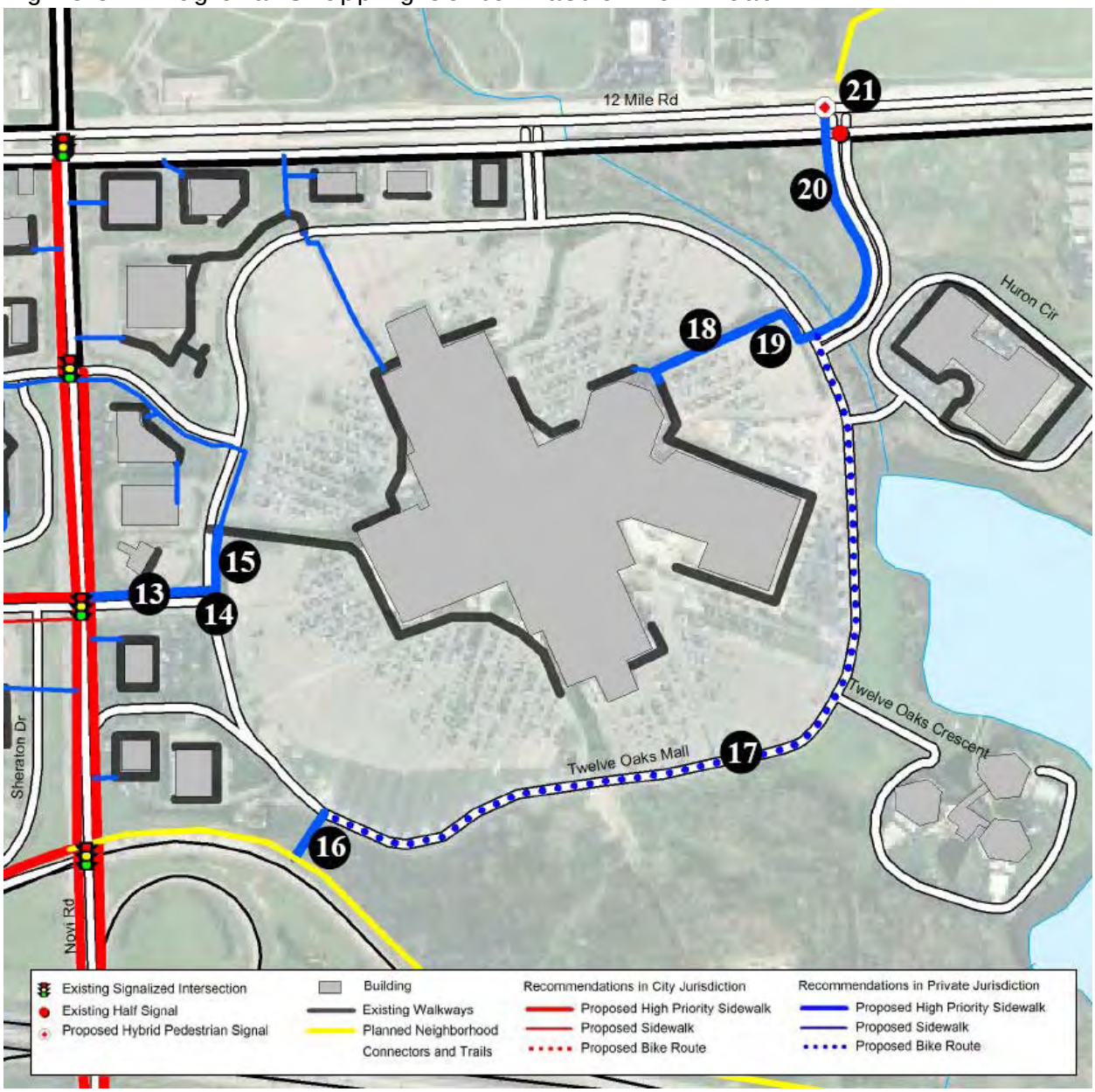
Recommendations for items in Public Jurisdiction:

1. Provide Pedestrian Crossing on 12 Mile by adding a Pedestrian Hybrid Beacon at Cabaret Dr
2. Implement on road bike route on Cabaret Dr
3. Extend 6’ pathway along the west side of Cabaret Dr down to Fountain Walk Dr
4. Build 10’ Shared Use Path along the south side of Fountain Walk Dr
5. Extend 6’ pathway along the east side of Donelson Dr between West Oaks Dr and 12 Mile Road
6. Provide Pedestrian Crossing on 12 Mile by adding a Pedestrian Hybrid Beacon at Carlton Way
7. Provide road crossing on West Oaks Dr
8. Provide road crossing on Fountain Walk Dr between Donelson Dr and Novi Road
9. Build 6’ sidewalk along north side of West Oaks Dr between Donelson Dr and Novi Road
10. Build 10’ Shared Use Path to north side of Fountain Walk over to Novi Road
11. Build Sidewalk along both sides of Novi Road

Recommendations for items in Private Jurisdiction:

12. Build 6’ sidewalk connecting Cabaret Dr to the Existing sidewalks

Fig. 3.3E. Regional Shopping Center East of Novi Road



Recommendations for items in Private Jurisdiction:

13. Build 6’ sidewalk along north side of road
14. Provide Pedestrian crossing at intersection
15. Build 6’ sidewalk along east side of road to connect to existing sidewalk
16. Build 10’ shared use path when trail along I-96 is built
17. Implement on road bike route along drive when I-96 trail connection is made
18. Build 6’ sidewalk
19. Provide pedestrian crossing at intersection
20. Build 6’ sidewalk along west side of road

Recommendations for items in Public Jurisdiction:

21. Provide Pedestrian Crossing on 12 Mile by adding a Pedestrian Hybrid Beacon when neighborhood connector pathway is implemented

4. Proposed Policies

These policies and programs provide the institutional support for the non-motorized system. They provide the necessary support systems for the proposed physical system. They also provide a framework within which new issues related to non-motorized transportation may be addressed.

Topics:

Prioritization Process for Policy Recommendations:

The method of prioritization for the following policy recommendations was made by identifying the relative importance of that policy and the ease with which it could be implemented within a given time frame. Some policy items could readily be achievable within a year. Others, due to the process required to put together the necessary items needed to fully implement the policy, may take three to five years. These policies are flexible enough that they can be rearranged as priorities and available resources change.

Roles and Responsibilities in Implementing Policy Recommendations:

The policy recommendations have not been assigned to particular departments or staff positions in the City. One of the first tasks in implementing these recommendations would be assigning each policy recommendation to a responsible party.

4.1 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

Numerous local communities have already adopted complete streets resolutions or ordinances. In 2010, the City of Novi adopted a resolution of support for complete streets. The city is currently drafting more comprehensive guidelines on complete streets that specifically addresses how the city will integrate complete streets into its plans, policies and programs.

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.

The adoption of this plan addresses many of the elements.

Policy Recommendations for Complete Streets:

Within One Year:

- Adopt the Non-motorized Transportation Plan
- Draft a Complete Streets Policy that address the ten key elements as defined by the National Complete Streets Coalition and that clearly defines the responsible authorities
- Adopt a Complete Streets Policy
- Develop 5-year non-motorized improvement plan (based on the Non-Motorized Master Plan)
- Meet with MDOT and Oakland County Road Commission to review 5-year plan as it relates to facilities under their jurisdiction

Within Three Years:

- Implement recommended operations procedures
- Establish performance measures
- Begin data collection
- Build a reference library of current best practices
- Establish professional staff training program
- Identify City standard plans and details that need to be revised
- Begin revising standard plans and details

Within Five Years:

- Complete update of standard plans and details
- Evaluate progress

4.2 ADA and Transition Plan

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.

Policy Recommendations for ADA Compliance:

The City of Novi is in the process of preparing an ADA transition plan.

Within One Year:

- Establish an interim transition complaint based transition plan.
- Designate an ADA coordinator.

Within Three Years:

- Have an inventory based transition plan in place.
- Integrate the transition plan into the capital improvement plan.

Within Five Years:

- Complete the inventory of physical barriers.
- Have made substantial progress in removing barriers in the most highly traveled corridors.

4.3 Safe Routes to Schools

The challenges to getting more children to walk and or bike to school are significant. Approximately half of all children in the United States are driven to school in a private vehicle and only 13% walk or bike to school.[1] The number of children walking or biking to school has dropped 37% in 20 years.[2] This drop in the number of children walking and bicycling to school can be attributed to many factors that have changed over the past 20 years:

- Increase in availability of before and after-school programs.
- Increase in the number of schools of choice, private schools and charter schools.
- Increase in the number of grade-based elementary schools.
- Increase in the number of children bused to school who live within walking distance due to real or perceived safety concerns.
- Fewer children living in each home.

These factors have combined to simultaneously reduce the total number of children who attend their neighborhood school, reduce the number of kids who walk and spread out the times children arrive at and depart from school. The result is a loss of the critical mass of children walking to school and the perceived safety in numbers.

These factors are combined with the fact that there is also an increase in the number of two-wage earner families where both wage-earners are leaving for work in the morning. This makes dropping a child off at school on the way to work the easy and seemingly logical choice. We have now entered a period in time where choosing to have a child walk to school is considered a political statement or some act tantamount to child neglect rather than the default choice.

While the challenges to getting more children to walk and bicycle to school are significant, the consequences of doing nothing are even more challenging. The Center for Disease Control states that 13% of children in the United States are overweight, and the number of overweight teens has tripled since 1980. Many children in the United States do not get the hour of daily physical activity recommended by the Surgeon General. Decreased participation in physical activities, and fewer students walking or riding their bikes to school may be contributing to the rise in childhood obesity.

For many children who live very far away from school, walking or biking is not a feasible option. However, the CDC estimates that only 31% of the children living a mile away or less walk or bike to school. Often times, schools and their surrounding areas lack safe road crossings, preventing children from having safe access to school on foot. Parents and caregivers cite perceived traffic danger as the second most common barrier to children walking and biking to school, preventing as many as 20 million children from walking or biking to school nationwide.[3] The amount of people driving their children to school in private automobiles not only represents a missed opportunity for physical activity, but also increases traffic congestion and puts a huge strain on existing road systems during peak travel times. In one city examined, 20-25% of morning traffic consisted of students being driven to school and 50% percent of children hit near schools were hit by parents of other students.[4]

[1] Center for Disease Control. *MMWR Weekly*. August 16, 2002. 51(32);701-704
[2] Michigan Governor's Council on Physical Fitness, Health and Sports.
[3] Center for Disease Control. *MMWR Weekly*. August 16, 2002. 51(32);701-704
[4] Center for Disease Control, 1995.

In an effort to reverse these alarming trends, the CDC announced a national health objective to increase the proportion of walking and biking trips to school for children living a mile or less from 31% to 50% by the year 2010. Communities, school groups, and local officials all over the country are responding to this challenge by mobilizing children to walk to school, addressing traffic safety concerns, mapping safe routes to school, and by measuring and taking account of their neighborhoods' walkability.

Michigan's Safe Routes to School (SR2S)

Michigan has a model Safe Routes to School program that is managed by the Michigan Department of Transportation (MDOT) in partnership with the Michigan Fitness Foundation which provides training, administrative and technical support. The center for Michigan SR2S program's website www.saferoutesmichigan.org has extensive information on how a school may start a SR2S program.

The website describes the six step SR2S planning process:

1. Register a school on the website.
2. Designate a SR2S coordinator.
3. Establish a SR2S team comprised of school officials, students and their parents and local officials.
4. Survey the students and parents to understand the issues.
5. Perform a safety assessment of the physical environment.
6. Develop an action plan.

Beyond describing the planning process Michigan's SR2S program offers technical assistance and support to schools. These include:

- A SR2S Handbook with a wealth of information including templates and forms useful in implementing a program.
- Providing training programs.
- Walk to School Day kits.
- Newsletters.
- Direct technical assistance.

The City's Role in SR2S Programs

The City of Novi is a key partner in any Safe Routes to School Program. SR2S school 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.

The City of Novi has worked with Walled Lake, Novi, and Northville schools on school pedestrian issues in the past and uses quarterly traffic safety meetings as the venue for these discussions. School speed zones have been established at two Walled Lake schools and several improvements were made at Village Oaks School to provide a safer environment for walking children.

A typical SR2S program addresses issues such as the education of parents and students as well as improvements to the physical conditions on the school grounds. But much of the SR2S physical improvements take place on facilities outside of the school's jurisdiction and must be undertaken in

partnership. Likewise the city's non-motorized network identifies key routes that transverse school grounds. Thus, both entities must work together in order to meet their shared goals.

Novi's transportation policy should include a system of accountability for responding to and remedying safety concerns along children's routes to school. The City should work with the surrounding School Districts to evaluate how best to spend transportation dollars, looking at busing, facility improvements, and the addition of adult supervisors for children walking to school.

Ensuring safety in the school zone must be a combined effort of traffic engineers, local officials, law enforcement, school officials, parents and children. In addition to promotional and educational programs, a variety of roadway improvements can be used to increase safety in school zones and for children on their routes to school. Some important safety design guidelines for school zones include[1]:

- Reduced speed zones.
- Marked crosswalks.
- Signalized crossings at intersections with pedestrian activation.
- Pedestrian crossing islands and bulb outs where needed.
- Special crosswalk striping, painted according to state standards, and "School Crossing" signage where appropriate.

Police enforcement of yielding and speeding in school zones, and the utilization of adult crossing guards at difficult intersections can also increase safety in the school zone.

Individual school policies as well as district wide policies should be evaluated to make sure that they promote bicycling and walking.

In conclusion, increasing the number of children who are able to safely walk and bike to school is part of a national goal that will address childhood obesity, enhance neighborhood walkability, and help alleviate traffic congestion problems.

Key Programs to Continue for School Transportation

The City of Novi has some good existing policies and programs that support the non-motorized system. The following policies and programs should be reinforced and continued.

- Meadowbrook Elementary in the Walled Lake School District had a Safe Routes to School Program; however it was only somewhat successful. The City and School District should work together through quarterly traffic safety meeting with police, planning, engineering, traffic consultant, and road commission to figure out why this program did not work and see if there are ways to remedy it.

- City should continue to enforcement speeding in school zones and yielding to pedestrians in the crosswalks within school safety zone.

- The City should continue to encourage that within school safety zones, all safety design guidelines are in place and current with national safety guidelines.

[1] San Diego's Regional Planning Agency. Model Guidelines for the San Diego Region. April 2002. p. 105.

Policy Recommendations for School Transportation

The City of Novi and the Surrounding School Districts should jointly explore the following options.

Within One Year:

- The City and the School Districts should develop maintenance standards as well as fix defects and gaps in public sidewalk system adjoining school sites.
- Encourage the School District to consider the safest routes to school for children when adjusting school boundaries.
- The City and the School District should develop a cost-share policy for the construction and maintenance on pathways that are part of the City's Non-motorized System and traverse school property.
- The City and School District should develop a strategic implementation plan for pathways and trails that are part of the City's Non-motorized System that traverse school property.

Within Three Years:

- The City and School District should continue to enhance a system of accountability for responding to and correcting safety concerns along routes to school and other problems identified through these programs.
- The City should continue to promote and initiate with the school system and parents Walk-to-School Day events, "walking school bus" programs, "Safe Routes to School" programs, and walkability audits in conjunction with the state-wide program.
- School Districts should perform formal evaluations of how pedestrians and bicyclists are accommodated to all school grounds and prepare action plans to address deficiencies.
- School Districts should encourage walking and bicycling to school as a part of the physical education and well being of the students.
- School Districts should try to eliminate the need for all "Safety Busing" by remedying the hazards that currently warrant the safety busing.

Within Five Years:

- School Districts should evaluate all individual school and district wide policies regarding bicycling to school and amend policies that discourage bicycling.
- Encourage residential infill projects within walking distance of schools.

4.4 Bike 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

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.

Location- 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 building entrances and 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

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

Enclosed and Secured Bicycle Parking is best for areas where bikes are kept for extended periods of time, such as apartment buildings and near places of employment. These types of facilities are usually placed within existing parking structures and come with extra bicycle parking amenities.

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.

When bike racks are located within a parking decks there should be a safe means of egress to the parking area. If bicycles must access the space via a gate controlled access point, care should be taken to minimize conflicts with the gate arm. The gate arm should be shortened to allow a 4' wide pathway for bicycles. The end of the gate arm should be rounded and covered with foam. The pathway for bicycles should be clearly marked on the pavement. This pathway should be 3' wide and be located at least one foot from the end of the gate. Users of enclosed secured bike parking that is accessed via gate control should be provided instruction on how to safely navigate around the gate.

Access Control- Is by identification badge reader and for a specific location only.

Location- Generally within parking decks, but individual facilities may be established.

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

User Costs- Generally $60 to $80 per year rental plus $20 account set-up fee.

In Novi, Enclosed and Secured Bicycle Parking would work best at areas with high concentrations of people, such as at Hospitals or Regional Shopping Centers where the facilities are targeted toward employees.

Bike Station

Bike Stations are premium secured bike parking and maintenance facilities intended for transit stations located in high density areas. They are intended primarily to serve transit riders who will disembark and then retrieve their bike and continue onto their final destination. They will also serve as a centralized bike parking solution for bicyclists who are not using the transit station but whose final destination is near the bike station. The bike station has an attendant that assist with the bicycle storage and the day-to-day operations of the facility.

Amount of Parking- Based on the expected number of transit users and a survey of potential users.

Design- The bike parking and maintenance areas are restricted to bike station employees only.

Access Control- The bike station is opened and attended while the transit station is open.

Location- Generally within parking decks.

Amenities- Compressed air, lockers, benches, changing room, showers and bicycle repair shop. The changing room and showers may be omitted if most of the users are expected to arrive via transit.

User Costs- Generally $60 to $80 per year rental plus $20 account set-up fee or an hourly charge for parking. Repair cost at market rate.

At this point the City of Novi does not have the density to support a Bike Station in the City.

Bike Lockers

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.

On-Street Bicycle Parking

On-Street Bicycle Parking consists of movable bike racks that take the place of on-street motor vehicle parking. 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- These 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.

Bicycle Parking Requirements

Currently the City of Novi does not have any bicycle parking requirements in the City Code. The code should be revised and updated as necessary to address the following issues:

- Require a minimum of 4 bicycle parking spaces at each commercial development or multi-family dwelling.
- For each multi-family dwelling require half of the bicycle parking spaces to be covered if the site is required to have 16 or more spaces based on the existing code description.
- Incentives should be provided to commercial and multi-family dwellings for providing covered and secured bicycle parking (e.g. reduction of vehicular parking and/or density bonus could be offered).
- Incentives should be provided to commercial and multi-family dwellings for providing covered bicycle parking over uncovered bicycle parking when not required to by code (e.g. reduction of vehicular parking and/or density bonus could be offered).
- Explore the idea of required bicycle parking facilities being credited toward provision of motor vehicle parking. Each ten required bicycle parking spaces, or fraction thereof, may be substituted for one code required motor vehicle parking space.
- Provide or reference graphical design guidelines with information on the specifics of bicycle rack design and placement. The Association of Pedestrian and Bicycle Professionals recently published the 2nd Edition of Bicycle Parking Guidelines; these serve as a good model or may be referenced. The report may be found at http://www.apbp.org/resource/resmgr/publications/bicycle_parking_guidelines.pdf
- Require hoops on every block with retail in a downtown/commercial zone.

Policy Recommendations for Bicycle Parking:

Within One Year:

- Update the City code to include bicycle parking requirements and design standards.

Within Three Years:

- Implement the bicycle parking requirements and design standards.

4.5 Maintenance of Non-motorized Facilities

The success of the City'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 City of Novi update its ordinance to require property owners to maintain the sidewalk adjacent to their property. It is recommended that the city develop a citywide inspection program to identify and cite hazardous sidewalks. The program should evaluate different areas of the city each year and property owners should be notified if their sidewalk is not in compliance with city regulations. If a property owner does not make the required repairs, the City 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 make large portions of the City 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 Novi, (Boulder-60", Madison-42", Novi-41") have bicycle mode-shares significantly higher than Novi. Both Minneapolis and Madison have higher bicycle commuting rates than San Diego[1].

The City currently has a sidewalk snow removal policy in place that should be continued and built upon. Just as it is important for roads to be cleared for automobile, it is important for sidewalks to be cleared for

[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.

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 intersections and pedestrian crossing islands. Crossing islands are not the responsibility of an adjacent property owner, so they require clearing by City staff. Additional attention may be needed to identify "orphan" areas, such as over freeways 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 City 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

Motor vehicles tend to sweep debris into bicycle lanes 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. The City should repaint its 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. The City should avoid multiple layers of thermoplastic 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.

The City should 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 the City 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. The City 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 City staff both time and resources. Public participation also allows citizens to feel that the City 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 City 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.

Key Programs to Continue for Maintenance of Non-motorized Facilities

The City of Novi has many good existing policies and programs that support the non-motorized system. The following policies and programs should be reinforced and continued.

- The City has a sidewalk snow removal policy in place. Residents are responsible for the snow removal on their property within 24 hours after the end of each accumulation of snow greater than 2 inches. This policy should be enforced and continued.
- The City should continue enforcing the street sweeping policy to keep the bike lanes clear of debris.
- The city should continue to refresh pavement marking on all roadways, including bike lanes and crosswalks, yearly to maintain high contrast and visibility.

Policy Recommendations on Maintenance of Non-motorized Facilities

Within One Year:

- The City should develop a multi-year maintenance schedule as part of the annual striping program for updating signs and refreshing pavement markings on Trails and Bike Routes to maintain high contrast and visibility and help bicyclist and pedestrians navigate.
- The City should develop a citywide inspection program to identify and cite hazardous sidewalks.
- The City
- should develop a comprehensive citywide asset management for entire system that addresses regular inspections, preventative maintenance and ADA issues.
- Establish a dedicated website form for non-motorized service requests.
- Develop an educational campaign encouraging property owners to clear curb ramps and bus stops when shoveling their sidewalks.
- Establish a policy for maintenance and snow removal of crossing islands.
- Establish a policy to integrate all of the non-motorized facilities that are part of the Network Plan into the current snow removal program.

Within Three Years:

- The City should determine if additional means are necessary to develop a program that provides maintenance contact information, such as stickers or signs to be placed on pedestrian signals.
- The City should assess the effectiveness of the efforts of the code compliance staff to enforce the existing snow removal ordinance on privately owned hard surfaced sidewalks and pathways, specifically on local roads and private drives. If necessary, the City should develop a program to assure snow removal from privately owned sidewalks and pathways along Arterials and Collectors.
- The City should designate or hire additional staff and assign responsibility for clearing and maintaining crossing islands, shared-use trails and off-road pathways of snow and ice.
- The City should develop a program that monitors the condition of sidewalks along Arterials and Collectors on a yearly basis.

Within Five Years:

- Establish a maintenance hot-line and website for non-motorized issues (this may be integrated with other maintenance hot-lines) and place a sticker with this hotline number and website address at locations around town including at all pedestrian activated signals.

4.6 Sidewalk/Roadside Pathway Completion

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. Sidewalks are one of the key components to a walkable community and policies and programs need to be established to support the installation of these facilities.

In general, sidewalks should be installed by developers when constructing new buildings or homes and by the local city, county or state agency during a roadway improvement project. Every city handles sidewalk installation differently, but the important thing is to have policies in place that require the installation of sidewalks in both existing and newly developed areas.

Sidewalks/Roadside Pathways along Arterial and Collector Roads

There are usually many destinations along arterial and collector roads so it is important to have a complete sidewalk and/or pathway on both sides of the street.

In 2006, the City of Novi approved a Pathway and Sidewalk Prioritization Analysis and Process that provides an inventory of the existing, scheduled and proposed pathways and sidewalks along the arterial and collector roads. Since the program began, the City of Novi completed almost 20,000 feet of pathway and sidewalks and developers completed over 10,000 feet of pathways and sidewalks in the City of Novi.

This plan builds upon the prioritization system to establish sidewalks along key corridors across the city.

Sidewalks in Residential Neighborhoods

Local sidewalks are critical to the walkability of a neighborhood. In many communities, local sidewalks are where a majority of daily recreation takes place. Daily activities such as jogging, dog walking, and socializing occur along local neighborhood streets so it is important to provide a safe alternative to the roadway where these activities can take place.

There are many neighborhoods in the City of Novi that have an incomplete sidewalk system along the local roadways. The current policy for sidewalk construction applies to new construction, not to existing subdivisions where there are many gaps or no sidewalks at all within the entire development. Also in many of the newly constructed subdivisions, sidewalk construction is not required until the house is completed. Due to the current economic downturn, many of the new subdivisions are only partly built out, creating many gaps in the sidewalk system where houses have not been built yet.

City Policy should be revised for possible updated to include the following:

> In New Construction of Subdivisions, given the development may take up to 10 years to complete, sidewalks must be complete at the time the road is being built.
>
> In Existing Subdivisions where there are sidewalk gaps, or no sidewalks are present, establish a process for completing the sidewalk system. It is suggested that if 2/3 of the occupied households vote to complete the sidewalk system that is being constructed with cost assessed to the landowners who segments are incomplete. If it is for a sidewalk along a local neighborhood road the vote should be among property owners just on that road. If it is for a sidewalk along a neighborhood collector road then the vote should be among the property owner in the neighborhood.

Key Programs to Continue for Sidewalk/Roadside Pathway Completion

The City of Novi has many good existing policies and programs that support the non-motorized system. The following policies and programs should be reinforced and continued.

- The City has a Pathway and Sidewalk Prioritization Analysis and Process that has been successful in installing sidewalks and pathways along arterial and collector roadways. The prioritization should be continued and updated every five years.

Policy Recommendations on Sidewalk/Roadside Pathway Completion

Within One Year:

- Establish a committee to update the City code based on the recommendations within this report.

Within Three Years:

- Establish the process for neighborhoods to complete their sidewalk system.

Within Five Years:

- Update the City's Pathway and Sidewalk Prioritization Analysis and Process and track its progress.

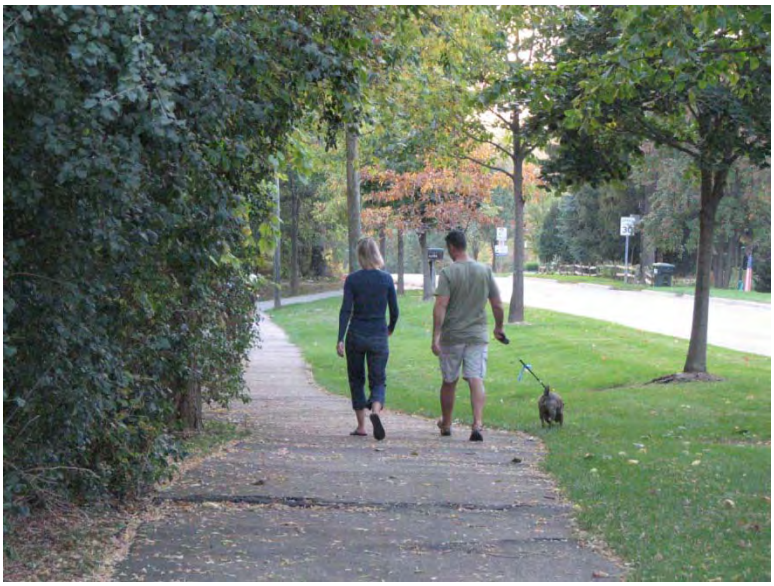
5. Design Guidelines

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):

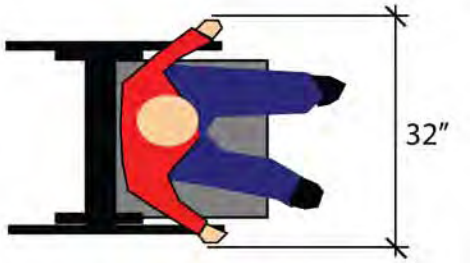
1. Presence of a sidewalk
2. Amount of lateral separation between pedestrians and motor vehicles
3. Presence of physical barriers (such as trees) and buffers (including parking) between pedestrians and motor vehicles
4. Motorized vehicle volume
5. Motorized vehicle speed

Pedestrian Spatial Requirements and Sidewalk Width

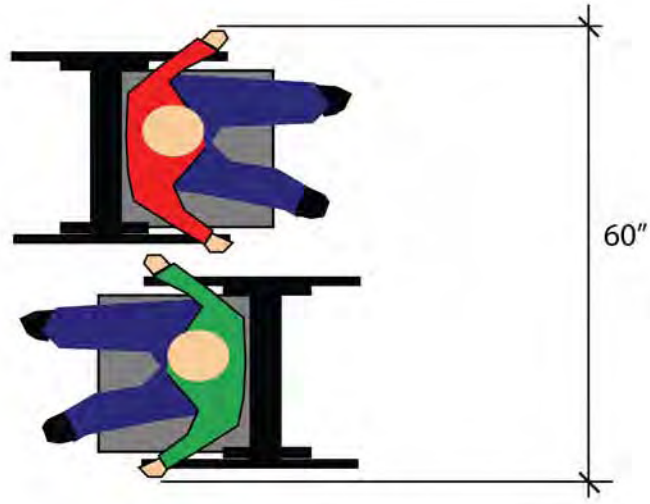
Pedestrian spatial requirements vary greatly given the variety of pedestrians. More significant than the size differential between individuals, the various mobility aids utilized have a major impact on how much space is required. Pedestrians who use crutches, walkers, wheel chairs, scooters or guide 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



Single Wheelchair Passage



Two Wheelchairs Passing

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. 2.2A *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

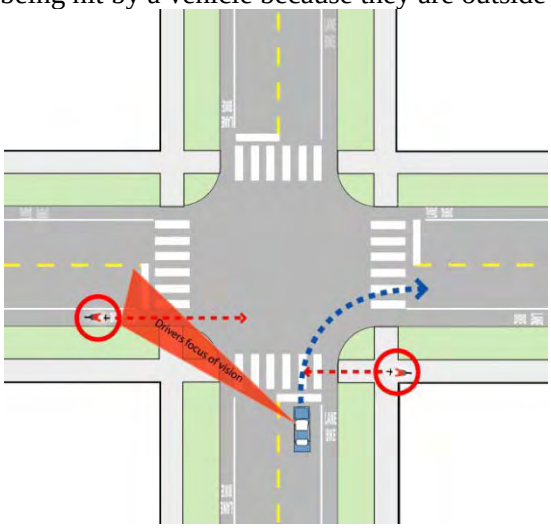
One of the most significant drawbacks to bicycling on sidewalks as opposed to bicycling in the roadway is the loss of right-of-way when traveling along collectors and arterials. When riding in the roadway of a major road, the vehicular traffic on side streets that do not have a traffic light generally 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

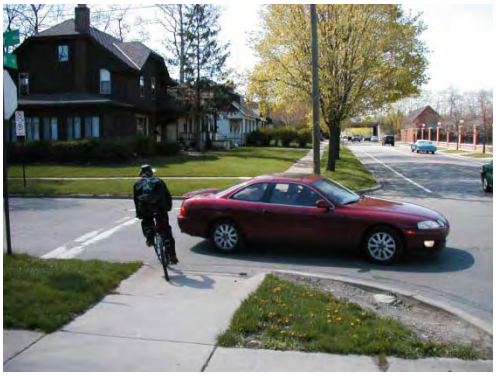
Bicycles traveling in the opposite direction of traffic on sidewalks have significantly greater chance of being hit by a vehicle because they are outside of the driver's typical field of view.

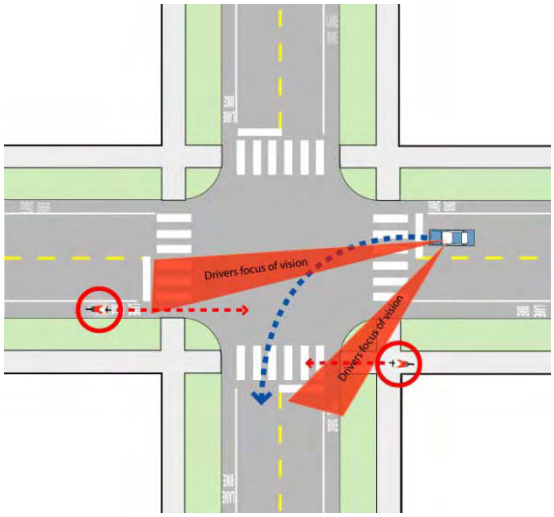


Car turning right

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.

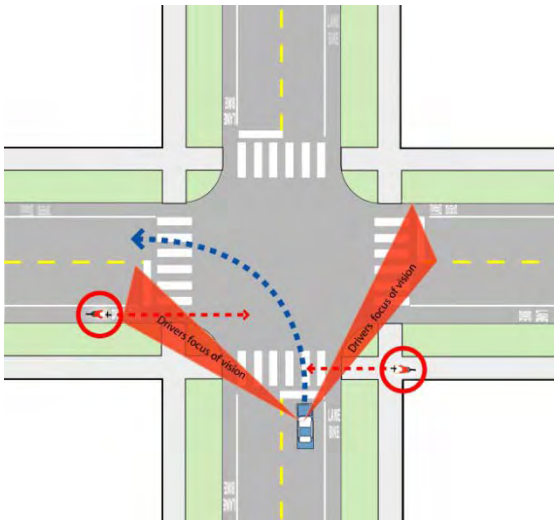




Car turning left

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 nonmotorized 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

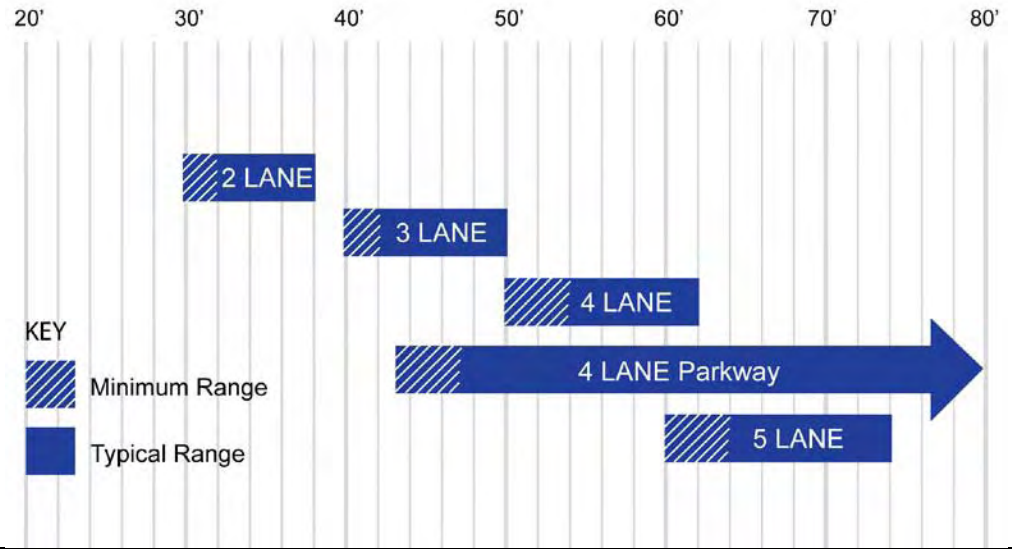
There are various configurations of overall road widths depending on individual lane widths. For instance, a road may have anywhere from ten to twelve foot travel lanes and five to eight foot Bike Lanes. Variation in any or all of these widths has an impact on overall road width.

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

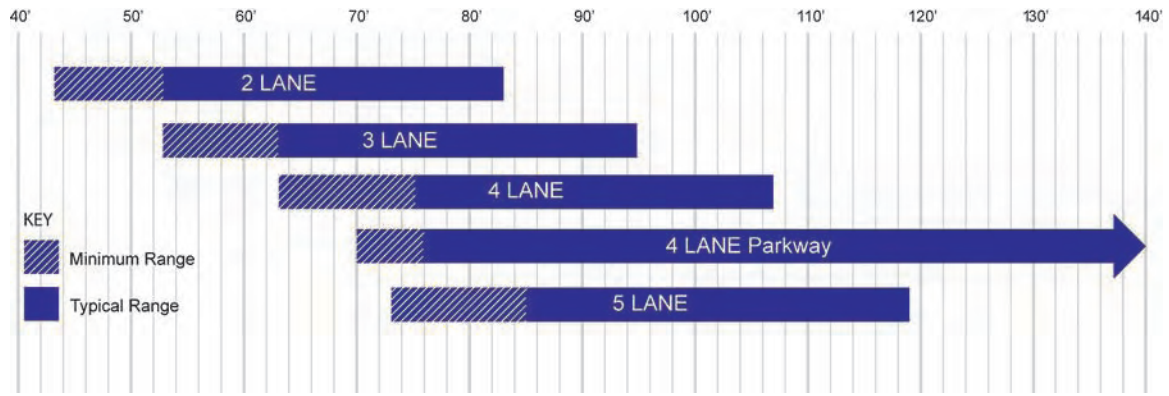
In addition to the road, the ROW contains sidewalks/path, the buffer area between the sidewalk and the road and space for a median if any. There is tremendous variation within some variables such as the buffer and the median distance.

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.

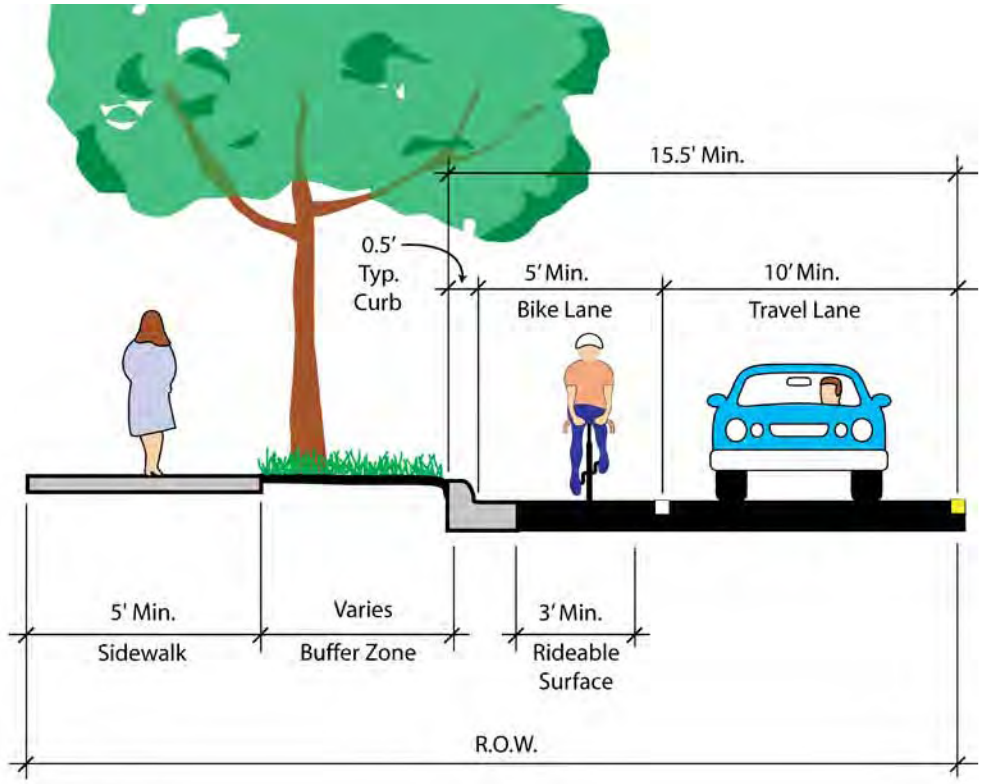
Motor Vehicle Lane Width

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



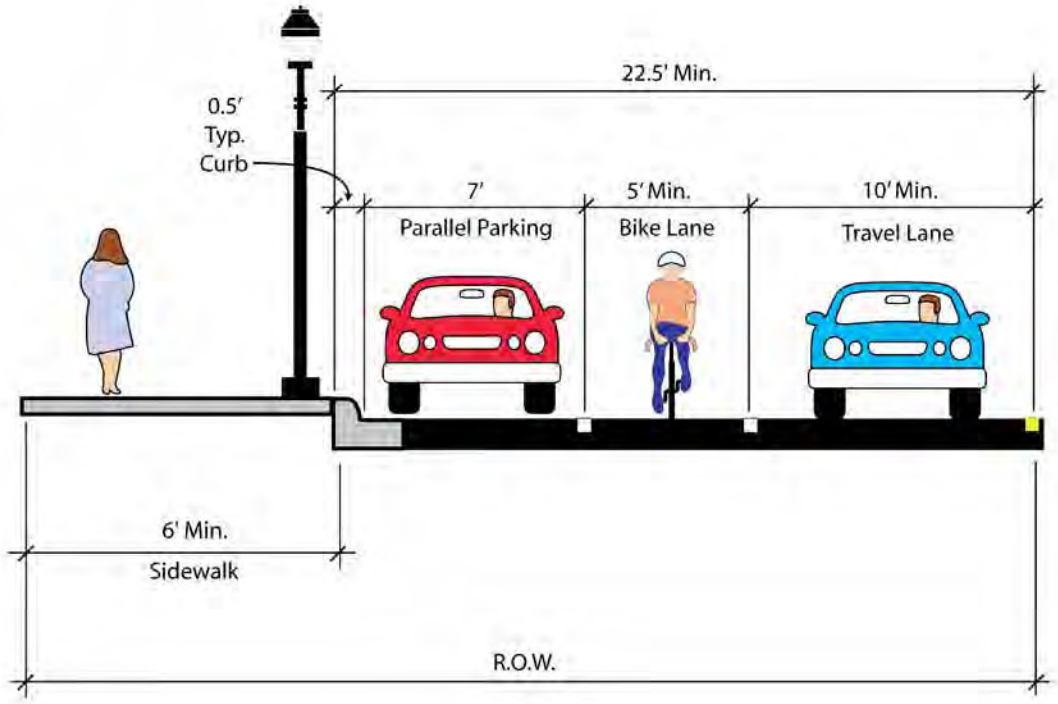


Fig 5.4B Urban Bike Lane Sizing Chart

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

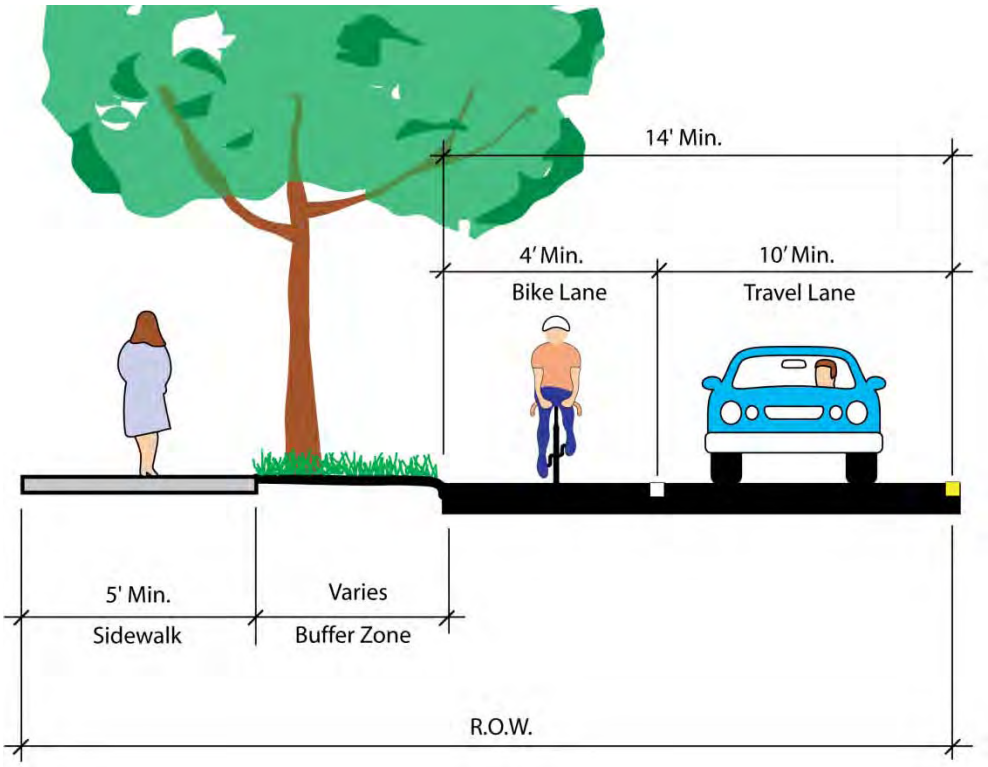


Fig 5.4D Rural Bike Lane Sizing Chart

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

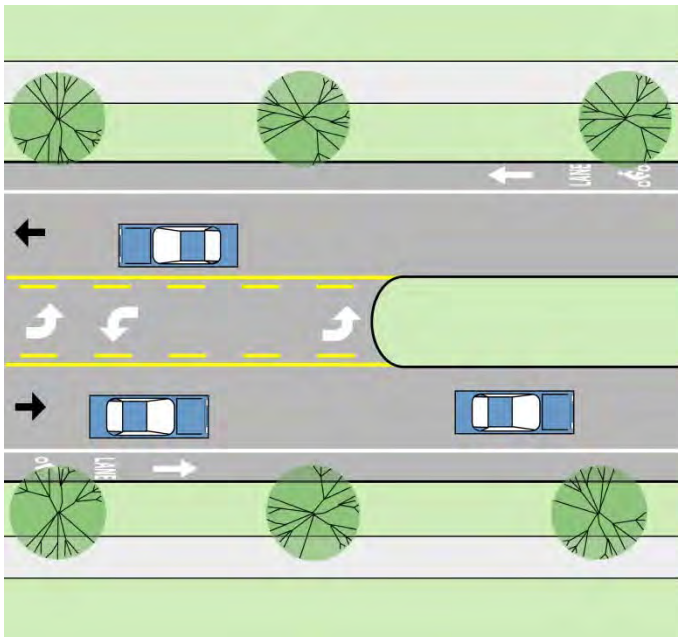
10' Travel Lanes

	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.

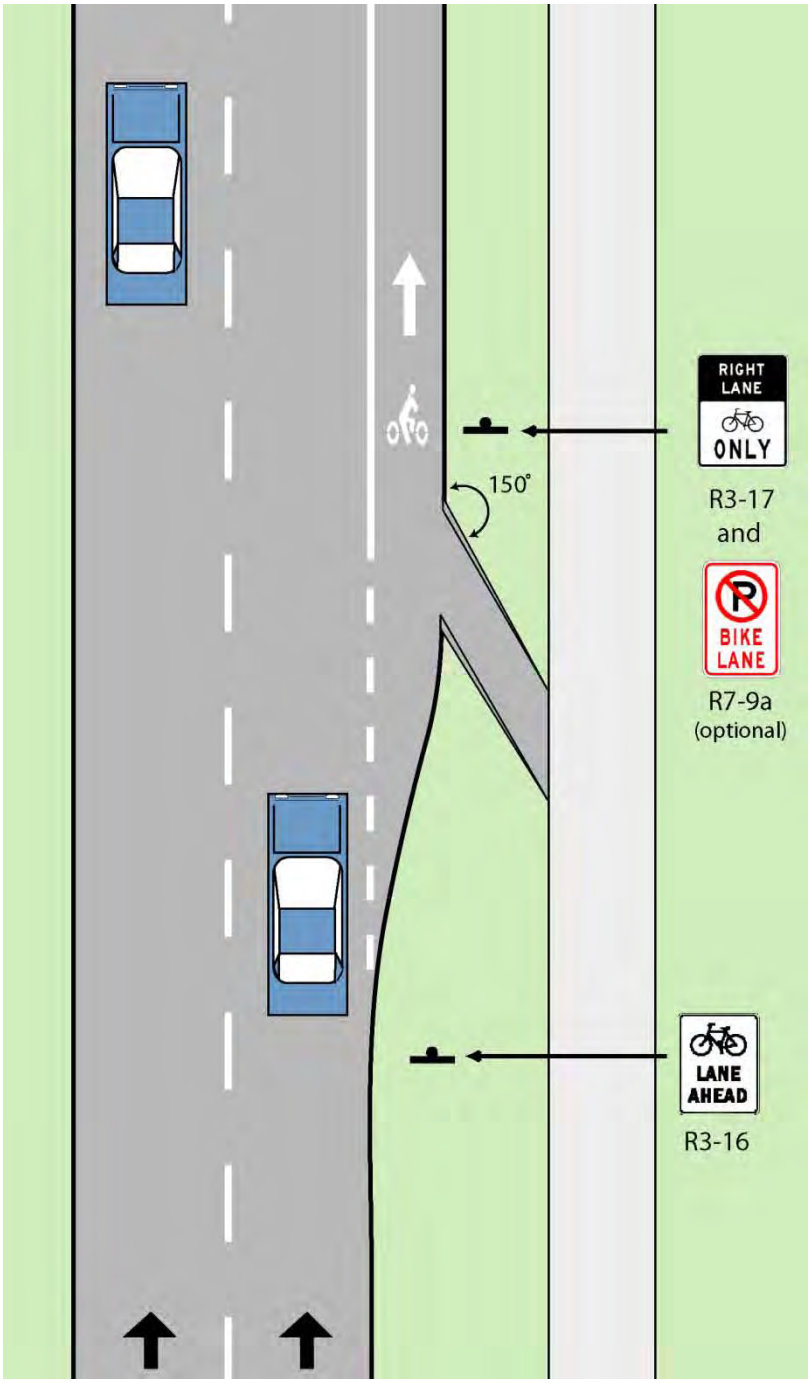
The transition points between sidewalk bikeways and bike lanes, presents a number of challenges. This underscores the importance of making the non-motorized system as consistent as possible. When bringing bicyclists into the roadway as shown in Fig 5.5A (next page), the entrance point needs to be protected. 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

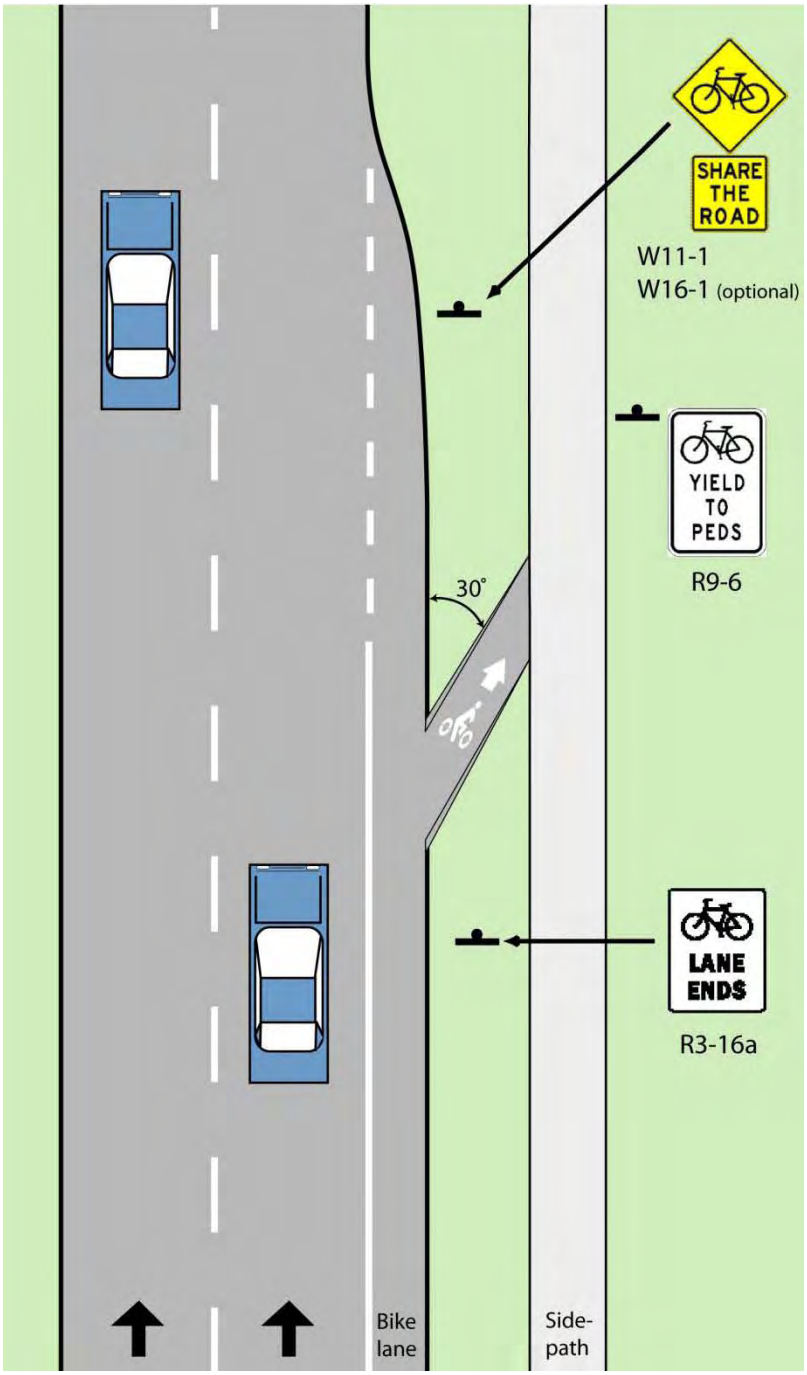
The bike entrance ramp is used to provide easy transition from a sidewalk bikeway to a bike lane or to allow a bicyclist to enter the roadway to make a turn as a vehicle.

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

Novi's 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

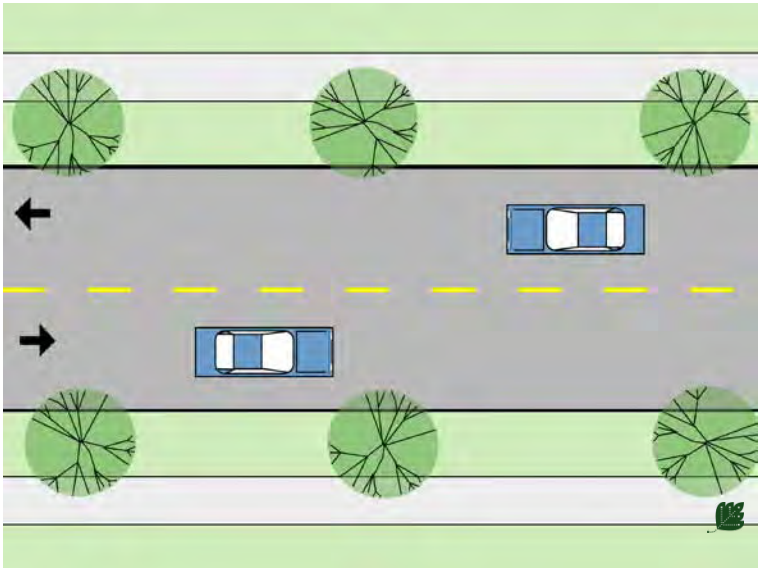
The narrowing of high speed four and five-lane roads to accommodate bike lanes has some specific conversion issues. Given the higher volumes of traffic, higher speeds and higher number of heavy vehicles on many of these roadways, it is desirable to keep the motor vehicle lane widths as close to an 11' minimum as possible. On some of Novi's four and five-lane roads, this may mean that it is not possible to accommodate a bike lane on both sides of the roadway in the near-term.

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.

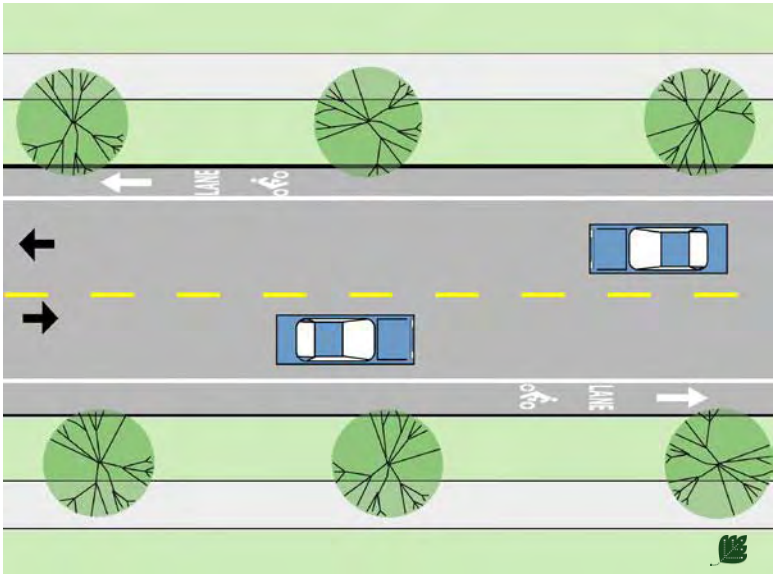
When there is not a bike lane in the road, the bicyclist should be provided the option to use a sidewalk or to bike in the road. Exit and entrance ramps should be used to ease the transition between on-road and off-road facilities.

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

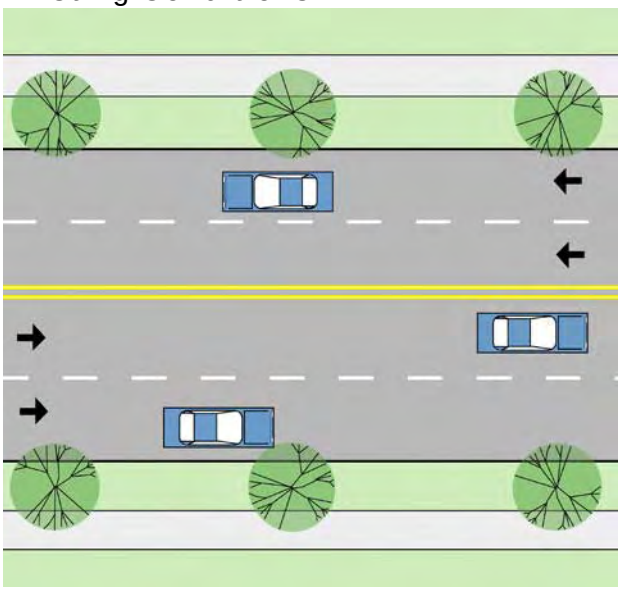
In general, lane narrowing to provide for bicycle lanes may be considered in the following situations (as measured from back of curb):

- 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

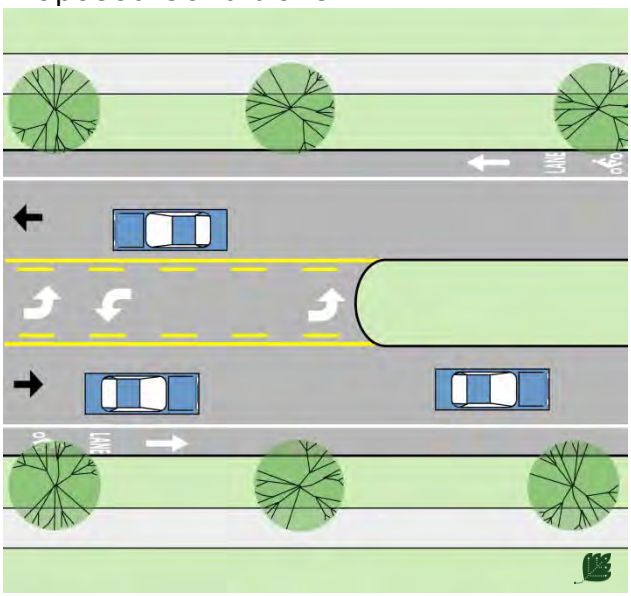
Higher speed roads may require additional width; see notes on multi-modal roadway design guidelines.

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.

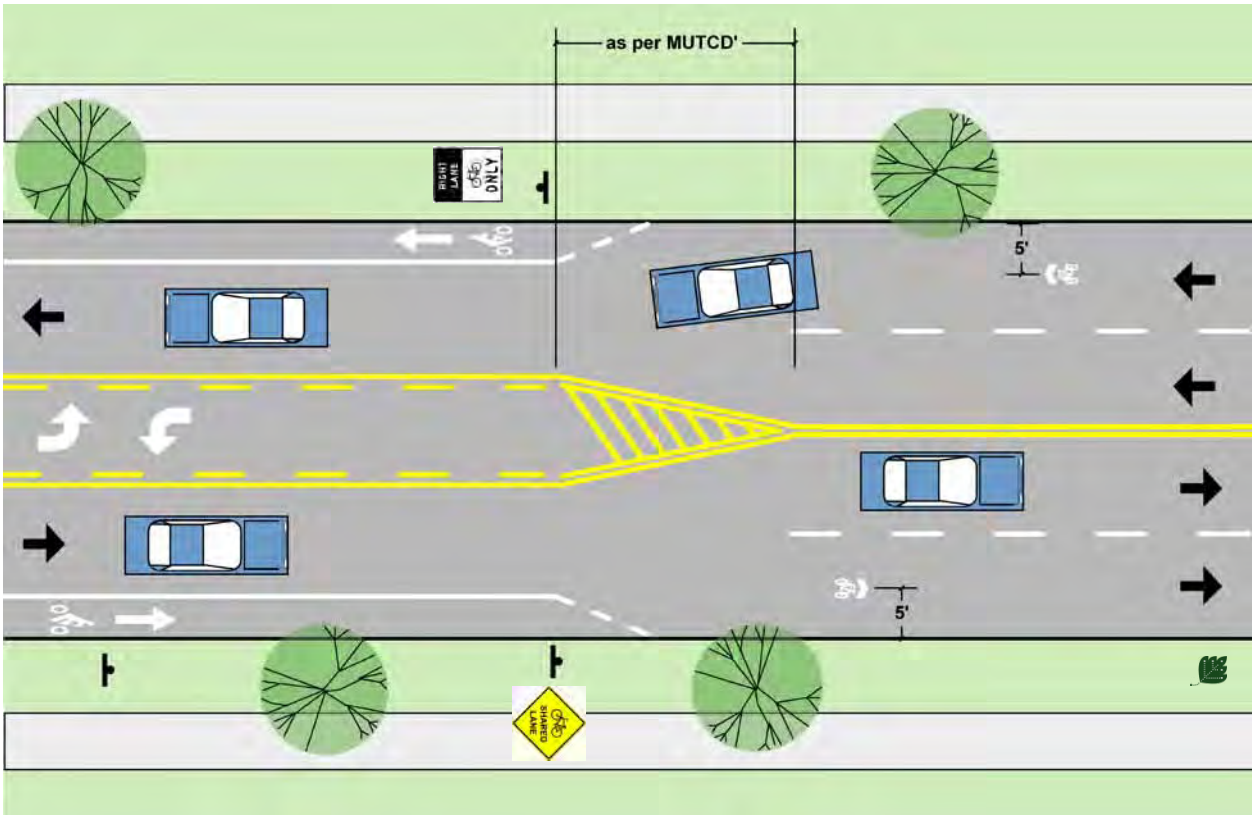
Application

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.

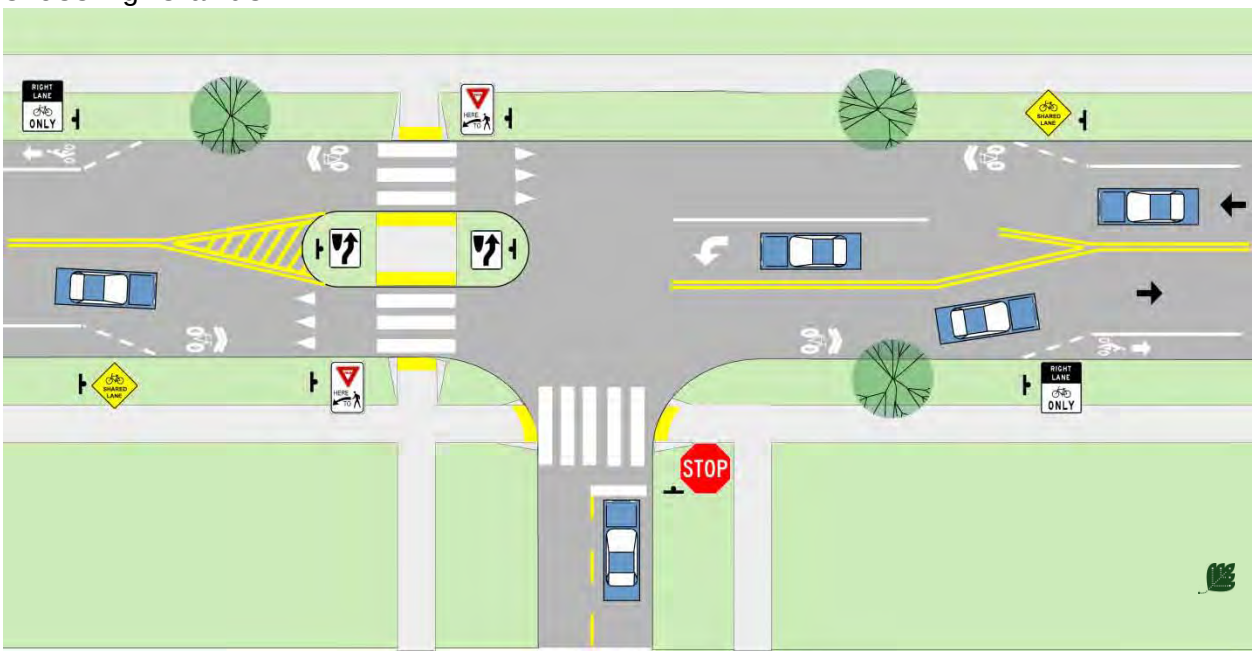
Application

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

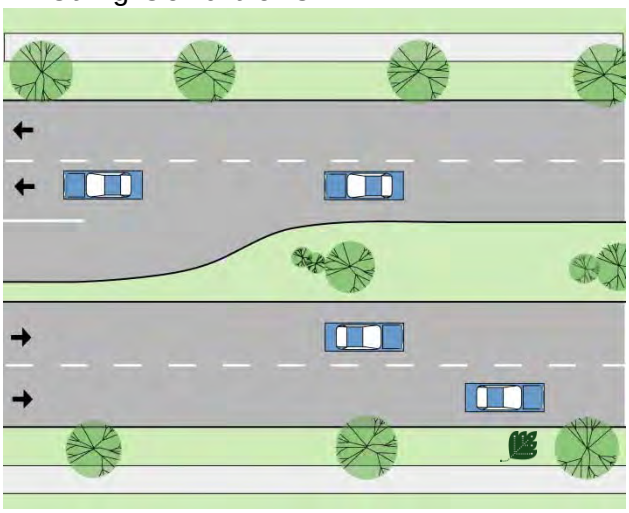
Where a designated left-turn lane is warranted and/or a pedestrian crossing island is appropriate, the bicycle lane may be dropped and replaced with the Shared-Use Arrow.

Application

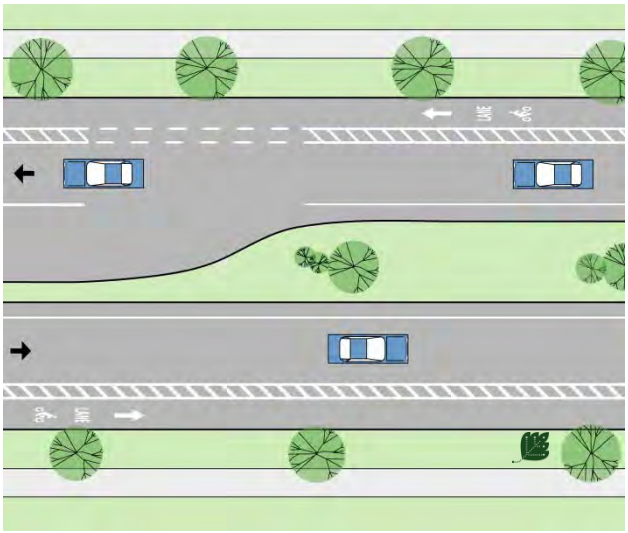
This is an interim approach to accommodating the turn lane and the crossing island. The long-term solution would expand the intersection to accommodate bicycle lanes. The length of the left-turn lane should only be as long as it needs to be to accommodate the conditions of each specific site.

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.

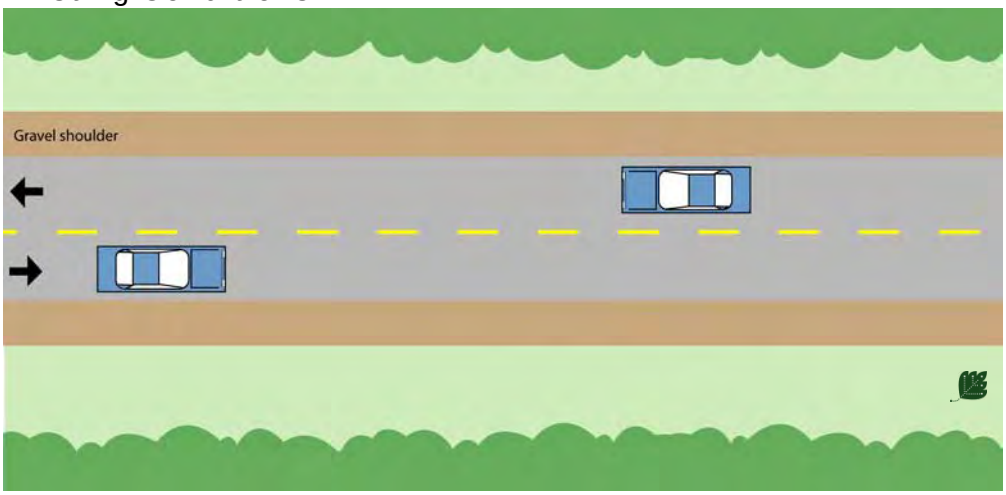
This striped buffer is replaced with a dashed line where bicycle-merging movements are expected.

Application

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

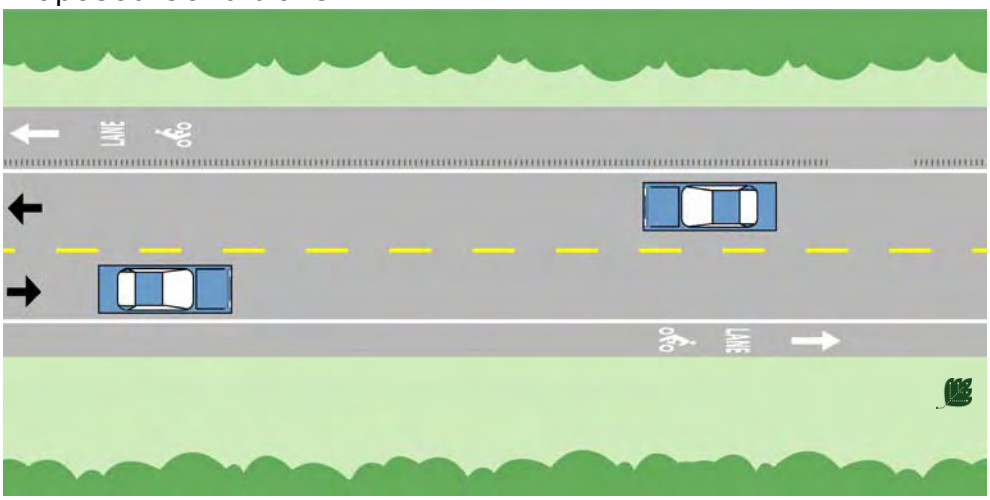
Fig. 5.6F. Paving Shoulders

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



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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. The City of Novi should continue to enforce the 25' corner clear zone that is noted in the zoning ordinance requirements. 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.

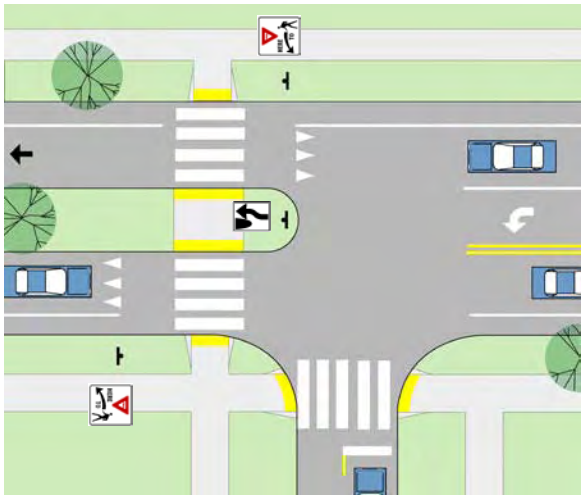
[1] AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities (Draft).* August 2001.

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

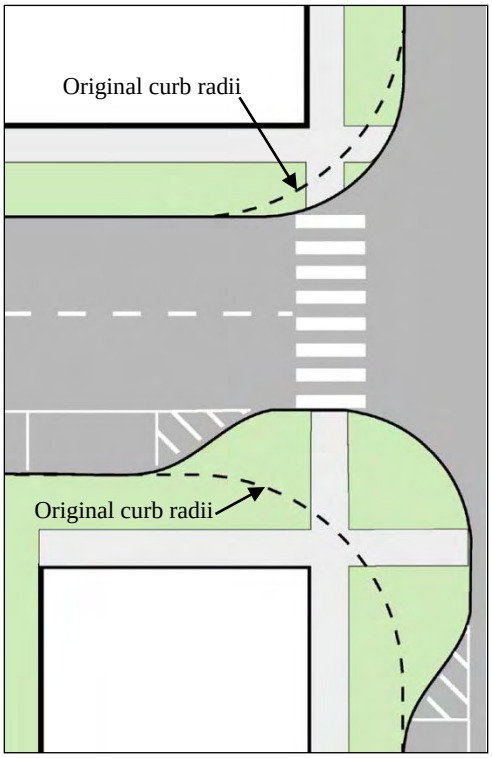
Crossing islands are raised areas that separate lanes of opposing traffic and eliminate the need for pedestrians to cross more than one direction of traffic at a time (see Figure 5.7A to the left).

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



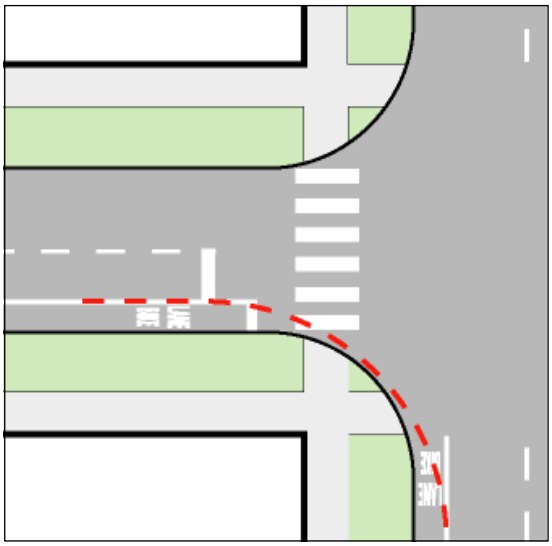
Minimizing Crossing Distances

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

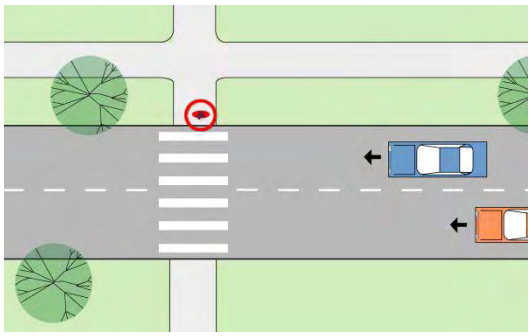
Bicycle lanes provide an added advantage of effectively increasing the turning radius for motor vehicles. This is especially the case where both intersecting roads have bike lanes as shown in the figure to the left.

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).

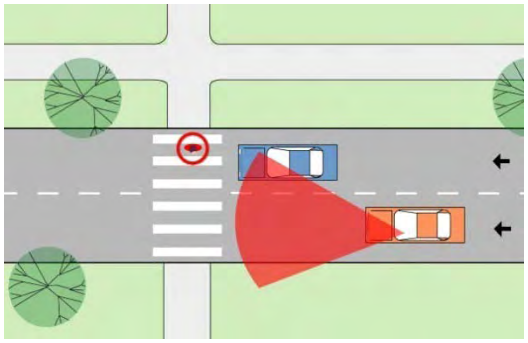
The increased effective turning radius means that motorists are less likely to encroach on adjacent motor vehicle lanes during the turning movements.

Fig. 5.7D. Multiple Threat Crashes Issues

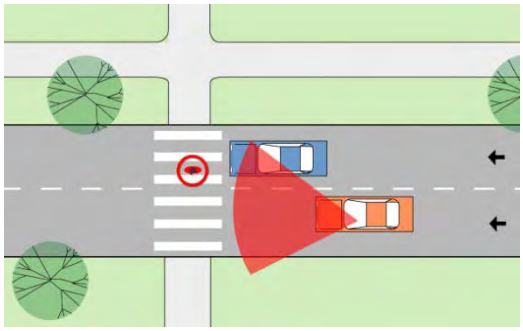
Whenever a crosswalk traverses multiple lanes of traffic traveling in the same direction, there is a potential for what is known as a multiple-threat crash. The crash unfolds as follows:



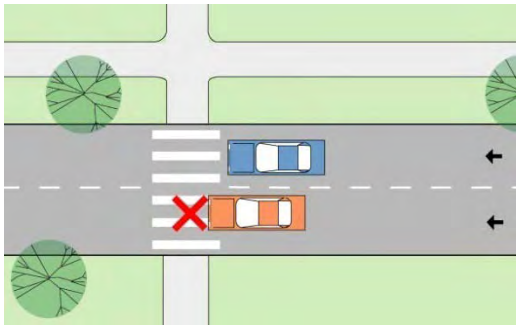
1. The driver in the lane closest to the pedestrian sees the pedestrian approaching the ramp or just entering the roadway and begins to slow down



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 City 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 City 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

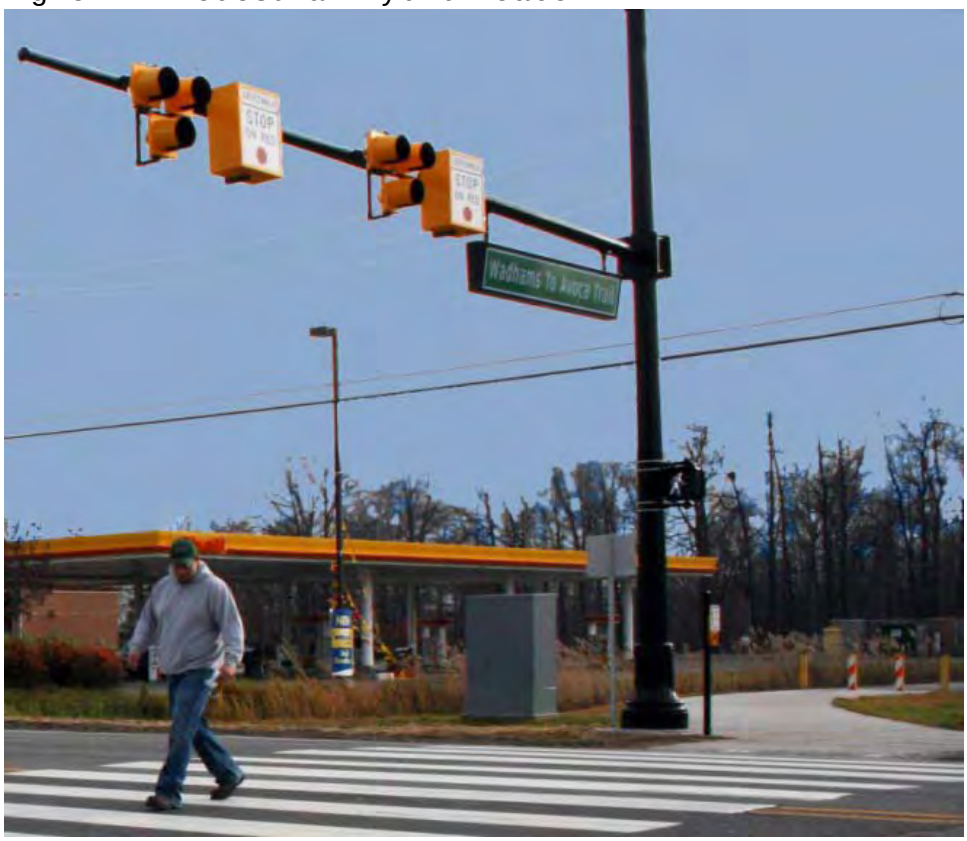
Description

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

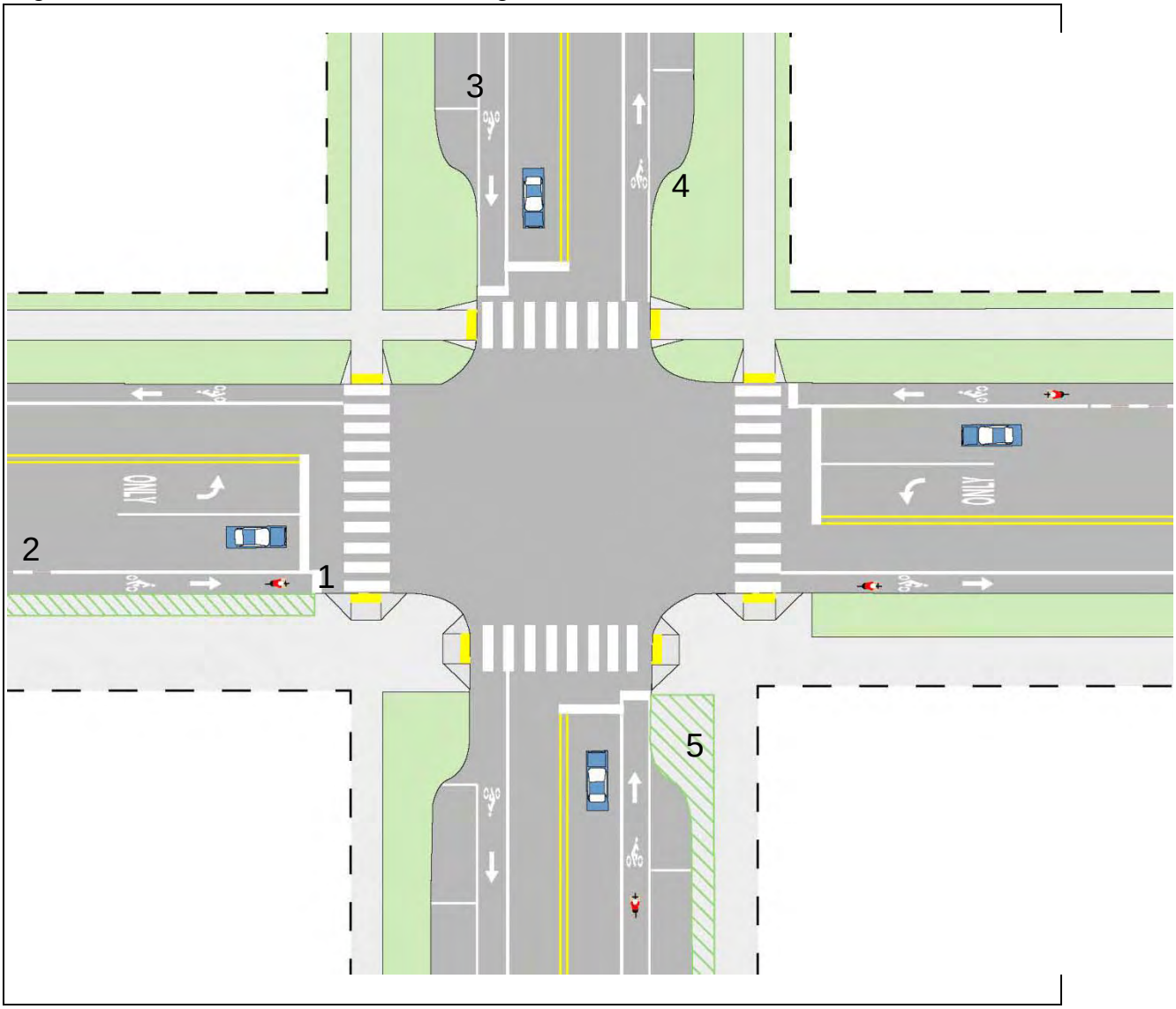
The Pedestrian Hybrid Beacon, also known as a HAWK signal, is a beacon used to help pedestrians cross mid-block where a traditional pedestrian crosswalk signal would be inappropriate. The pedestrian hybrid beacon is similar to an emergency beacon in that the signal's purpose is clearly signed adjacent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

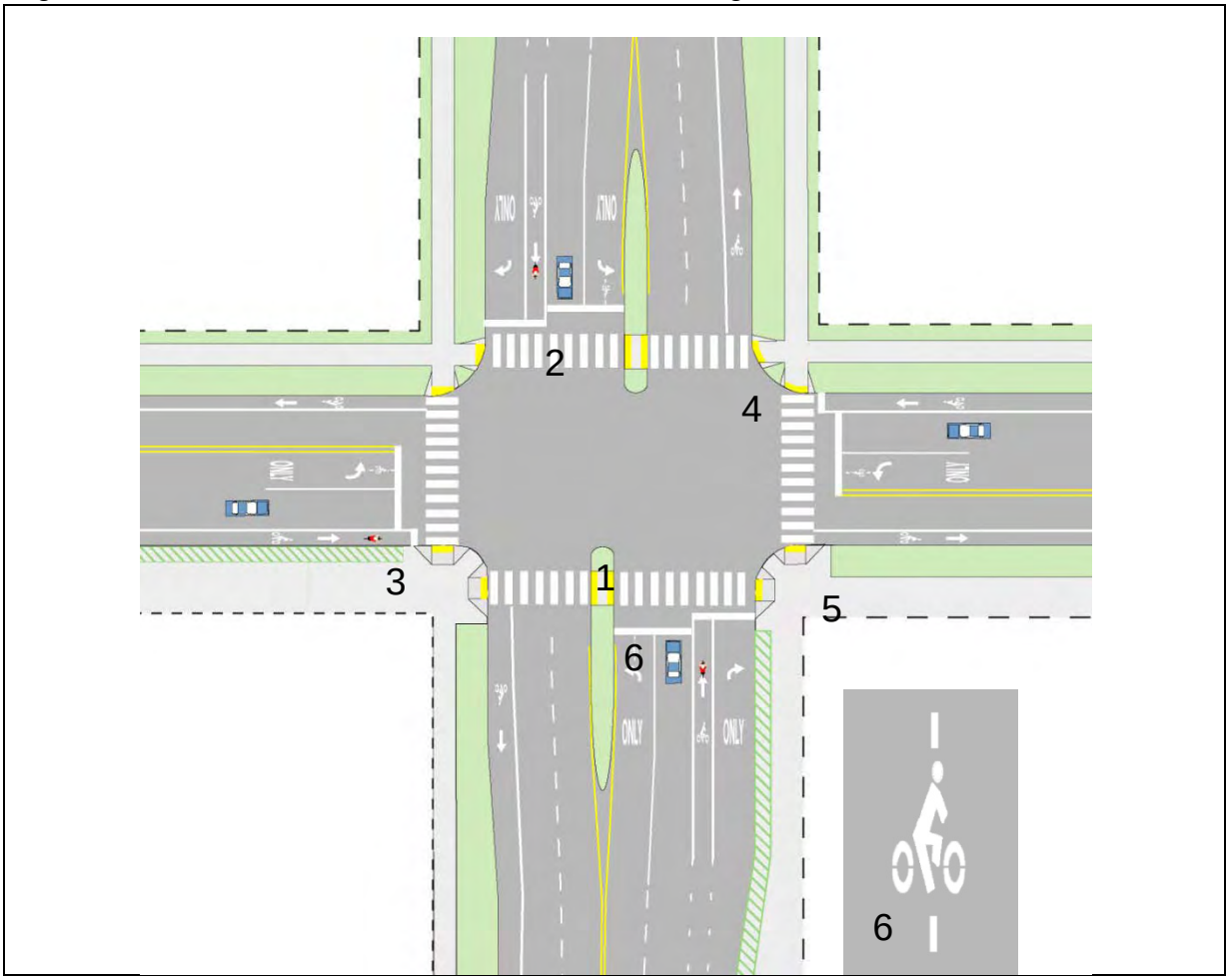
Fig. 5.7J Urban Intersection Design Guidelines



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

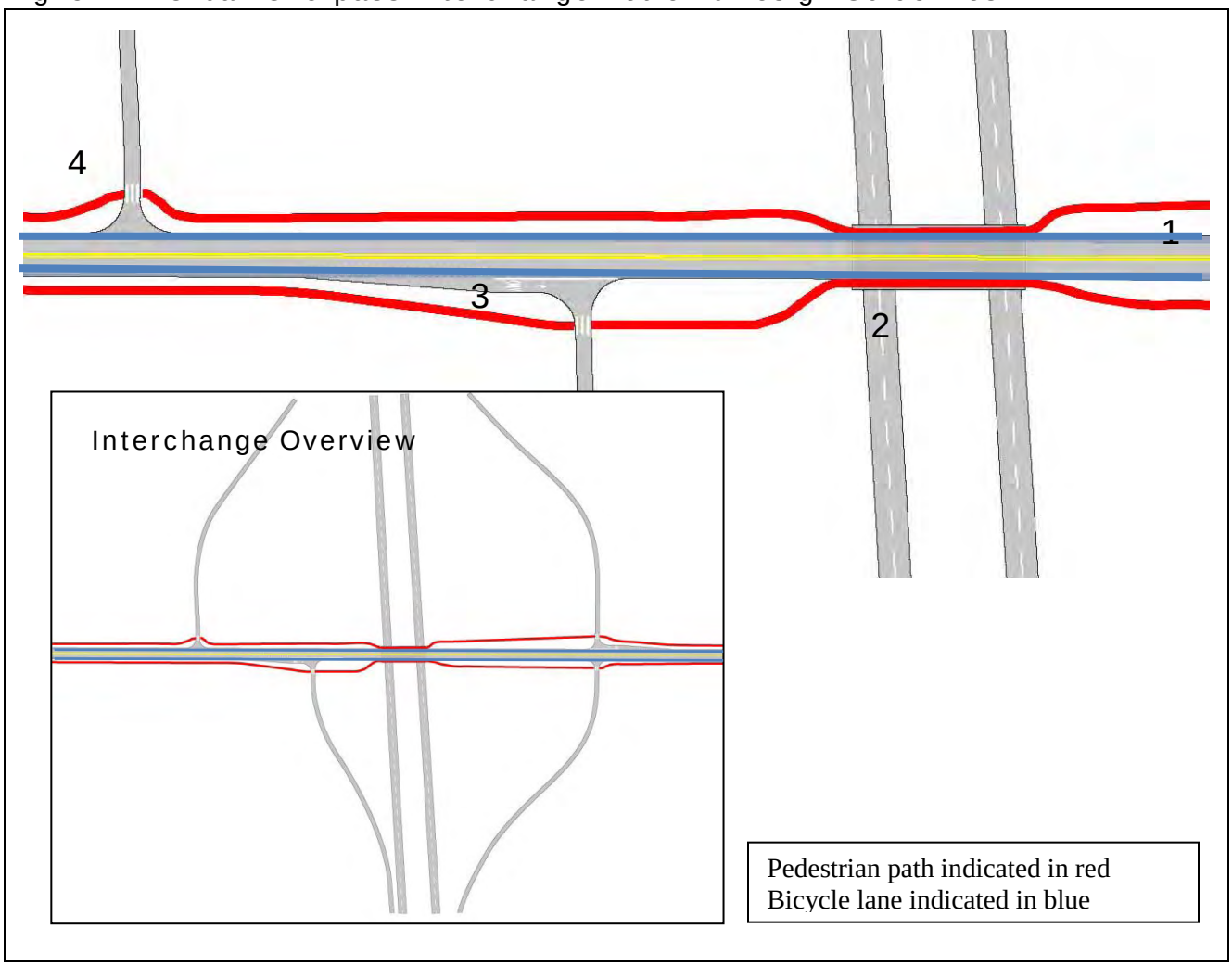


Key Elements

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.

Fig. 5.7L. Urban Overpass Interchange Retro-fit Design Guidelines



Key Elements

1. Bike lanes must be on both sides of the road to allow cyclists to ride with traffic.
2. Sidewalks with barriers between the sidewalk and the roadway should be provided at the bridge. If retrofitting an existing bridge, consider cantilevering a sidewalk.
3. The through bike lane should be to the left of the right turn lane onto the approach ramp.
4. Curb radii of ramps are tightened to narrow pedestrian crossing distances and crosswalks are clearly marked.

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 City 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 City 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[23]. 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.[24]

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

[23] AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* July 2004.
[24] 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. 5.7M. 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. 5.7N. 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. 5.7O. 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 city.

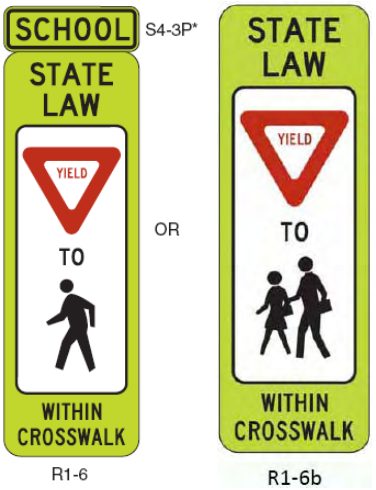
Fig. 5.7P. School Crossing Sign Options

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.

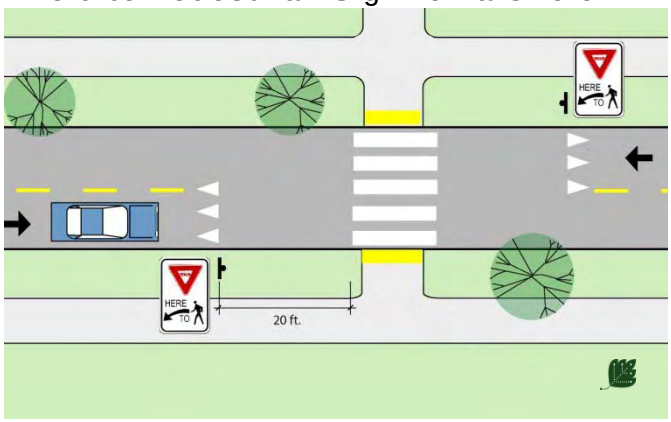
The School Crossing signs are intended to be placed at established crossings that are used by students going to and from school. However, if the crossing is controlled by stop signs, S1-1 should be omitted at the crosswalk location. Only crossings adjacent to schools or on designated routes to school 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. 5.4P are required in the 2009 MUTCD. MDOT has until the end of 2011 to adopt these changes.

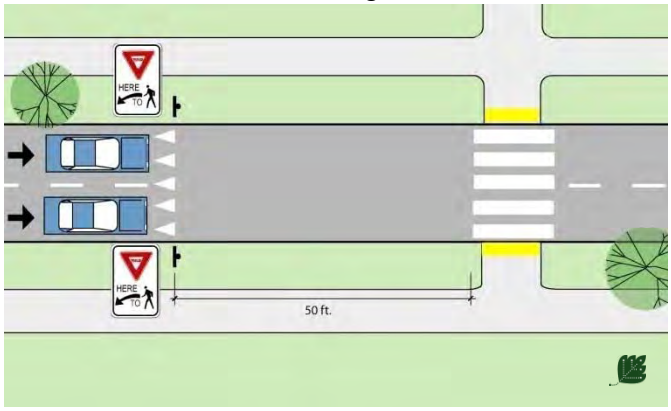
.Fig. 5.7Q. Crosswalk Sign and Yield Line Placement

"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.

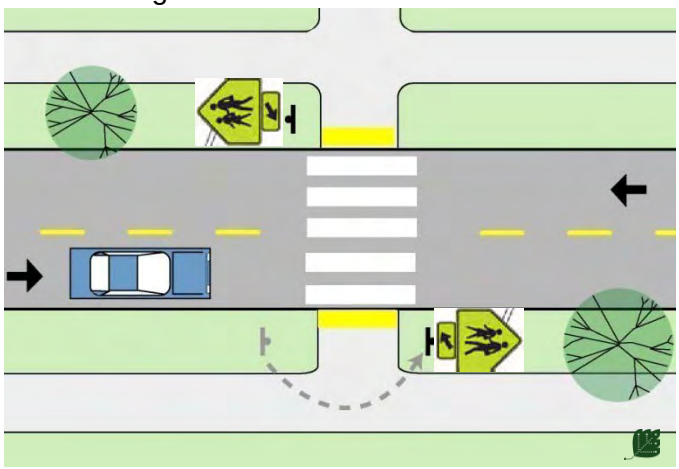
"Yield to Pedestrian Sign" on a Multi-Lane Road



"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

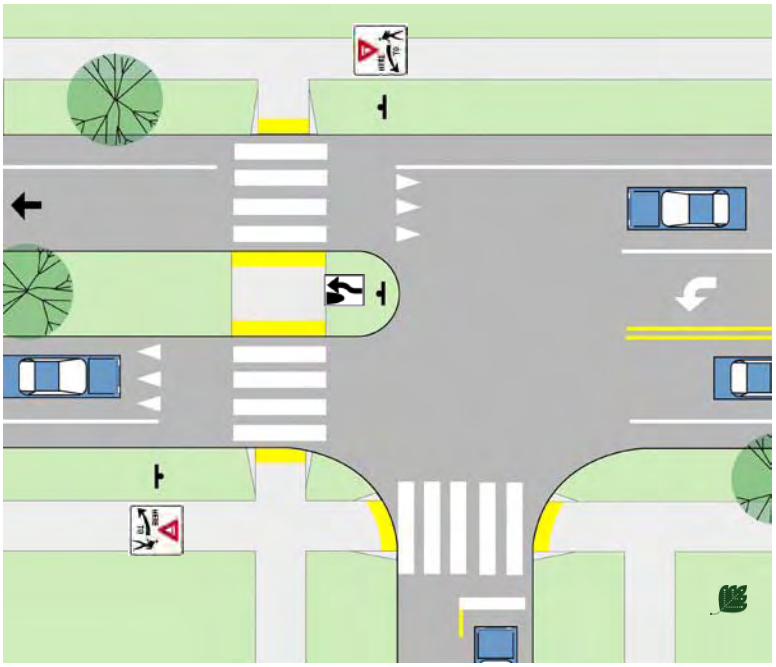


School Crossing Signs should be placed behind the crosswalk to improve visibility of crossing pedestrians rather than in front of the crosswalk where the large signs may obstruct motorists' views.

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. 5.7R. Unsignalized Tee Intersection with Turn Lane Guidelines



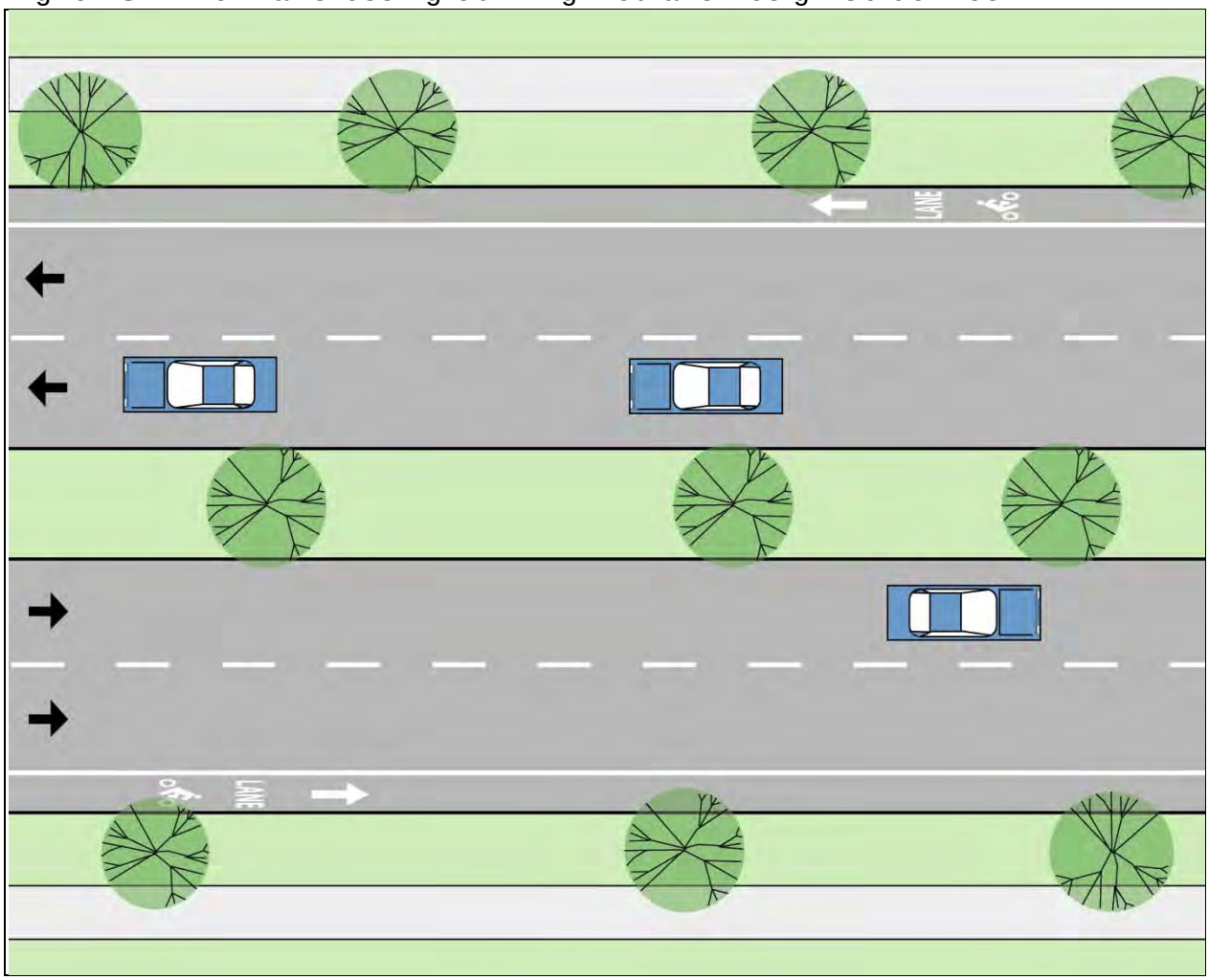
Description

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. 5.7S. 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

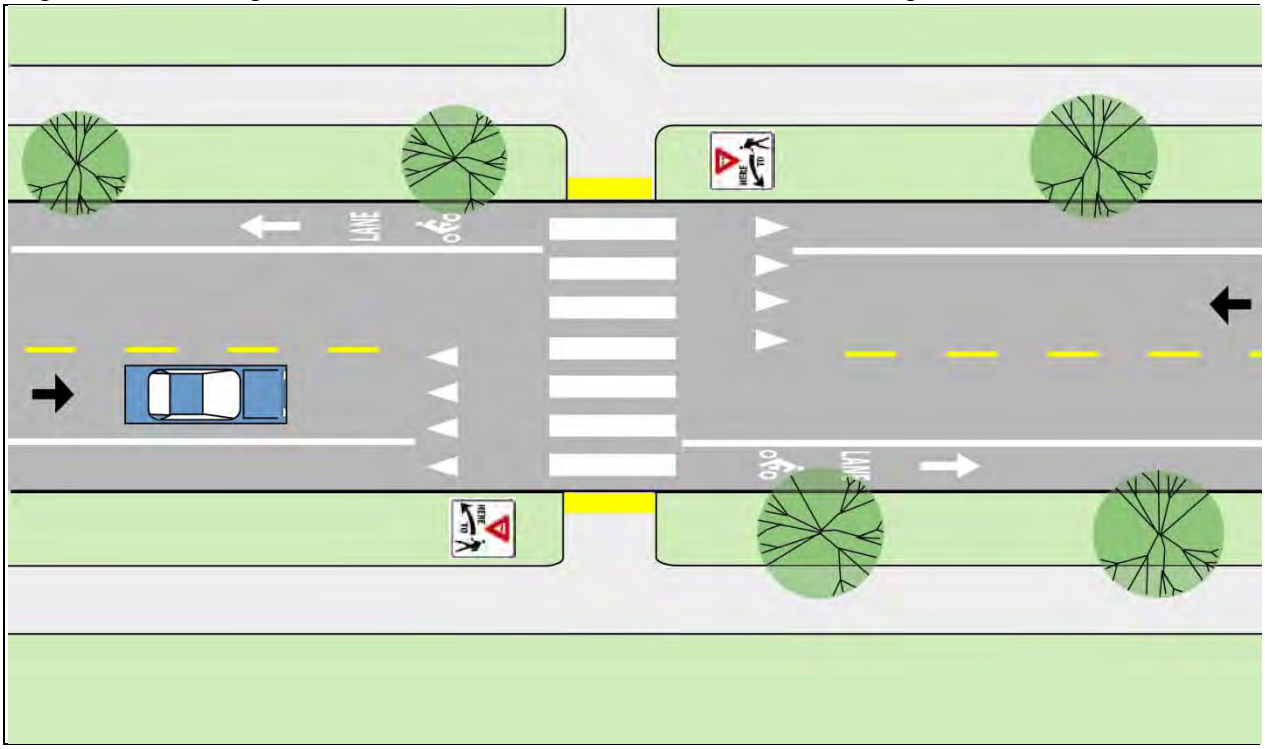
A median with plantings that permits traversing by foot and allows good visibility between the driver and the pedestrian.

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. 5.7T. 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:

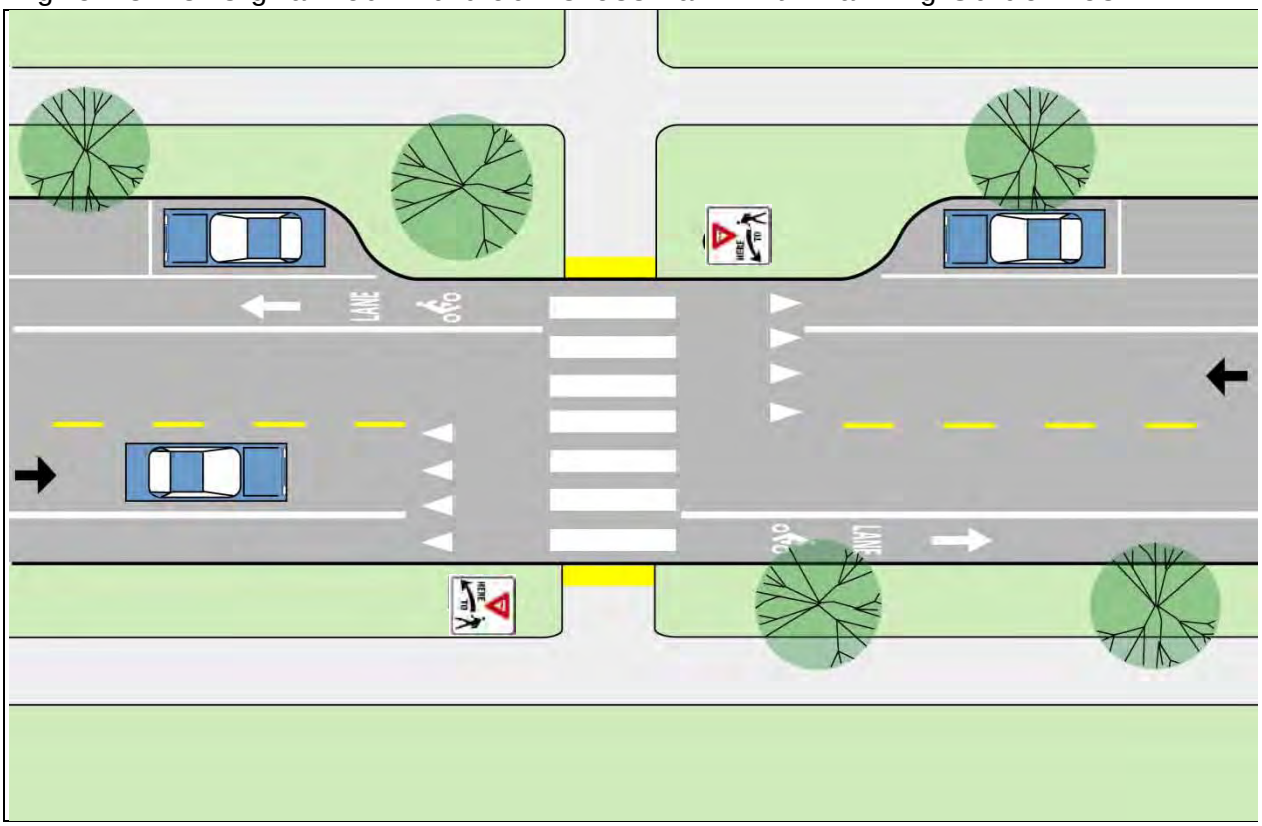
- The yield markings are set back from the ladder crosswalk to minimize the potential for a multiple threat crash.
- Where crossing signs other than the R1-5/ R1-5a "Yield Here to Pedestrians" are used, yield lines should be omitted.
- Sightlines are kept clear of vegetation.
- A 2' wide detectable warning 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. 5.7U. 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:

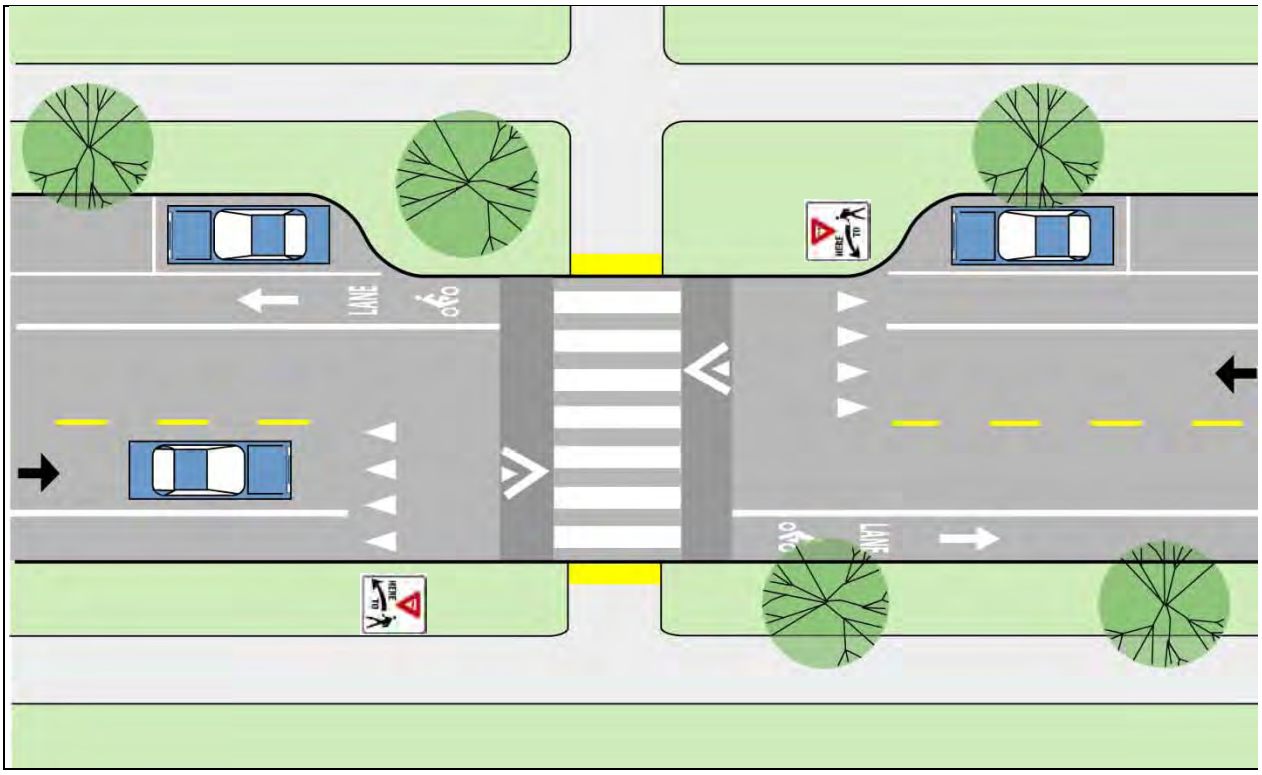
- See elements listed under Unsignalized Basic Mid-block Crosswalk.
- A bulb-out extends the pedestrian ramp into the sightlines of oncoming vehicles, reducing the potential for a “dart-out” type crash.

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. 5.7V. 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:

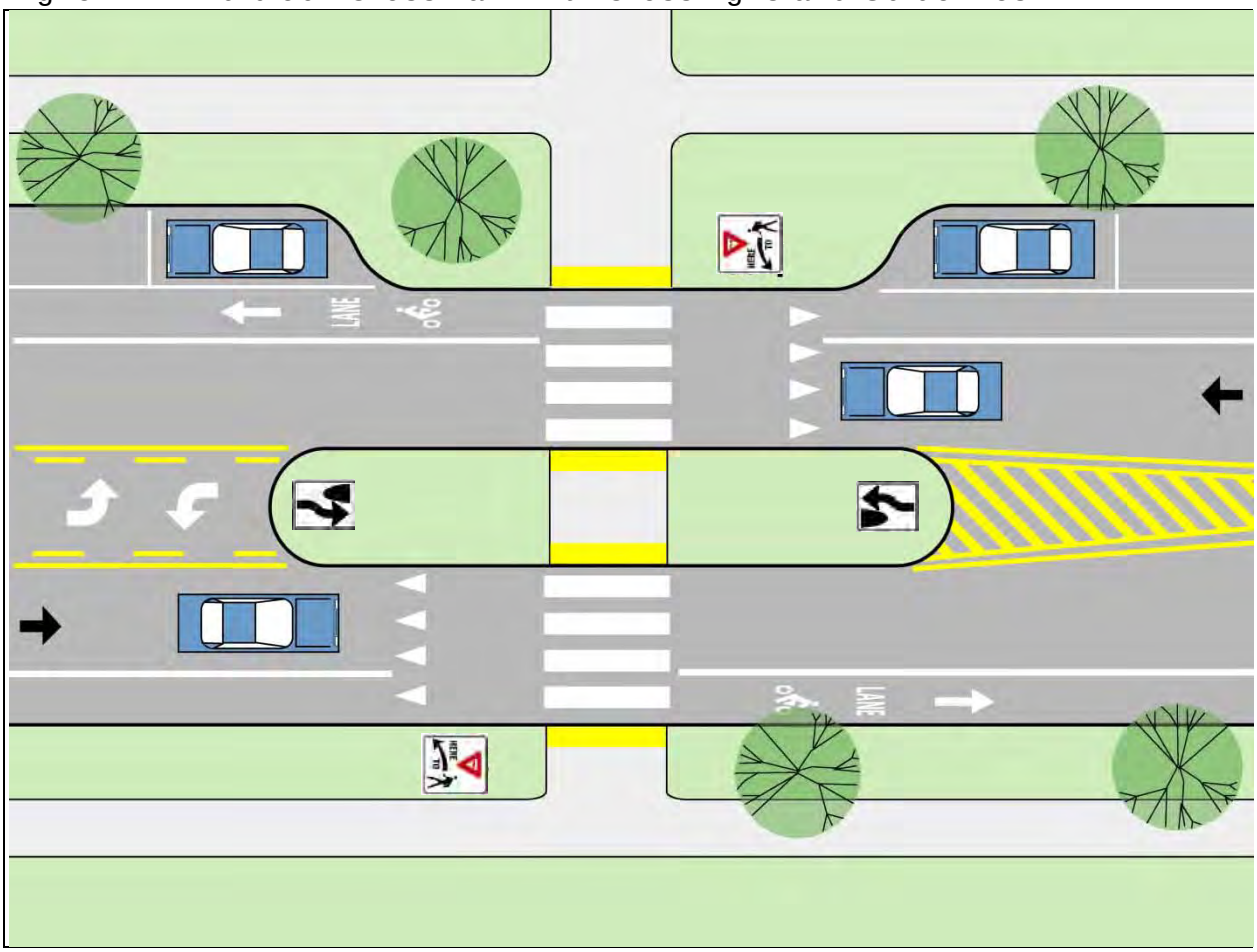
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Parking.
- A speed table with 6' long approach ramps and a 4" high table is placed under the crosswalk to bring travel speeds to approximately 25 MPH.
- When retrofitting existing roadways, maintaining 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. 5.7W. 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:

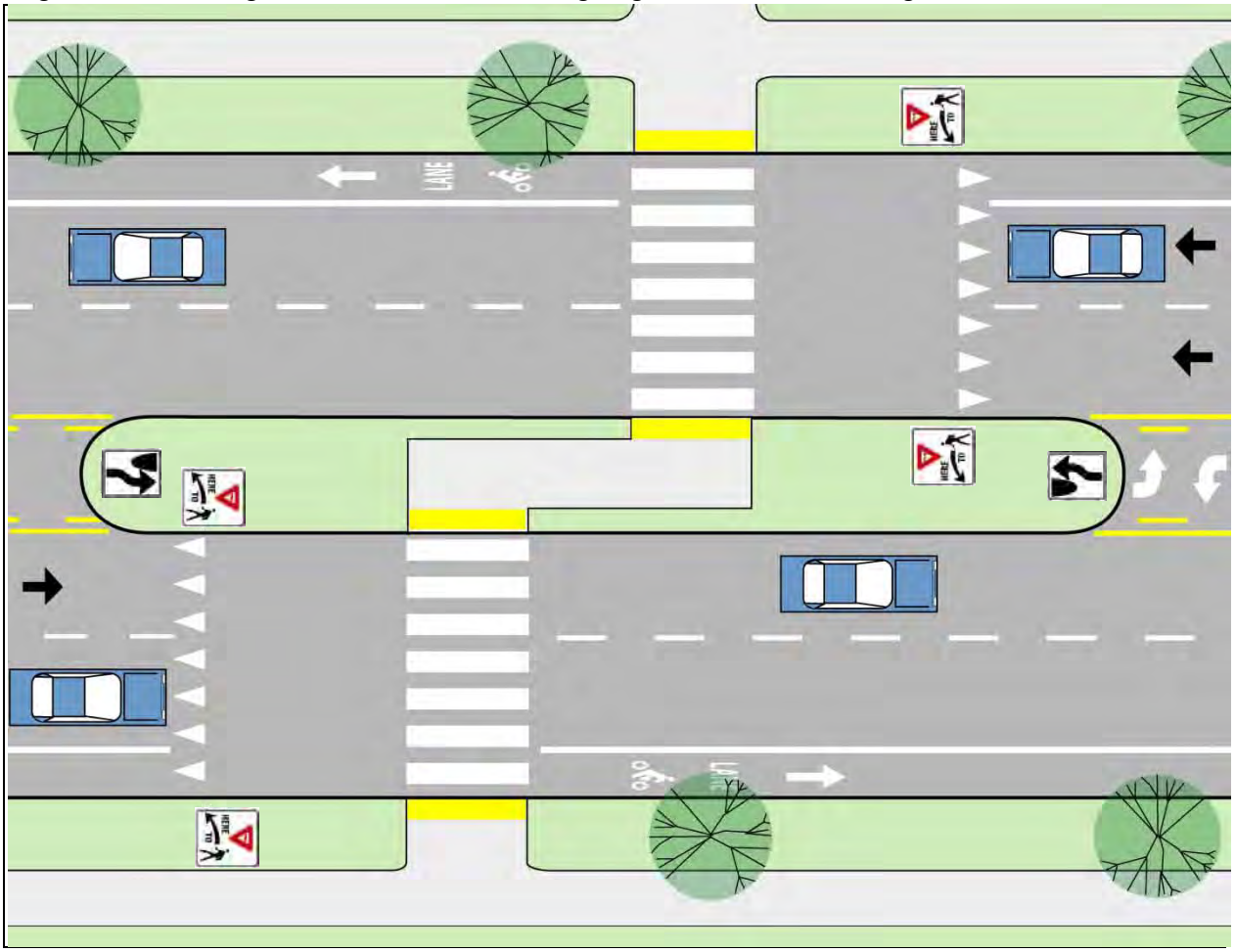
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Parking.
- A crossing island is provided to break the crossing into two separate legs. The island has a minimum width of 6' with 11' or wider preferred.
- Planting on crossing islands should be 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. 5.7X. 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:

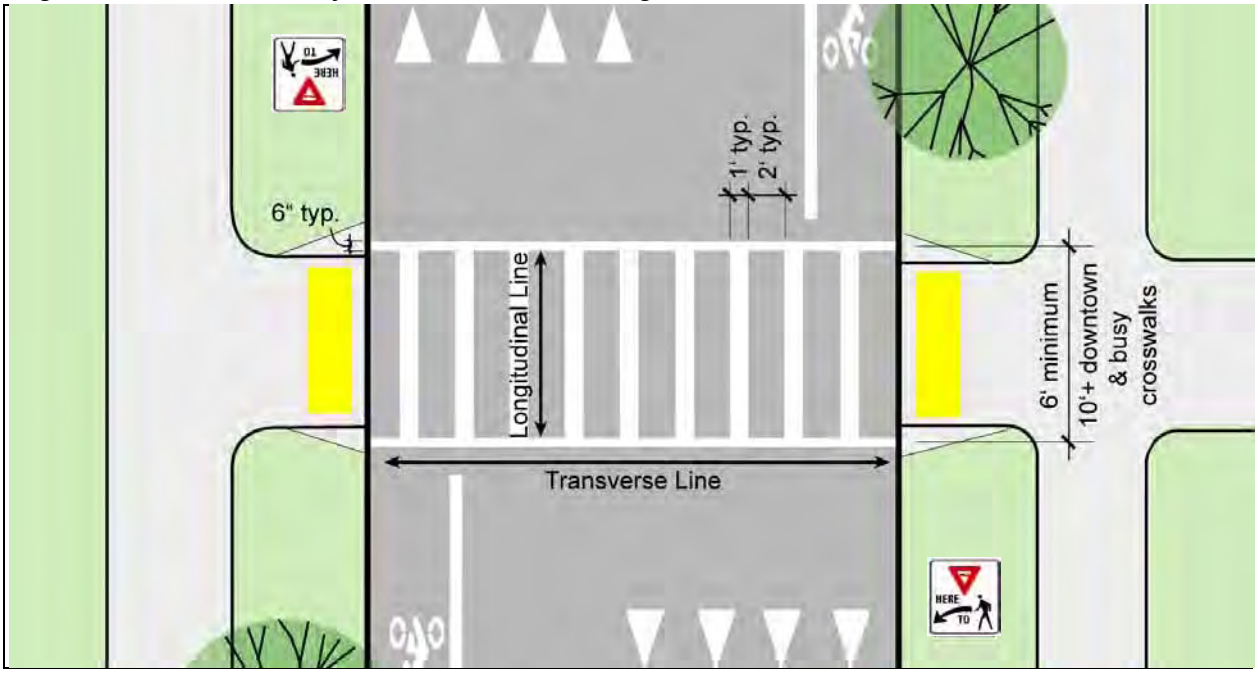
- See elements listed under Unsignalized Basic Mid-block Crosswalk and Unsignalized Mid-block Crosswalk with Crossing island.
- The crosswalks are staggered to direct the pedestrian view towards oncoming traffic.
- Yield markings are set further back to improve pedestrian visibility from both lanes and 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. 5.7Y. 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.

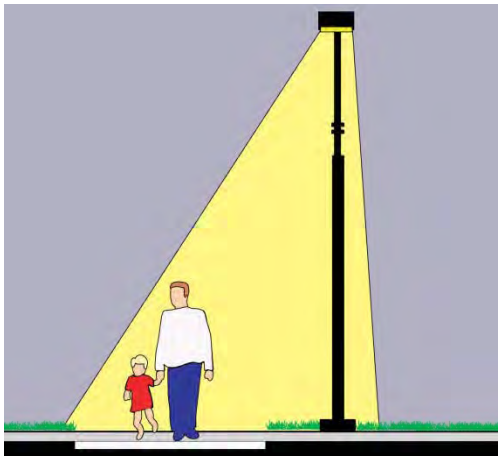
Application

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.

Subdivision Entrances

Subdivision entrances pose many challenges for bicyclists and pedestrians using the roadside pathways and sidewalks as well as trying to cross the primary road. In most cases when a local roadway intersects with an arterial or collector road, by-pass /de-acceleration lanes are added to the road turning a two lane road into a four lane road right at the point where most non-motorized traffic want to cross the road. Not only does this make crossing the road twice as long, at many of the entrances there are signs and landscaping that block visibility creating safety hazards for bicycles and pedestrians. Minimizing the number of lanes that a pedestrian has to cross, pulling vegetation and signs back to improve visibility and providing refuge islands at road crossings are ways to mitigate some of the safety concerns.

The City of Novi has the potential to implement many subdivision intersection improvements which could greatly improve the quality and safety of the road corridor for bicyclists and pedestrians. As it will take many years to construct a complete bike lane system, bicycles will continue using the roadside pathways for many years and thus it is imperative that a safe intersection be constructed.

Fig. 5.7Z. Existing Subdivision Example

Issues with Typical Subdivision Entrances:

- Multiple entrance and exit lanes to subdivisions make it difficult for pedestrians and bicyclists on roadside pathway crossing subdivision entrance.
- Landscaping and subdivision identity signs often block visibility of bicyclists and pedestrians on roadside pathways.
- Addition of by-pass lanes on the primary road widens the primary roadway from two lane to four lanes at most likely pedestrian crossing point.
- Left-turning vehicles may also block visibility of pedestrians crossing the road from motorists using by-pass lanes.
- Wide right-of-ways and limited traffic calming elements encourage motor vehicles to speed also compounding pedestrians crossing the primary road.

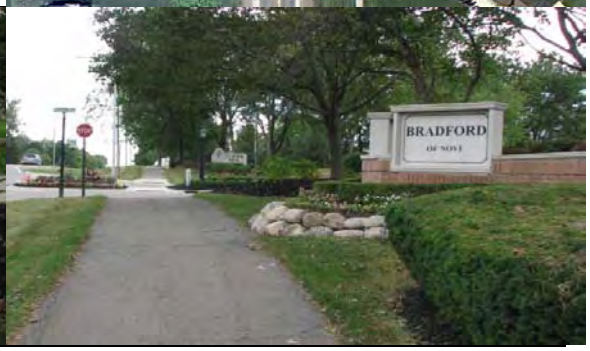
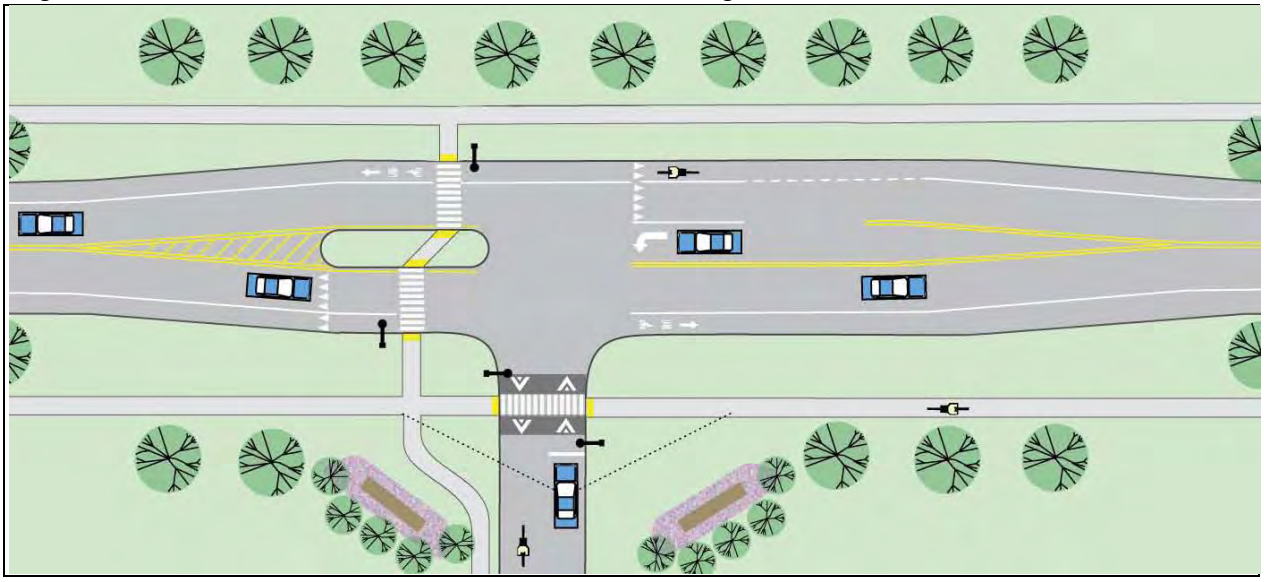


Fig. 5.47AA. Subdivision T-Intersection Design Guidelines



Description

This type of intersection treatment is used to provide a pedestrian crossing where a subdivision intersects with a major.

Key Elements:

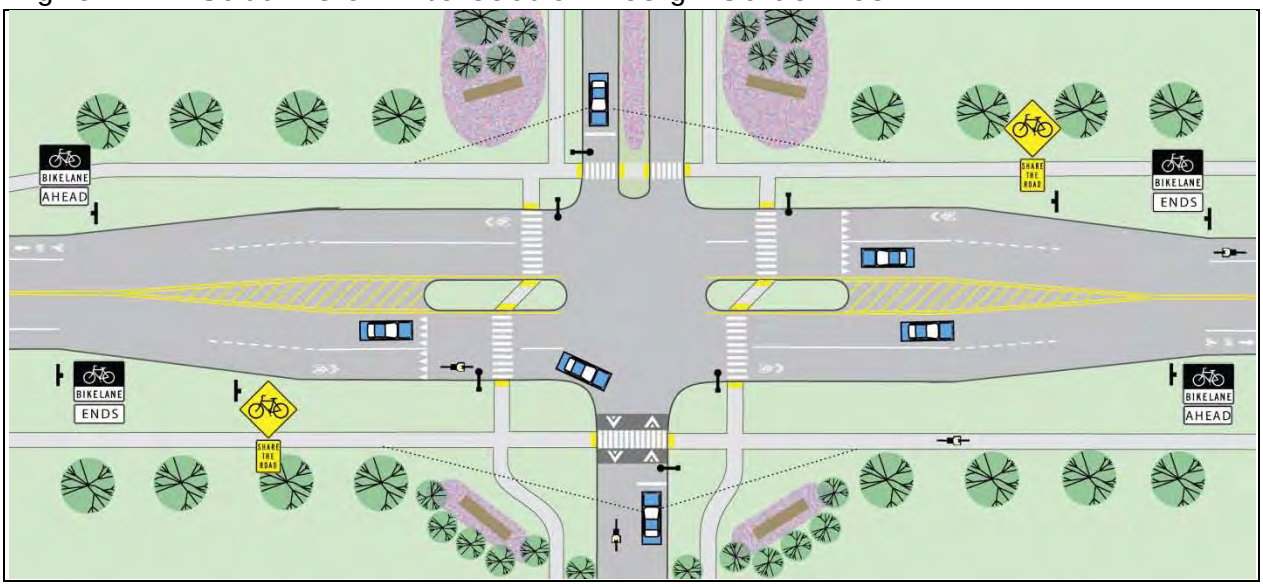
- Restrict subdivision entrance and exit lanes to one 11’ wide lane in each directions
- Where visibility is restricted, provide speed table crosswalks on subdivision entrances
- Construct sidewalk and pathway ramps such that they provide a smooth transition for bicyclists
- Provide lighting at crosswalks that illuminates the side of the pedestrian or bicyclist facing on-coming traffic

Applications

Where a local road or subdivision entrance intersect with a collector or arterial road.

Example

Fig. 5.4AB. Subdivision Intersection Design Guidelines



Description

This type of intersection treatment is used to provide pedestrian crossings between two subdivisions as well as provide traffic calming on long-stretches of roadways between signals.

Key Elements:

- Narrow the lanes in the existing right-of-way to add a crossing island.
- Where visibility is restricted, provide speed table crosswalks on subdivision entrances
- Construct sidewalk and pathway ramps such that they provide a smooth transition for bicyclists
- Provide lighting at crosswalks that illuminates the side of the pedestrian or bicyclist facing on-coming traffic

Applications

Where two subdivision entrances intersect with arterial and collector roads on opposite side.

Example

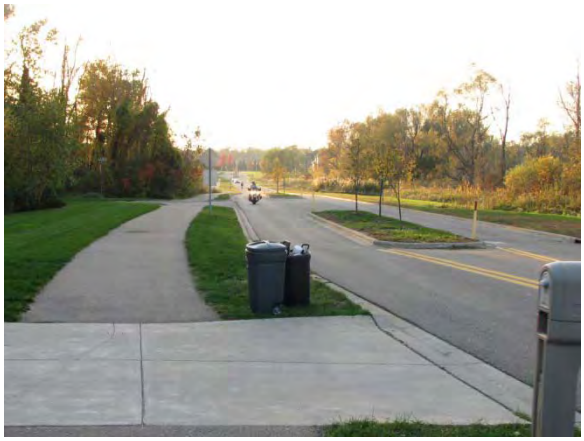
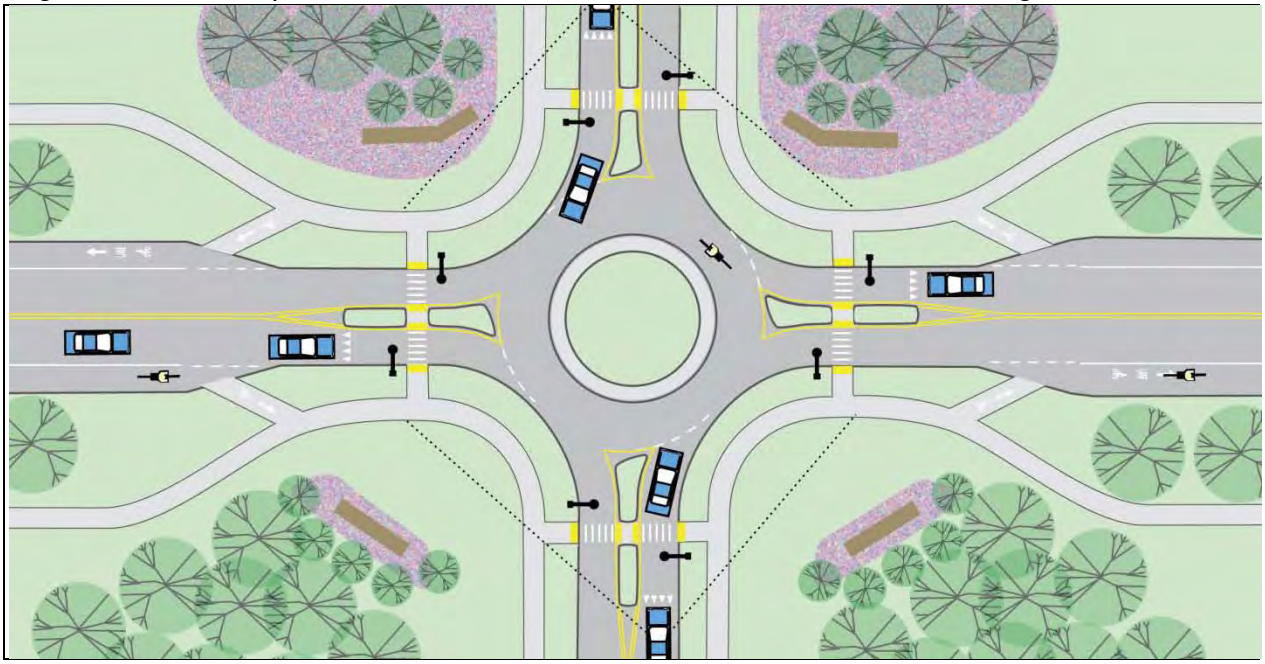


Fig. 5.7AC. Compact Roundabout at Subdivision Entrance Design Guidelines



Description

A compact roundabout is used to provide pedestrian crossings between two subdivisions as well as provide traffic calming on long-stretches of roadways between signals.

Key Elements:

- Provide vegetated buffer between sidewalk and circular.
- Restrict entrance and exit lanes to one 11' wide lane
- Set back crosswalk one car length from circular
- Construct sidewalk and pathway ramps such that they provide a smooth transition for bicyclists
- Provide lighting at crosswalks that illuminates the side of the pedestrian or bicyclist facing on-coming traffic

Applications

Where two subdivision entrances intersect with arterial and collector roads on opposite side and there are significant turning movements from the subdivision entrance. Generally implemented as a four to three lane conversion, in instances such as Fig.5.6B.

Example

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.

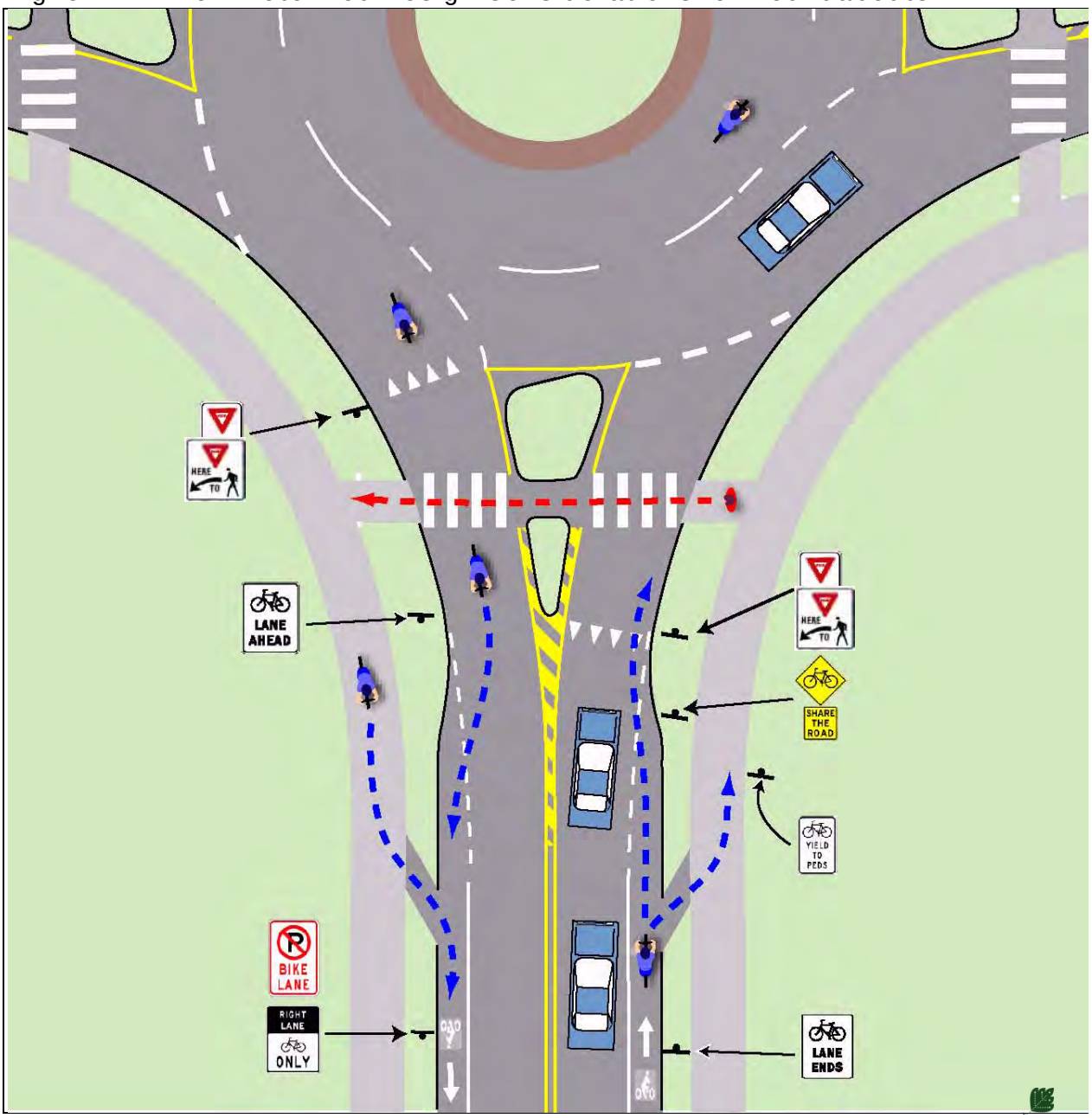
Because there are no traffic control signals to provide a pedestrian "walk" signal, pedestrians wait for an appropriate gap in traffic and cross. The splitter or diversion islands provide a crossing island for the pedestrian, breaking the road crossing into two stages so that they are only dealing with 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. 5.7AD. 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 City'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

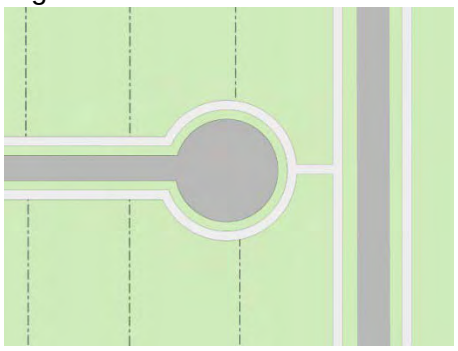
If a new development has limited road access to surrounding arterial streets, special access points for pedestrians and bikes should be incorporated between property lines or along utility rights-of-way. Non-motorized connectivity between adjacent residential, commercial and institutional developments should be provided. The City 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

Introduced in Section 3 Proposed Facilities, 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

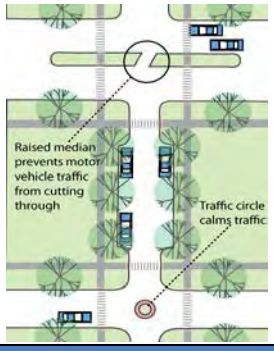
- Located primarily on low speed, low traffic volume local roads and connecting pathways
- Signs provide wayfinding by noting direction and distance to key destination such as schools, parks and the downtown
- Identify routes that may not be obvious to someone who is unfamiliar to the area
- Along the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

NAMED ROUTES:

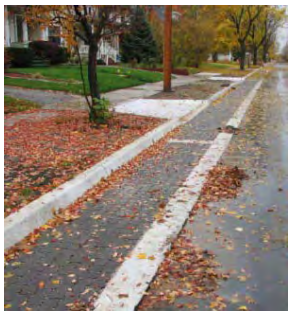
- Incorporates the elements of the Guided Routes
- Provides trail system branding and specific route identification
- Are helpful in providing consistency where a long-distance route is comprised of a number of different facility types
- Generally used on routes that provide key connections between major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

Route Characteristics

Routes signed as a Bike Route should be roads that have a relatively high Quality/Level of Service for bicyclists. The route should not have any known hazards to bicyclists and should be maintained in a manner that is appropriate for bicycle use. While many local roads may meet these criteria, the key is that the road is part of a specific route to a particular place. Obvious routes need not be marked. Bike Routes should be used judiciously to identify obscure routes to key destinations that avoid travel along major roadways.

Where a bicycle route on a local road intersects a busy multi-lane primary road and continues on the other side of the road, a traffic signal or appropriately designed mid-block crossing should be provided.

Bike Routes generally do not include specific bicycle improvements such as Bike Lanes. Bike Lane pavement markings and signs already indicate that a road segment is designed to specifically accommodate bicycles. Bike Route signs are to be used where no obvious bicycle facility exists yet the route is advantageous to bicyclists. Thus road segments with Bike Lanes should generally not be marked as a Bike Route, except where the bike route uses these facilities as short connectors to continue the route.

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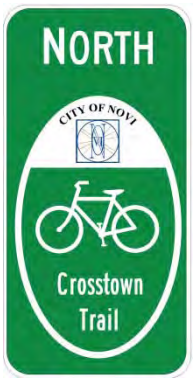
MUTCD 2009

Bike Route Guide Signs

The most basic bike route signs are Bike Route Guide Signs (shown to the left). These are used on designated bike routes to inform bicyclist of changes in direction and the distance to the next destination. Bike Route Guide Signs are placed at changes in direction of designated bike routes. Not every bicycle facility will necessarily be designated a bike route. Bike routes should be used where the signage would help direct a bicyclist to a key destination that may not be obvious.

Bike Route Identification Signs

Some bike routes are significant enough to warrant a name or numerical designation. Typically these are key connectors between off-road trails or used to help delineate a trail that incorporates many different facility types. Bike Route Identification Signs (shown to the right) establish a unique identification for a bike route. These signs are typically used with auxiliary plaques that indicate the direction of travel and any changes in direction of the route.



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5.10 Bicycle and Pedestrian Boulevards and Neighborhood Greenways

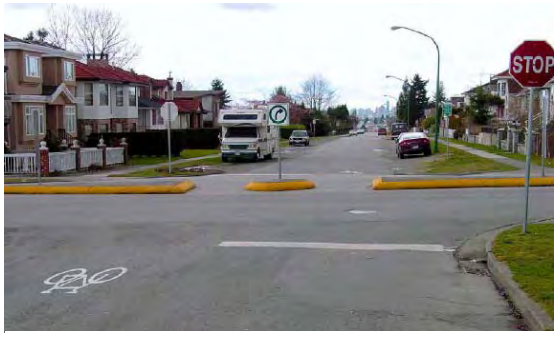
Bicycle and Pedestrian Boulevards and Neighborhood Greenways are Neighborhood Connectors that function as premium bicycle and pedestrian routes. They create an attractive, convenient and comfortable environment that is welcoming to all cyclists and pedestrians. Bicycle and Pedestrian Boulevards and Neighborhood Greenways are a great way to navigate through a city, where arterial and collector roads may be undesirable to bicyclist and pedestrians. They can also function as an extension of an off-road trail, creating a smooth transition between two trail systems.

Bicycle and Pedestrian Boulevard Design Elements

Bicycle and Pedestrian Boulevards are located on low-volume and low-speed streets that have been optimized for bicycle and pedestrian travel through special treatments that allow through movement for bicyclist and pedestrians while discouraging similar through trips by non-local motorized traffic. Bicycle and Pedestrian Boulevards can take many forms. Special treatments such as traffic calming and traffic reduction, signage and pavement markings and intersection crossing treatments all help to optimize these routes for cyclists.

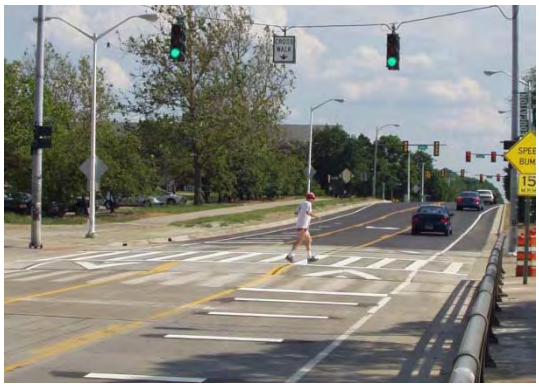
The following are some example of treatments that can be used to develop a Bicycle and Pedestrian Boulevard:

Pavement Markings
Identifies this route as a Bicycle Boulevard



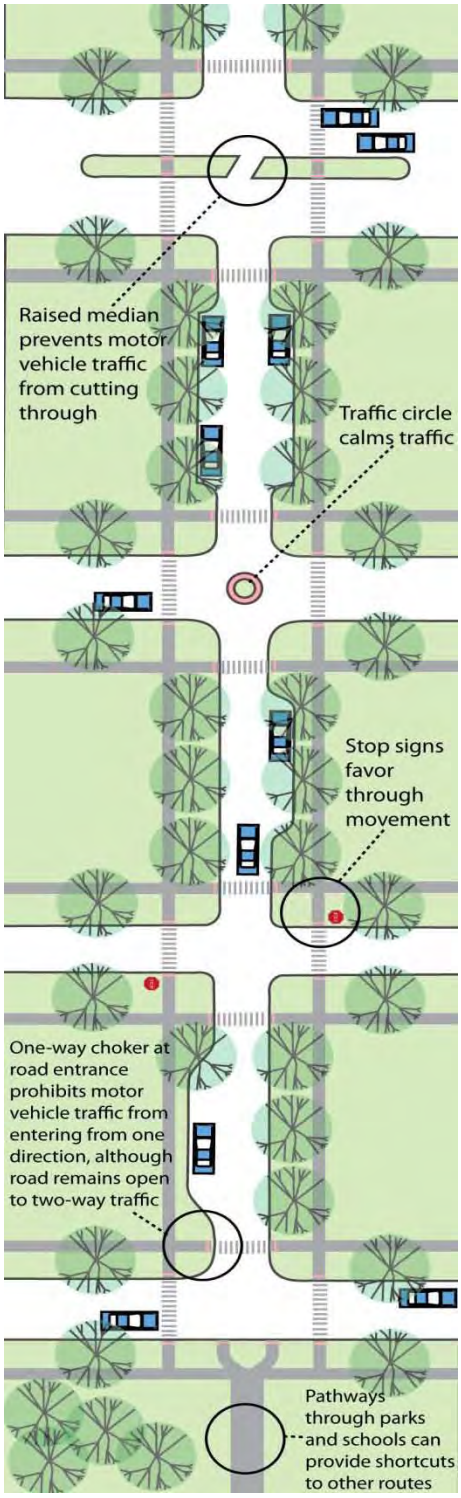
Traffic Reduction
Restricts motorized vehicles while allowing bicycle traffic

Traffic Calming
Mini Traffic Circles help reduce speed at intersection without stopping



Traffic Calming
Speed Tables help to reduce speed and enhance the crosswalk

Fig. 5.10A.
Each corridor needs to be specifically tailored to its needs by selecting the appropriate mix of design elements.



Some local streets may already have traffic conditions optimal for a bicycle boulevard and may require minimal improvements to become a new bicycle boulevard.

The following are examples of these types of treatments that are already in Novi:

Non-motorized Pathway Connections through Landings Park

Sidewalk Extension at the end of Russet Lane into Ella Mae Power Park

Raised Median at Glenwood Dr Entrance

Neighborhood Greenway Design Elements

Neighborhood Greenways incorporate all the elements of bicycle boulevards but take the concept to the next level. They typically incorporate sustainable design elements such as rain gardens, bio-swales, native plantings, etc. They should incorporate pedestrian amenities such as art installations; benches; interpretive sign; and community vegetable and ornamental gardens. They may take on many different looks from avant-garde to traditional.

5.11 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 City's non-motorized transportation system.

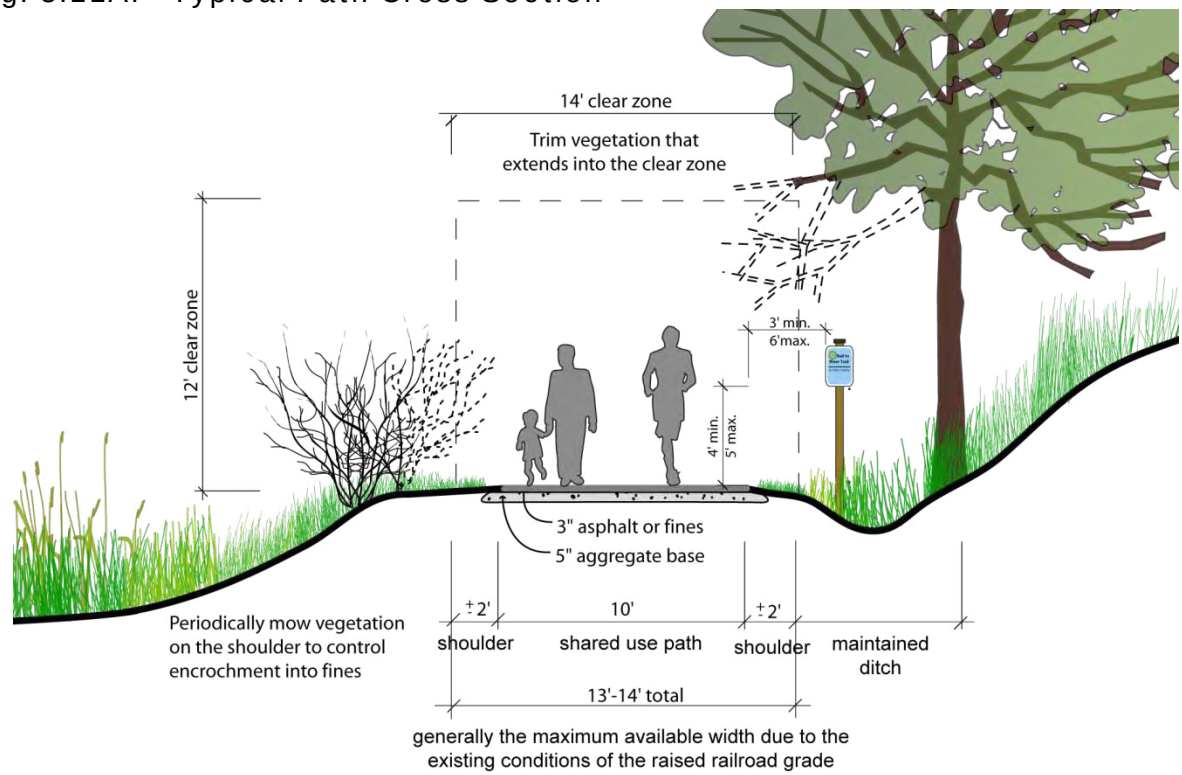
Independent pathways should be designed to accommodate shared uses including cyclists, walkers, strollers, in-line skaters, and people in wheelchairs. For the safety of all users, the pathway should be built wide enough to accommodate these shared uses. AASHTO guidelines indicate that a 10' wide path 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 5.8A 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. 5.11A. 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. 5.11B. Typical Pathway/Roadway Intersection

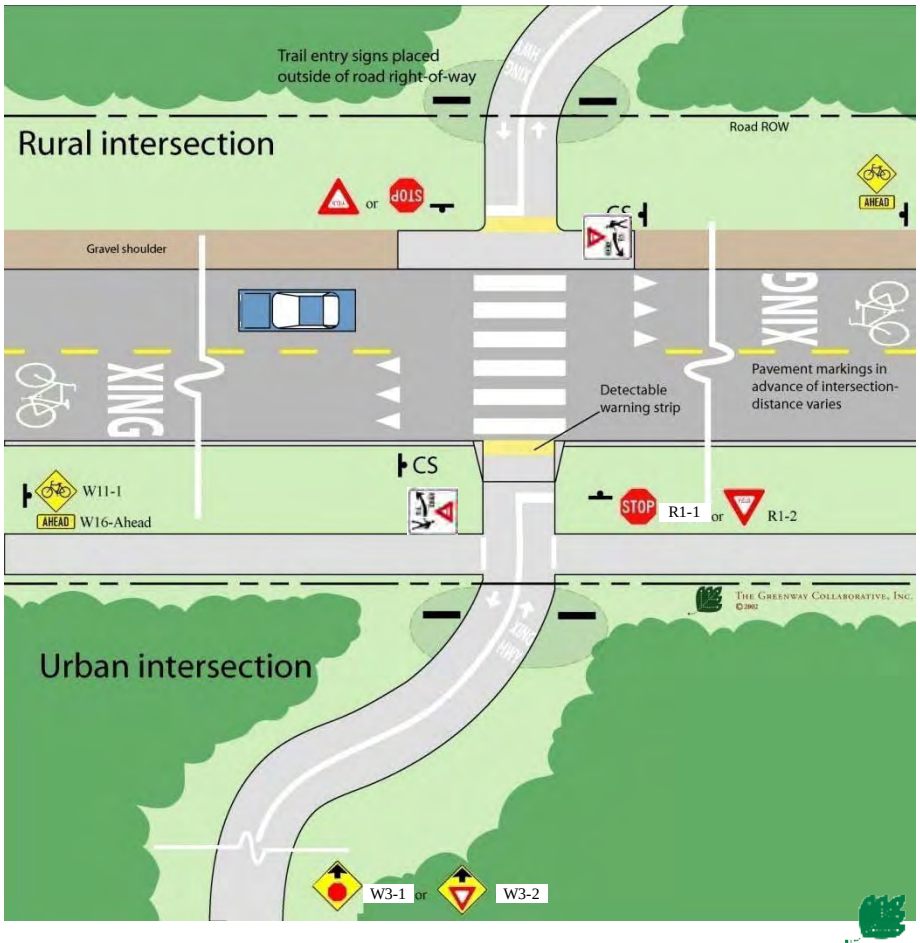


Fig. 5.11C. Trail Signs at Road Intersections

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.

5.12 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.

Circulation within the Site

Buildings with frontages located near the street create a streetscape that is comfortable and accommodating to pedestrians, and help keep traffic moving at slower speeds. Parking to the side or the rear of the building keeps the streetscape intact, allows easy access for pedestrians from adjacent sidewalks and minimizes automobile and pedestrian conflicts. As the building frontages are moved back from the streetscape to accommodate parking, the pedestrian's sense of exposure to traffic, the distance they must walk to access the store, and their resulting discomfort substantially increases.

Setback of the building frontages from adjacent intersections also complicates pedestrian travel across the roadways. Typical development patterns are "L" shaped with the majority of buildings set back from the intersection and one or two isolated buildings near the intersection. This pattern places the majority of the buildings away from the primary pedestrian crossing point and puts a large expanse of parking between the isolated buildings on the corner and the majority of the buildings. Depending on the development across the street, "L" shaped developments can set up strong pedestrian desired lines across mid-block locations. Because of the large scale of most of these developments, the distance between the desired lines and the signal is significant.

If orienting proposed development projects to improve non-motorized uses is not a feasible option in designing the layout of the buildings, then providing clear, direct and safe pedestrian access at mid-block locations is necessary to minimize out of direction travel through or around the parking lot by pedestrians. Parking lots can be dangerous areas for pedestrians and present many challenges for safe navigation. Older adult pedestrians have a high incidence of accidents involving vehicles backing up, a common maneuver in parking lots.[25] Site plans should be required to include the following design measures:

- Reduce building setbacks as much as possible and provide walkways to the entrances that are clearly marked, accessible and buffered from the surrounding parking lot.
- Use raised crosswalks and striping to clearly deferentiate the walkways from driveways. Speed tables and raised crosswalks can calm traffic and increase visibility.

[25] National Highway Traffic Safety Administration. *Pedestrian Safety for the Older Adult*.

Fig. 5.12A. Typical Commercial Center at Intersection of Main Roads

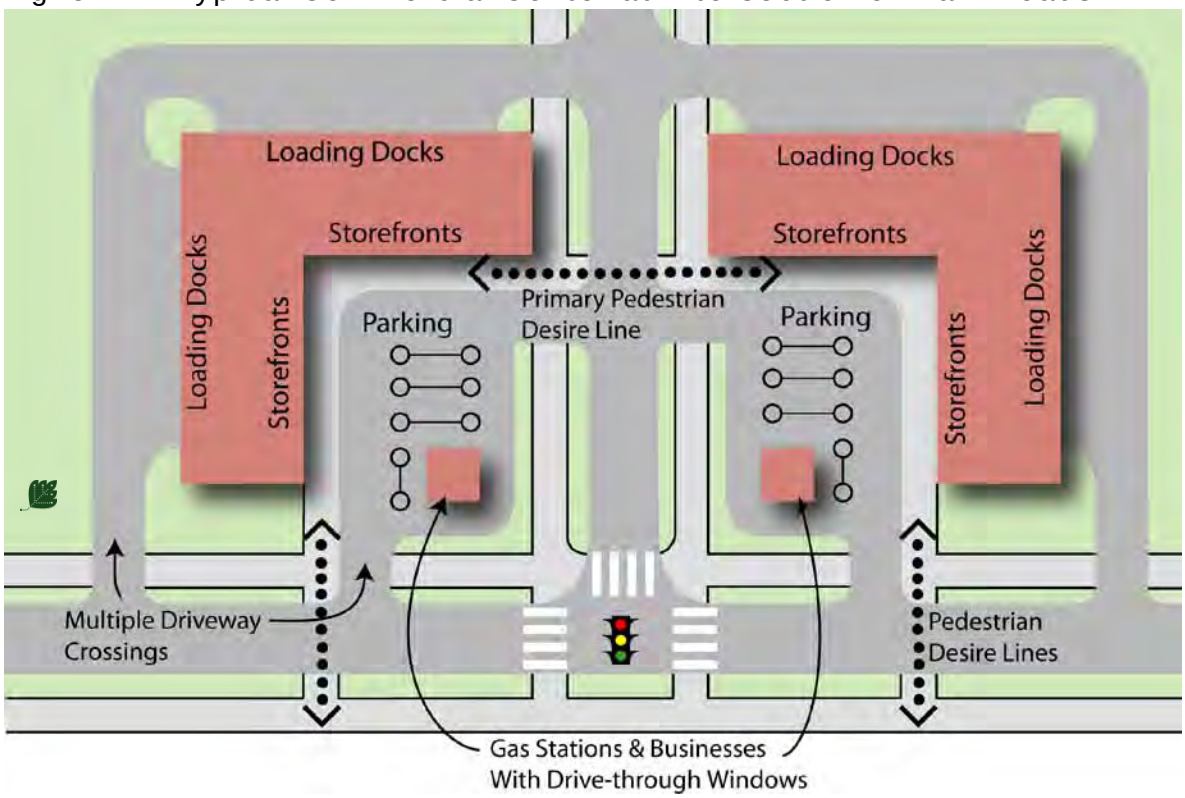
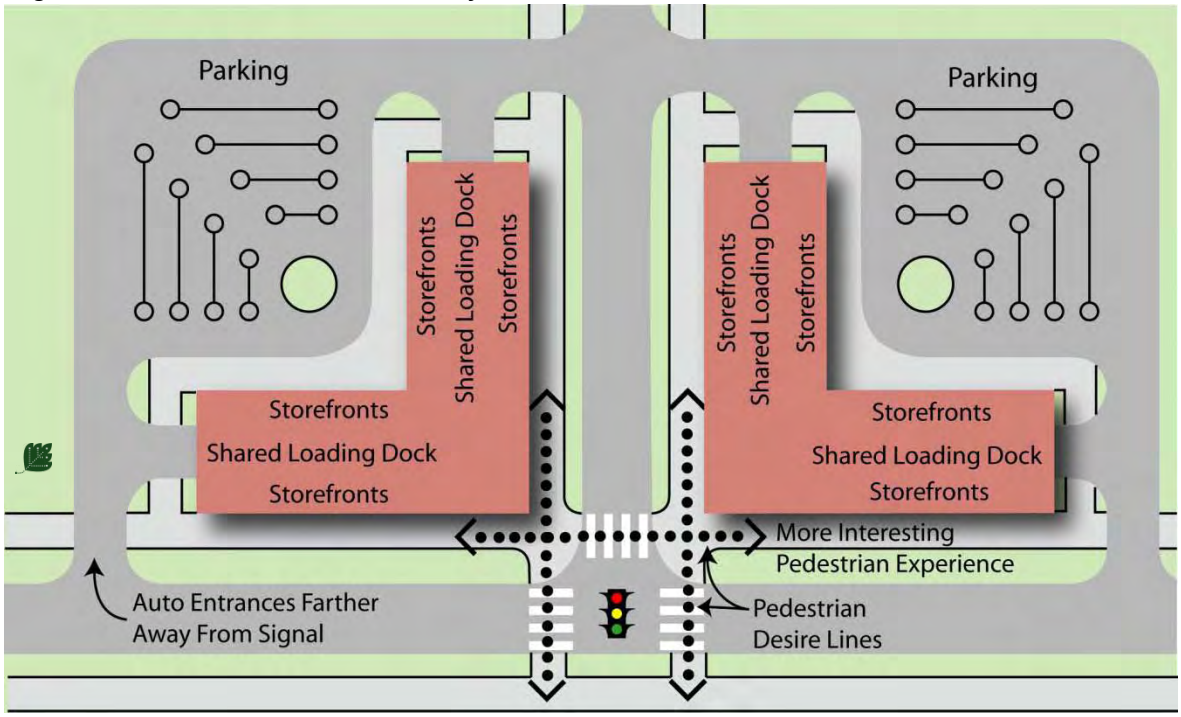


Fig. 5.12B. Pedestrian Friendly Commercial Center Alternative



- Provide trees and other plantings to buffer pedestrians from parking areas, enhance parking lot aesthetics, and minimize the pedestrian's exposure to the elements while crossing the vast expanse of pavement.
- Walkways should have direct and clear access to building entrances and be designed to safely go through the parking lot, or circumnavigate it if necessary.
- Walkways along the buildings should be wide enough to accommodate several people abreast and have frequent curb cuts and ramps for accessibility, as well as tactile and audible pedestrian information.

Just as pedestrians need direct and clear access through the parking lots to the buildings, bikes should also be safely directed through the parking lot. Bike parking should be provided in a visible and convenient location. Many cyclists are reluctant to lock their bikes in an area that is out of the way and unfrequented because of the greater likelihood of theft. This leads to situations where bikes are locked to anything available such as signposts or railings. These bikes can cause hazards for pedestrians and obstacles to accessibility. Providing bike parking facilities in convenient and well-lit locations will minimize these problems.

The site plan review process will allow the City to ensure that these design measures are followed. The City should require that developers include these specific pedestrian and bike accommodations early in the site planning.

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. For more information see the Land Use Considerations in the next section. 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 City 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:

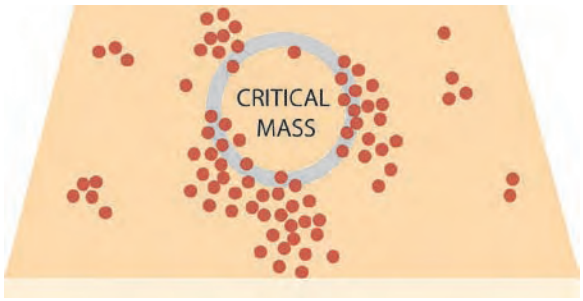
❑ Amenities are provided to create a comfortable and appealing environment, pre-empting litter and responding to user needs.

Landscaping Checklist:

❑ Landscaping does not compromise user security and safety.

5.13 Land Use Planning

Land use patterns greatly affect the viability of non-motorized transportation. There is a general consensus based on a significant body of research that three key issues determine how supportive an environment is to walking, bicycling and transit.

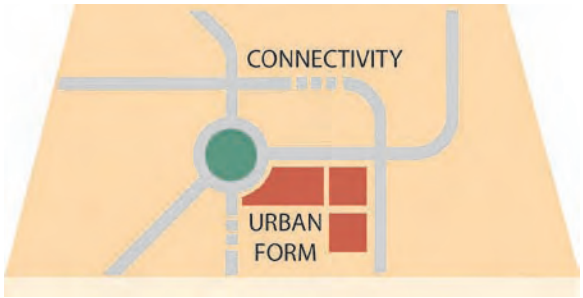


Density

The density of the residential population determines if an area is capable of supporting a transit system, both economically and efficiently. The Southeast Michigan Council of Governments generally considers that at least 3 to 7 households an acre and 4 to 7 jobs an acre are necessary to support a transit system. Higher density encourages retail services needed to maintain a healthy urban environment. Increased population density introduces a critical mass of pedestrians who provide comfort and security to each other with their combined presence. Higher density uses support a non-motorized transportation system more than low density land uses. It has been noted that the key indicator of the vitality of a place is the presence of pedestrians.

Diversity

The diversity of land uses refers to the proximity of trip origins and destinations. If the distances are comfortable for bicyclists and/or pedestrians they will be more likely to use non-motorized means, thus reducing the number of motor vehicle trips. A diversity of services at key public transportation stops allows transit users to minimize their travel and combine many errands at one place.



Design

The design of the non-motorized system and the support facilities determine if a pedestrian or bicyclist trip will be safe, comfortable and convenient. The design is also key in determining how accessible transit stops are and how large an area each transit stop draws from. Design is important on both a macro and micro scale. On a macro scale the directness and interconnectedness of the network is critical for permitting quick access to adjacent diverse land uses. On a micro scale an environment that rewards non-motorized users with safe and pleasant surroundings encourages use.

Density, diversity and design must all work in concert to make an environment that supports alternative transportation. The absence of one element has the ability to reduce the positive impact of the presence of the other two. Municipal planning can guide land use plans and zoning plans to encourage dense, mixed-use development and design considerations that support a variety of transportation choices. Ordinances may be used to permit mixed-use developments with higher densities, as well as promote increased densities around major destination points and transit lines.

A community's transit, bicycle and pedestrian friendliness has as much to do with a community's population density, land-use diversity and the layout of the street network as it does with providing specific facilities for bicyclists and pedestrians.

6. Outreach and Education

The education and marketing is critical for the establishment of a successful non-motorized environment in the City of Novi. This section outlines recommendations and strategies on how the City can develop a program for public outreach and education for the non-motorized system.

Topics:

Imagine walking into a new sandwich shop. In front of you is a menu 6 feet high and 8 feet wide filled with an overwhelming array of sandwich choices. Many of the sandwiches listed have ingredients you've never tried before. So you decide to go with what you know: a ham and cheese sandwich on white bread. The next day you walk into the shop and order the same thing. And again the day after that. Even though some of the other sandwiches might be cheaper, or better for you, you are hesitant to break out of your routine.

Many people experience their transportation choices in the same way. They think "I could walk to the grocery store or bike downtown, but will it be safe? Will I get dirty? Will I look silly?" So many people stick to what they know and lose out on the great benefits non-motorized transportation can offer.
So how do we break people out of their routine and encourage them to try non-motorized transportation? A public education and outreach program can provide the encouragement many people need to move them from considering using non-motorized transportation to actually using it.

The following recommendations outline the strategies the City can use to develop a public outreach and education program for the non-motorized system. It is important that the recommendations outlined in this section are done in tandem with the infrastructure changes so that what is being sold by the outreach program is truly a good product. If people are told that a particular bike route is safe and then have a fearful experience when they try it out, the result will be counterproductive.

6.1 Existing Promotional and Marketing Activities

The following is a list of activities that are already being done to promote non-motorized transportation in the Novi area.

Southeast Michigan Council of Governments (SEMCOG) (www.semcog.org)

SEMCOG offers limited information on bicycling and walking programs at http://www.semcog.org/WalkableBikeableCommunities.aspx. Their information includes biking maps for Oakland County and the surrounding area.

Safe Routes to School (http://www.saferoutesmichigan.org)

City of Novi has an active Safe Routes to School Committee with three schools having Safe Route Action plans to make it safe for kids to walk and bike to schools.

League of Michigan Bicyclists (www.lmb.org)

The League of Michigan Bicyclists provides advocacy, events, and resources for cycling in Michigan. Their website contains information on bike rides, Smart Commute events throughout the state, and ways to get involved in advocacy efforts around cycling. LMB has regional representatives for each part of the state. Rory Neuner of the Michigan Environmental Council is the current representative for the Lansing/Novi area.

Michigan Mountain Biking Association (www.mmba.org)

The MMBA provides advocacy, events, programs and resources for mountain biking in Michigan. Their website contains information on trail guides, news, upcoming events, and ways to get involved in advocacy efforts around mountain biking. MMBA has regional representatives for each part of the state. Dave Thompson is the current chapter representative for the Metro South region.

Michigan Trails & Greenways Alliance www.michigantrails.org/

Michigan Trails and Greenways Alliance fosters and facilitates the creation of an interconnected statewide system of trails and greenways for environmental/cultural preservation purposes, and includes an extensive database of Michigans trails. The organization has been very active in the Detroit metro area. Their website currently includes information on the I-275 Metro Trail.

City of Novi (cityofnovi.org)

Parks and Recreation

The City of Novi Parks and Recreation department provides information on its website about current biking facilities, including Lakeshore Park mountain biking.

6.2 Opportunities and Assets

When developing a public outreach and education program for the City's non-motorized plan, it is important to survey the opportunities and assets for promoting and encouraging non-motorized transportation.

Partnerships

There are many opportunities for the City of Novi to partner with other groups to promote non-motorized transportation and collaborate on programming educational opportunities and events.

Novi Police Department: Novi's Police Department is highly regarded throughout Michigan for its professionalism, public programming, and in particular for its work to improve traffic safety; it has been awarded the state's Excellence in Traffic Safety award four consecutive times. It already participates in a wellness event, the Run! It's an Emergency! 5K run, in partnership with other emergency response agencies and Providence Park Hospital.

Providence Park Hospital: Novi's primary wellness provider, Providence Park 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.

Safe Routes to School: Parents in the Novi Public Schools have been working on the Safe Routes to School Program, already exposing them to the benefits of non-motorized transportation for their children. They may be willing participants in exploring Safe Routes opportunities for other trips within their community for their children and for themselves, such as Safe Routes to summer park programs, to shopping, or to work.

The merchant community: Novi's newest merchant developments, such as Novi Town Center and Main Street, were developed with the pedestrian and bicycling environment in mind. Merchants may be enthusiastic participants in programs and events that leverage their "lifestyle" image to encourage residents to bike or walk to their businesses.

Corporations: Effective company wellness programs send cost savings in health insurance and lost productivity straight to a company's bottom line. Many major employers are located near Novi's existing trails, the I-275 Metro Trail and the M-5 Metro Trail, presenting an opportunity to engage companies from an employee wellness perspective as partners in bicycling and walking programs and events. There may also be opportunities to partner with the Novi Technology Innovation Center since it is based downtown and houses innovative small businesses. Corporations can apply for Bicycle Friendly Business awards as well, from the League of American Bicyclists.

Walled Lake residents: The Lake Area Homeowners Association (LAHA) is a powerful stakeholder in the quality of life for Novi's lakeside residents, and works to promote active, outdoor recreation as a component of lakeside living. The LAHA may be willing partners in recreational cycling and walking events that showcase the lake lifestyle, and in programs that provide safer, more convenient, and enjoyable cycling and walking routes around the lake and to Novi's services, restaurants and shopping.

Community Groups: It was noted that the City of Novi has active Neighborhood Associations, civic groups and environmental groups and volunteer associations, many interested in promoting a higher quality of life for Novi residents. These groups may represent a good avenue for promoting non-motorized transportation and creating a movement around walking and biking as a Novi way of life.

Oakland County: Many other Oakland County communities, such as as Royal Oak, are also pursuing improvements to their walking and biking environments to improve sustainability, economic activity and quality of life. These communities may make powerful allies for Novi as a coalition of bicycling and walking-friendly communities on regional issues, programs, and infrastructure improvements.

Communications

City of Novi: The City of Novi distributes Engage, a recreation program and events guide, to residents three times a year, and publishes a monthly e-newseltter, Novi in a Nutshell. The City produces a variety of programs on its public access channel, Novi Television, including an environmentally themed program, the Green Zone.

Social networks: The City has a robust social networking presence with well over 1200 followers on Facebook and Twitter.

Periodicals: The Novi News is the City's local daily, with a circulation of 4000. Other important publications include the Detroit Free Press and Crain's Detroit Business.

Events

Community Events: Novi hosts many events that could be opportunities for promoting biking and walking and providing traffic safety education. These events include the city's summer festival, Novi Palooza, its summer athletic programs, and events hosted by the Recreation Department, such as 2010's National Take Your Child Outside Day. Bicycling and walking programming and education also will likely fit well with Novi's Farmer's Market, which is open May through October.

5K runs and mountain biking: Novi has a strong community of runners and mountain bikers, thanks to excellent accommodations at its parks such as Lakeshore Park, whose trails include nine miles of "primitive" trails for mountain bike use. These populations may be a rich opportunity to find programming and event participants, but also perhaps to find volunteers interested in supporting the City's efforts to create a community friendlier to walking and biking.

6.3 Public Outreach and Educational Strategies

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 Novi and many other communities have been designed around automobile use for the last 50 years. Thus, many residents won't naturally feel comfortable using a non-motorized system and will benefit from some encouragement.

To address this issue a public outreach and education strategy has been developed to engage a community to:

- Improve attitudes towards biking and walking
- Teach residents to be safer walkers, bikers and drivers
- Find partners and volunteers in creating better biking and walking conditions and producing events
- Maintain momentum for the often long and frustrating effort to improve the built environment
- Grow a movement

The great thing about public outreach and education is that it can start immediately, before the City of Novi lays one more mile of sidewalk or completes another trail connection. Novi, like most communities, has enough infrastructure and the programs, partners, and community pride to begin adding to the numbers of residents willing to try biking and walking right now. Efforts now will prime the City for success as it begins the hard, tedious work of improving its infrastructure for non-motorized transportation.

This section breaks out a Year One and a Year Two for outreach and encouragement to help the City set a direction and build momentum towards a sustainable, rich and varied outreach and education program. While the programs were selected as suitable for Novi, it's likely that a diverse and committed Task Force of local experts will discover new programs or tweaks to those listed that will work even better.

Year One: Establish the Program

In the first year, Novi can expect to:

- The city administration should determine the home of the city's biking and walking outreach and education program. The Parks and Recreation Department may be a natural location should additional resources be provided.
- Establish a Bicycling and Walking Task Force to help shape, produce and guide the outreach and education efforts.
- Establish a brand for the bicycling and walking outreach and education program
- Create a Facebook and Twitter presence for the outreach and education effort
- Establish partnerships with experienced bicycling and walking organizations such as Michigan Trails and Greenways Alliance, Michigan Mountain Biking Alliance and League of Michigan Bicyclists
- Apply for grants to fund a part-time coordinator for the outreach and education program and related tools and materials like website development, printed materials, and events promotion

- Begin tying active transportation messages and information into existing events such as organized runs, mountain bike events at Lakeshore Park, summer athletic leagues, the Farmers Market, and Novipalooza.
- Produce one stand-alone bicycling event

Establish the Encouragement and Outreach program within the City's Recreation Department
The City's Recreation Department represents the most expertise and best fit among the City's departments for many of the program and outreach components of this program. Already experienced in producing events large and small that leverage existing facilities, educate participants, and promote messages, the Recreation Department should make a capable home for many of the recommendations in this section of the plan.

Establish a Bicycling and Walking Task Force to help shape and direct the Education & Outreach program
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 Bicycling and Walking 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 up to 12 members. Suggested stakeholders for this Advisory Board include the following:

- Staff member from the City of Novi's Recreation Department who will serve as the administrator for the program
- Staff members from the City of Novi that represents transportation, public relations
- A representative of the Novi Chamber of Commerce
- A representative from the Novi Police Department
- An interested employee of a Novi-headquartered major company
- A representative of Providence Park Hospital
- A representative from Michigan Trails and Greenways Alliance
- Up to three residents interested in bicycling and walking, including a Walled Lake resident
- Representative of Novi Public Schools working on Safe Routes to School issues

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.

Define a brand for biking and walking programming and education in Novi
A city's non-motorized transportation education and outreach efforts are best delivered through a branded program that gives the city a tool for promoting, communicating and creating buy-in for its events and

initiatives. Novi has done this before, with its Novi Goes Green environmental sustainability brand and its associated programs.

There is not one correct way to create a public outreach and education campaign. Some, like Ann Arbor's getDowntown Program, focus on a particular target audience (employers and employees in the downtown), some, like CATA's Clean Commute Options Program, repackage a portion of an organization to promote the use of existing services (CATA's buses, rideshare program, etc) among a certain audience (commuters and students). No matter how a Public Outreach and Education program is organized, it is extremely important that the program is packaged in some way.

While biking and walking safety demonstrations, encouragement programs, and events may seem to fit well under the Novi Goes Green brand, consider that people come to bicycling from diverse preferences and backgrounds. A brand that directly communicates biking and walking separate from Novi Goes Green will give the Task Force and the City more flexibility in marketing programs and messages. Brands that evoke motion and active living also may appeal more to current state, federal and private interests issuing grants and assistance for improving wellness.

Establish a web presence for the program at cityofnovi.org and social networking sites
The branded program should have its own page at cityofnovi.org, similar to the Novi Goes Green program. The page should offer a calendar of biking and walking-related events in the area, information available through the program, an explanation of the Task Force and meeting minutes, and updates regarding grant awards and efforts to improve the built environment. The page should be complimented by links to follow the non-motorized transportation plan on Facebook and Twitter.

It's important that the social networking feeds, Facebook and Twitter, post not just the City's progress towards bicycling and walking improvements but ANY information about walking or biking in Novi or neighboring communities, including mountain biking events and races such as Run, It's an Emergency! The Facebook page should be open to all notes, commentary and encouragement regarding the current cycling and walking experience, good and bad. Novi has no identified group of cyclists or walkers, which communities typically build upon to create a movement around sustainable transportation. Both Facebook and Twitter can build community but only if communication is two-way and open.

A great strategy would be to make two or more of the Task Force members administrators for these pages, allowing posts to reflect a variety of opinions and perspectives about walking and biking in Novi. The goal is to start and grow a conversation around the shared vision of a walking and biking-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.

Establish partnerships with experienced bicycling and walking organizations
The Recreation Department's programming at Lakeshore Park has produced at least a basic knowledge of mountain biking across a wide base of residents. But Novi lacks an analogue for street cycling and pedestrian issues, and has no local cycling club or pedestrian rights group to provide ideas and expertise for outreach and education.

Michigan, however, has excellent non-motorized transportation organizations, including Michigan Trails and Greenways Alliance, Michigan Mountain Biking Association and the League of Michigan Bicyclists. These organizations have active volunteers and/or staff working in the Detroit Metro region. These resources should be tapped through the Bicycling & Walking Task Force to supplement the Task Force's local knowledge with bicycling and walking program expertise, and to help identify opportunities for grant proposals and partnerships. As Novi begins to implement changes to build environment as well as

education and outreach initiatives, these contacts become important promotional channels as well to a regional, state and national audience.

Apply for grants to fund a part-time coordinator for the outreach and education program and related tools and materials such as website development, printed materials, and events promotion
Taking a look at successful non-motorized programs throughout the country, from Ann Arbor to Boulder, it's clear that if a community wants to transition from a car-centered culture to one that makes biking and walking a safe and attractive option, that community must make a commitment to provide some staffing for this effort.

The Recreation Department already has clear expertise in program development, event production, instructional services, and promotion. Evaluate if it is possible, or if additional resources should be provided for an existing staff position to be in part recast to spend up to half of their time on coordinating the outreach and education objectives set by the Task Force.

Whether it's a new hire or an internal job description change, the Task Force should pursue grants available through private and public agencies that fund wellness, recreation and non-motorized transportation initiatives. The Kellogg Foundation, the Meier Foundation, and the Kresge Foundation all have funded wellness and active lifestyle staff and programming in the Detroit Metro region and around the state. The state's own Highway Safety program may also provide funding for traffic safety education materials and programs.

Begin tying active transportation messages and promotions into existing events such as organized runs, mountain bike events at Lakeshore Park, summer athletic leagues, the Farmers Market, and Novipalooza

While creating bicycling and walking programming and information from scratch is considerable work, relying on existing materials produced elsewhere and incorporating sustainable transportation messaging and instruction into planned and existing events and publications is simple, effective and inexpensive.

The Task Force can help the Recreation Department determine the City's top three messages for encouraging safe bicycling and walking to be incorporated into the materials developed for Engage, into the City's Go Green materials and communications, and into the community's mountain biking and running/walking events. The Task Force should look to Michigan's bicycling advocacy groups, MDOT, and national advocacy groups for materials suitable for distribution at the farmers market and at events. These materials should become part of the table-top kit for the Recreation Department.

Produce one small-scale stand alone bicycling event
In a city like Novi, which hasn't had an organized cycling community hosting rides and cycling-related events, even a small, well-publicized cycling event can generate interest and excitement community-wide with modest resources.

An event such as Bike & Dine is small enough to be produced wholly within the Recreation Department, whether or not the department is successful in hiring an outreach and education coordinator. A Bike & Dine is simply a progressive dinner by bicycle. The Task Force identifies 3-5 Novi restaurants to visit by bicycle, and asks each restaurant to offer one course of a meal to all participants. Following a pre-selected route, with police escort if desired, participants ride to each establishment, enjoy the restaurant's offerings, and continue on to the next. Bike & Dines typically are limited to less than 35 participants, and involve a fee to cover the restaurants' costs.

While characterized by the Twelve Oaks regional mall and its busy Mile roads and arterials, Novi's clusters of retail and restaurants still offers a selection of high quality dining and drinking within easy riding distances of one another. A select bicycle tour of these establishments can garner media attention to local businesses and raise the profile of cycling as a way to encourage and enjoy local patronage.

The City of Royal Oak hosted its first Bike & Dine in fall 2010 with no city staff time or resources involved; volunteers organized through Facebook produced the event themselves, and more than 35 people spent an enjoyable evening exploring their community by bicycle. It's easy to imagine that a Bike & Dine in Novi would be similarly successful.

Year Two: Build a culture of biking and walking

Year one recommendations provide a structure and process for establishing outreach and education objectives, helps the City identify partners and supporters in the community, and begins a dialogue with the community about biking and walking in Novi. Year two recommendations leverage these efforts to begin initiatives in Education, Enforcement, and Encouragement that can grow biking and walking modeshare and consideration for other transportation system users going forward.

In year two, the City of Novi can expect to:

Educate

- Establish a biking and walking ambassador program within the Youth Police Academy
- Establish third grade bicycling and walking education programs as a prerequisite for riding to school in 4th grade

Enforce

- Deploy crosswalk stings at targeted pedestrian crossings
- "Ticket" children who are wearing bicycling helmets

Encourage

- Produce a community bicycle map
- Host Bike to Work Week
- Produce a larger bicycling event

Evaluate

- Survey residents' attitudes towards biking and walking efforts
- Apply for the League of American Bicyclists' Bicycle Friendly Community status and the state's Promoting Active Communities award

The following pages provide more details to the proposals listed above.

Education

Bicycling and Walking Ambassadors

The issue

Training children and adults in basic non-motorized traffic safety, developing awareness of all road and trail users, and raising the profile of cycling and walking as a healthy, smart, and valid choice of transportation within the community.

The idea

Junior Bicycle Ambassadors—teenage youth trained in traffic cycling and safe cycling and walking issues in order to deliver bicycle and pedestrian safety demonstrations for all ages, educate motorists and non-motorists, and assist with the development of local cycling activities and events.

Why it works in Novi

The award-winning Novi police force currently offers a popular one-week program that immerses youth in a broad-based, hands-on survey of police department operations, including traffic safety. This existing program provides an administrative structure for training youth and allows additional capacity for further training to be added incrementally. Federal Highway Administration safety funds, administered through MDOT, may provide funding.

How it works

The police department agrees to add an additional week of training for youth interested in serving a summer internship as a Bicycling and Walking Ambassador. The youth receive hands on training in bicycling and walking law and practicable skills, basic bicycle maintenance, and public outreach and presentation. Organizations such as Michigan Trails & Greenways Alliance or the Chicago-area Active Transportation Alliance can train police academy instructors to teach youth bicycle and pedestrian safety education and outreach skills and tactics. International Police Mountain Bike Association-certified instructors or League of American Bicyclist-certified instructors may be contracted to train police academy instructors to teach youth traffic cycling and bicycle handling.

Once trained, the Ambassadors would be programmed out of the Recreation Department to:

- Be deployed as instructors to Novi Parks & Recreation bicycle safety classes and local Safe Routes to School programs where they can provide helmet fitting, basic bicycle safety checks, and basic bicycle and crosswalk skills instruction.
- At motorized/non-motorized conflict points, distribute “Share the Road” and awareness literature to drivers as well as bicyclists and pedestrians (along with a supervising bicycle-mounted officer)
- Capitalize on local walking, running and bicycling events by providing safety demonstrations for participants and spectators, and they can be a safety/support resource for events as ride marshals or course marshals.

Related opportunities:

- Youth may design their own literature for cyclists, walkers and driver tips & awareness, and even their own presentations
- Youth may write a guest column for local news, maintain a Facebook page or blog, produce biking, walking & driving awareness videos
- Trading cards for each of the Jr. Ambassadors with “stats” could spread excitement about the program among pre-teen and younger youth

In Ann Arbor, Ambassadors are used during the month-long Commuter Challenge and are an invaluable resource, encouraging potential walkers and cyclists in the workplace to try sustainable transportation. In Chicago, Ambassadors help officers with targeted pedestrian crossing enforcement, deliver bicycling and walking instruction in the classroom and park programs, provide riding support during city cycling events, and distribute maps, information, and assistance on Chicago's busy Lakefront Trail. The Ambassadors become a high-profile home of community cycling expertise.

Third Grade Bicycle Academy

The issue
Begin normalizing the broad-based delivery of safe cycling education to children and their parents in a fun, engaging way. Mitigate growing school traffic aggravated by the elimination of bus routes for financial savings.

The idea
Make completion of a safe cycling course at the end of third grade, taught by the Ambassadors, a prerequisite for the privilege of cycling to school

Why it works in Novi
Children—and their parents—would begin seeing cycling as a right of passage rewarded with a new privilege, which is a powerful motivator for most people, especially children paying close attention to older kids. A culture of responsible cycling to school would follow the children into middle school.

Also, having to teach is often the greatest teacher: The Biking & Walking Ambassadors, supplemented by a bicycle-mounted supervising officer, could be this program's instructors while encouraging their own training to sink in for life-long behavior and attitude change towards cycling and walking. Novi's involved parents could be engaged by asking them to test their children at home; send-home evaluation materials to be filled out and signed by parents can deliver safe walking and biking education to the adults.

How it works
Elementary school districts adopt school travel policies that limit cycling to school to fourth grade and above, and establish a week-long, end-of-year "bicycle academy" integrated into third grade physical education. Using Ambassadors as instructors, children learn cycling skill basics, basic bicycle safety check, helmet fit, and appropriate traffic cycling skills such as crossing roads, driveway dangers, and negotiating sidewalks. Children completing the academy receive a free helmet and a certificate permitting them to bicycle to school in fourth grade.

This program, obviously, requires that children have a bicycle to use during the program. Not all children wishing to participate will have their own bike to use. The Recreation Department or the police department could quickly establish a small fleet of bicycles for the program by repurposing unclaimed bicycles recovered by the police department.

Enforcement

Police Crosswalk Stings

The issue
Improve the safety and comfort level of street crossings by changing the behavior of motorists to comply with state law requiring motorized traffic to fully stop before right on red, and to yield to the pedestrian or cyclist in the crosswalk.

The idea
Police stings at marked crosswalks and trail crossings that provide a warning period before hard enforcement. Any revenue beyond cost of enforcement can be used to fund the Ambassadors program explained above.

Why it works in Novi
Surveys show that crossing streets is a top safety priority for the Novi walking and biking community. The award-winning police department can leverage MDOT highway safety funding for sting operations at targeted high risk, high pedestrian or trail use crosswalks.

How it works: Crosswalk stings involve a public information campaign, a week of educating and issuing warnings, a week of hard enforcement, a video camera, and a chicken suit:

- **Week one** – A public information week promoting the stings as a response to Novi's residents demanding a safer bicycling and walking community and how yielding to users in the crosswalk is an essential component. Promotion includes specifying the locations of the stings to begin the following week, and that a chicken will be trying to cross the road at these locations.
- **Week two** – at the selected high risk/high use crossings, an officer dressed as a chicken crosses within a marked crosswalk (during the WALK cycle if signalized) while another officer (or Ambassador) films driver behavior. Turning or crossing traffic failing to yield/stop for the chicken are pulled aside by another officer/officers for a warning and education. At the end of the week, news outlets are provided video clips and a press release that includes a reminder of hard enforcement beginning the following week.
- **Week three** – Hard enforcement at targeted locations, including issuing traffic fines.

Humor has a big role in creating a memorable story with a large hook and in keeping the public on the side of enforcing better crosswalk behavior, and this program should leverage all opportunities to incorporate it. For example: Warnings and safety literature can be delivered inside large plastic eggs.

Helmet Ticketing Campaign

The issue
Encourage helmet use among children

The idea
Police issue "tickets"—actually a coupon for free ice cream or other suitable treat—to children "apprehended" wearing helmets properly

Why it works in Novi
It engages a real strength of the community—its police force—in a positive public relations campaign that will galvanize children to beg their parents for a well-fitting helmet. It will also encourage children to engage the police. It's easy to imagine children riding around, looking for police to show their helmets to.

How it works
Child wears helmet. Police issue free ice cream ticket. The ticket can also include a safe cycling message and instructions on proper helmet fit. Also consider a second ticket for children without helmets that offers a discount at a local bike shop or an option to purchase a low-cost helmet through the Recreation Department. (Helmets can be found for bulk order price of less than $4).

Encouragement

Novi Bicycle Map
The Recreation Department, with assistance from the Task Force and volunteers of route checkers, produces a map of recommended bicycle routes and trails, with an emphasis on connectivity using existing infrastructure for all residents to destinations (including trails, other routes and surrounding communities).

The best bicycling maps include the entire street network as a base, and rank on-street routes by color corresponding with the necessary traffic tolerance a cyclist would need to feel comfortable using them. A great map also includes 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 map should be a stand-alone document distributed to every household to generate excitement and awareness about cycling in Novi. But the map can be paired with other publications already targeting residents' mailbox for efficiency and coverage, like the park & recreation department's Edge publication.

Bike to Work Week/Commuter Challenge

The issue
A substantial number of adults working in Novi live in Novi and next-door communities, yet only 2% have tried cycling to work

The idea
Invite Novi's companies and organizations to challenge peers (by size, business category and/or organization type), perhaps regionally, to a contest over how many employees try cycling or walking to work during National Bike to Work Week.

Why it works in Novi
The I-275 Metro trail already exhibits unofficial access points near some of Novi's largest corporate clients, and the M-5 Metro Trail provides some access as well. A commuter challenge program leverages this activity to expand awareness of bicycling connections to the work place and to generate excitement among Novi's sizeable corporate community around the health and well-being benefits of cycling or walking to work.

How it works
The program should be housed in the Recreation Department under the Novi biking and walking brand. Key tasks are event promotion and providing a registration and tracking process, which can be as simple as a basic web-based form. Companies, organizations, and other job centers appoint a Commuter Challenge Team Leader who signs up co-workers to try biking or walking to work at least once during Bike to Work Week. The Team Leader also becomes the liaison to the program's organizers and a distribution point for safety information and encouragement items such as maps and fitness gear. During Bike to Work Week, the Team Leader tracks which employees tried walking or biking to work each day, and reports to the program organizer. When the week is over, the program organizers tally the counts and award prizes and acknowledgement to winners in each category as well as an overall winner.

Large Scale Ride

The issue
Generate regional excitement and notoriety for Novi as a healthy community that encourages cycling and walking

The idea
Establish a closed-course route within the Novi community, preferably a route that includes a major thoroughfare and some contact with Walled Lake, for a unique and family-friendly celebration of active living and recreation

Why it works in Novi
Most residents and visitors to Novi have only experienced travel around the community from inside a car, whose speed and seclusion blunt and condense observations of and interaction with the true character of its streets and neighborhoods. On a bike, residents and visitors will have a richer experience that often times seems wonderfully unfamiliar as participants literally see, hear and feel more of their community along the routes many of them have only ever driven. For many, it will begin to change their perspective of the quality of their community and the potential for active living.

How it works
A large scale ride will engage the entire Task Force, a crew of Ambassadors, and a team of volunteers besides, but the Recreation Department and the City of Novi should also invite a partner expert in large scale ride production and management, such as the organizers of Tour De Troit or the Michigan Trails and Greenways Alliance. Involving these organizations also invites their partnership in event promotion to their constituencies.

The event should charge a registration fee. Novi is a stable, upper middle class community whose demographics can support a charged-fee event. Most of the costs will be for personnel, including police control of any intersections with open streets, and they are substantial. Still, the City can expect to raise funding that can be used as matching dollars for federal walking and biking grants, as education and outreach funding, or to fund the bicycling and walking coordinator position. These program options for the funding should be a key message of the events' promotion.

Evaluation

Conduct evaluation survey and report results
By the end of year two, the City of Novi outreach program should be able to conduct a survey of either the entire program or a component of the program and report the results to the community. This evaluation will help highlight the successes of the program as well as some ways that the program might be improved.

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 Novi 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 and partner input

The Promoting Active Communities Award is a Michigan-Based award for communities that show a strong commitment to supporting physical activity. The City has applied for this award in the past. Communities are given awards from the highest level of Gold to the category of Honorable Mention. 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 Novi receive a designation.

7. Appendix

Topics:

7.1 Web Survey Results

Summary

A web survey for the City of Novi Non-motorized Master Plan was conducted over a three week period from the End of September, 2010 through the Beginning of October, 2010. The purpose of the survey was to collect information about current walking and bicycling patterns, determine the comfort level of using different non-motorized facility types, identify popular bicycle and pedestrian destinations as well as hopes and concerns for a non-motorized network in the project area. A total of 210 people took survey with 182 people completing the entire survey. 188 people who took the survey lived in the City of Novi and 61 people work in the City of Novi.
The survey was separated into six categories which focused on general non-motorized trip characteristics, non-motorized destinations, walking and bicycling to school, roadside pathways, bike lanes and desired project outcomes. The following summary provides key findings from the survey. For more detailed information please refer to the full web survey results which can be found at the end of this section.

General Non-motorized Trip Characteristics:
Participants were asked questions regarding the frequency and location of their current non-motorized trips.

- 2.4% of respondents currently walk and 2% bike to work as their primary mode of transportation
- The majority of respondents currently walk or bike on a daily or weekly basis for fun and/or exercise
    - 85% Walk
    - 67% Bike
- If a system of sidewalks, pathways, crosswalks, bike lanes, ect. were constructed, survey results indicate that there would be a large increase in the number of people who walk and bike for transportation on a daily and weekly basis.
    - Walking would increase from 19% to 47%
    - Bicycling would increase from 22% to 62%
- If a system of sidewalks, pathways, crosswalks, bike lanes, ect. were constructed, survey results indicate that they would be a slight increase in the number of people who walk and bike for fun and/or exercise on a daily and weekly basis.
    - Walking would not change significantly
    - Bicycling would slightly increase from 67% to 86%

Destinations:
Participants were asked questions regarding the destinations they currently walk and/or bike to and what destinations they would be interested in walking and/or biking to if there was a network of sidewalks, pathways, crosswalks and bike lanes.

- Universally there was a desire to walk and bike to all of the destinations that were listed.
- Consistently there were at least 20% more people who would like to bike than walk to the destinations. This may be due to the longer distances between places and the separation of land uses.
- When asked to indicate what items would make the walking or biking trip to the listed destinations actually happen in the future the majority of respondents felt that a complete sidewalk/roadside pathway system and complete bike lane system would be most important.

Walking and Bicycling to School:
Participants were asked how they or their children typically get to school. 54% of the survey respondents were the parent of a school age child or a student themselves. Statistically there were not enough responses to determine each individual school's trip characteristics.

- The majority of students ride a bus or are driven to school
- Thornton Creek Elementary School and Village Oaks Elementary School have students that typically ride their bike to school
- Hickory Woods Elementary School, Orchard Hills Elementary School, Parkview Elementary School, Parkview Elementary School, Thornton Creek Elementary School, Village Oaks Elementary School, Hillside Middle School and Novi High School have students that typically walk to school.
- 50% of respondents said that they or their child would be interested in walking or bicycling to school in the future if there was a network of sidewalks, pathways, crosswalks and bike lanes.
- The main concerns regarding children walking and biking to school are:
    - Lack of sidewalks or pathways along the main roads
    - Lack of sidewalks in the neighborhood
    - Signalized intersections too busy

Roadside Pathways:
Participants were asked questions regarding their comfort and concerns with roadside pathways.

- 40% of respondents walk on a roadside pathway daily or weekly
- 38% of respondents bike on a roadside pathway daily or weekly
- The main concerns regarding walking or biking on a roadside pathway are:
    - Gaps in the system
    - Being hit by a motor vehicle at intersecting driveways and roadways
    - Rough pavement transitions at intersection driveways and roadways
- 50% of respondents are uncomfortable or somewhat uncomfortable riding along a roadside pathway with frequent intersecting driveways and/or roadways

Bike Lanes:
Participants were asked questions regarding their comfort and concerns with bike lanes.

- 32% of respondents bike in a designated bike lane on a daily or weekly basis
- The main concerns regarding bike lanes are:
    - Gaps in the system
    - Being hit by motor vehicles turning into or out of driveways or local roadway
    - Being hit from behind by a motor vehicle
- Majority of Respondents are uncomfortable in a bike lane with speeds over 45 MPH no matter how many vehicular lanes are present
- 76% of respondents are comfortable or somewhat comfortable on a 2 to 3 lane road with speeds 35 MPH or less
- 54% of respondents are comfortable or somewhat comfortable on a 2 to 3 lane road with speeds 35 to 45 MPH

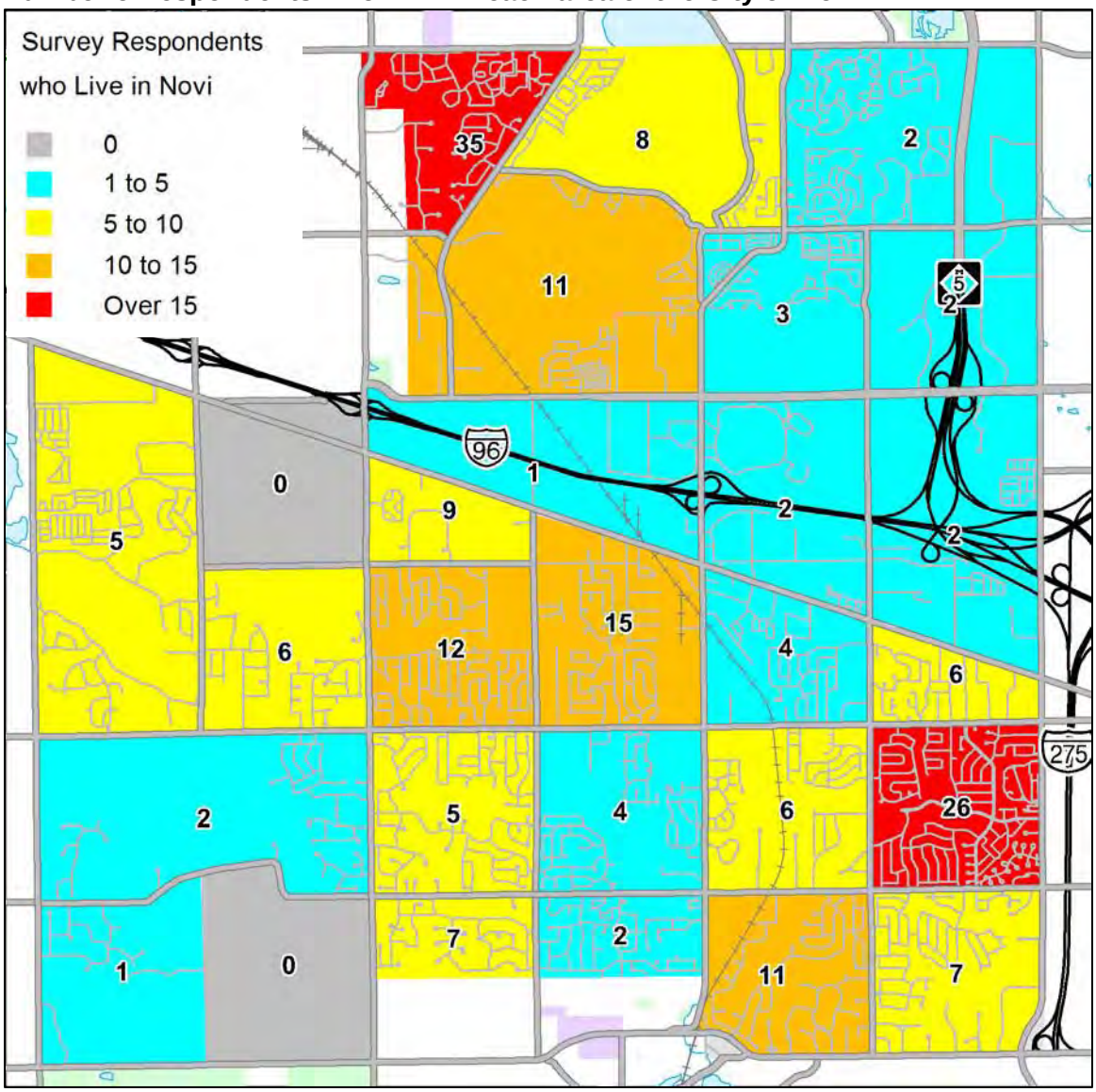
Desired Project Outcomes:
Participants were asked to think about how this non-motorized master plan might improve the way residents, businesses and visitors go about their daily lives and then identify what they thought the top priorities of this project should be. The following is a list of the top visions.

- Continuous sidewalk system along all roads
- More bike lanes throughout the city
- Bicycle and pedestrian friendly city
- Continuous Bicycle and pedestrian network with connections to destinations and neighboring communities
- Safe bicycle and pedestrian crossing at I-96 expressway

The following are the results of the specific questions of the web survey.

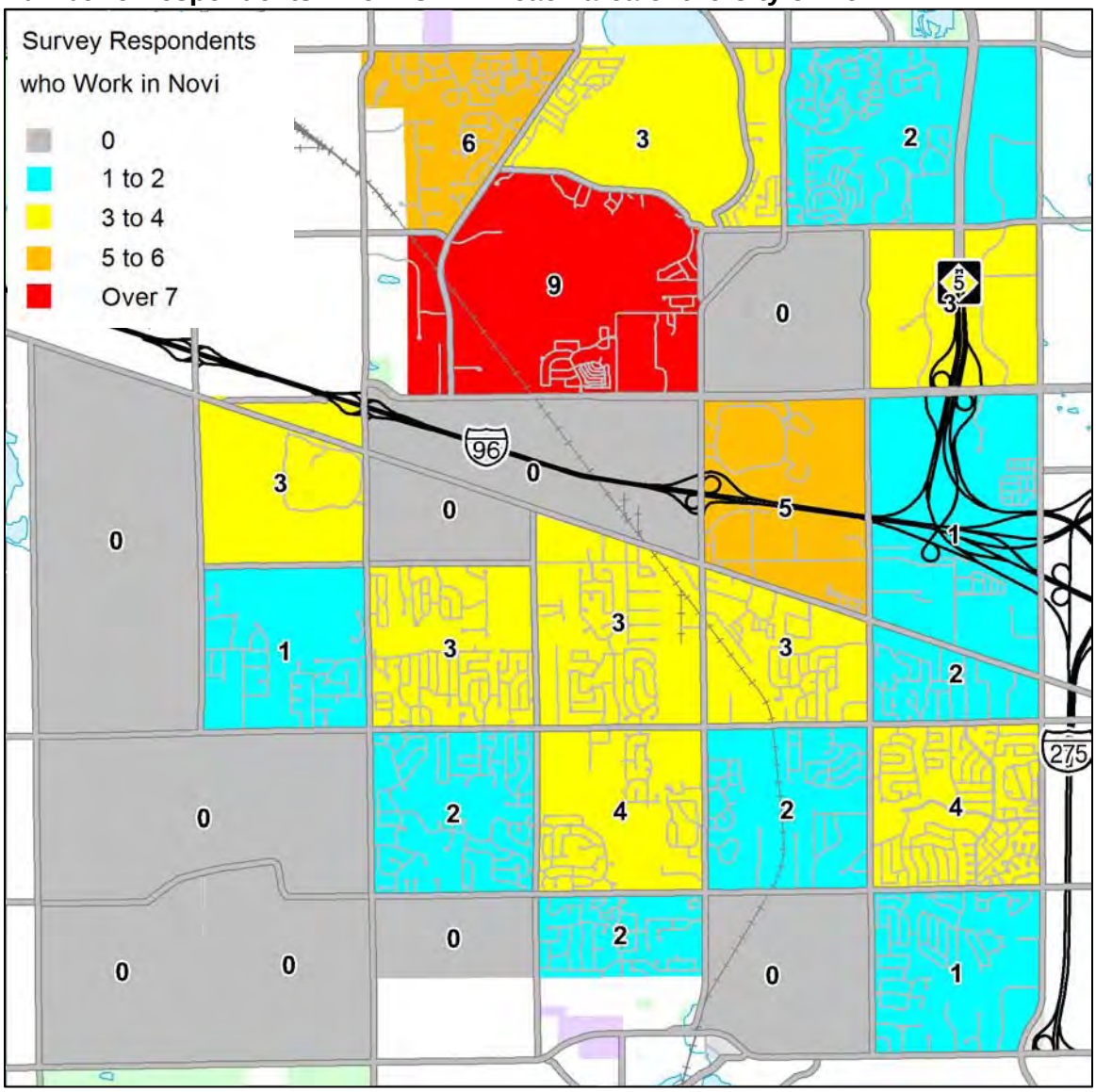
1. **Using the map for reference, please indicate where you live and work in the City of Novi.**

Number of respondents who LIVE in each area of the City of Novi:



- **210 people took the web survey**
- **182 people completed the web survey (86.7%)**
- **202 respondents answered this question (96.2%)**
- **188 respondents live in the City of Novi (93%)**
- **14 survey respondents do NOT live in the City of Novi (7%)**

Number of respondents who WORK in each area of the City of Novi:



- **171 respondents answered this question (81.4%)**
- **61 respondents live in the City of Novi (35.7%)**
- **110 survey respondents do NOT live in the City of Novi (64.3%)**

2. Please indicate which of the following best describes your circumstance. For the purposes of this question, a household is considered any type of residence with one or more occupants.

	Response Percent	Response Count
I am less than 18 years old	0.0%	0
I am part of a household without school age children	38.9%	81
I am part of a household with school age children	**52.4%**	**109**
I am a senior citizen	8.7%	18
answered question		208
skipped question		2

3. Please indicate your gender

	Response Percent	Response Count
Male	**56.5%**	**118**
Female	43.5%	91
answered question		209
skipped question		1

4.What is your primary mode of transportation for the following types of trips? Please select walking, bicycling, bus, motorcycle, drive yourself, passenger or other. If you don't typically make a particular trip type select "Not Applicable"

	Not Applicable	Walking	Bicycling	Bus	Motorcycle	Drive Yourself	Carpool	Passenger	Other	Response Count
To Work	13.7% (28)	2.4% (5)	2.0% (4)	1.0% (2)	0.0% (0)	**80.0% (164)**	0.5% (1)	0.0% (0)	0.5% (1)	205
Education/School	**59.7% (117)**	6.1% (12)	1.0% (2)	8.7% (17)	0.0% (0)	19.9% (39)	4.1% (8)	0.5% (1)	0.0% (0)	196
Shopping & Personal Business	1.0% (2)	3.4% (7)	3.9% (8)	0.0% (0)	0.0% (0)	**89.4% (185)**	1.0% (2)	1.0% (2)	0.5% (1)	207
Leisure & Recreation	0.0% (0)	18.9% (39)	35.9% (74)	0.5% (1)	0.5% (1)	**41.3% (85)**	0.5% (1)	2.4% (5)	0.0% (0)	206
Other	29.1% (34)	**29.9% (35)**	24.8% (29)	0.0% (0)	0.9% (1)	12.8% (15)	0.0% (0)	1.7% (2)	0.9% (1)	117
									Other (please specify)	37
									answered question	209
									skipped question	1

Other (please specifiy)
lake shore park is a weekly destination
Also Leisure and Recreation
Do alot of shopping by bike also
I would bike to work if 10 mile was bike friendly
Church
Shopping by bicycle if feasible
Church
Leisure
Exercise
Amtrak - business travel
Combination of walking/bicycling/driving myself.
trips to the bank, sports club
Exercise
Leisure & Recreation
wlaking for recreation and exercise
local CVS, etc.
I walk and bicycle for recreation and exercise
Walk to downtown for shopping/dinner
Excercise
Exercise
We walk to the businesses on Novi road.
Exercise
for recreation
We ride our bikes around Walled Lake often
often like to jog or ride bike around community
Leisure Bike Rides
City meetings
Activities with Kids
roller blade
Both forms of leisure
Leisure, Recreation, Excercise
Walk to the neighborhood park and local Schools
Any other destination - we drive since we're "land locked" in our subdivision
Taking child to daycare and summer camp.
exercise
Library
Leisurely walks daily

5. Please describe how frequently you walk and bicycle for the following types of trips:

	Daily	Weekly	Monthly	Rarely	Never	Response Count
Walk for fun and/or exercise	**42.4% (87)**	**42.4% (87)**	7.8% (16)	7.3% (15)	0.0% (0)	205
Walk for transportation	3.6% (7)	15.7% (31)	14.2% (28)	**38.6% (76)**	27.9% (55)	197
Bicycle for fun and/or exercise	19.9% (41)	**46.6% (96)**	18.4% (38)	11.7% (24)	3.4% (7)	206
Bicycle for transportation	5.1% (10)	16.8% (33)	8.2% (16)	**40.3% (79)**	29.6% (58)	196
					answered question	**208**
					skipped question	**2**

6. If a system of sidewalks, pathways, crosswalks, bike lanes, etc. is constructed, how do you think that would change your walking and bicycling habits?

	Daily	Weekly	Monthly	Rarely	Never	Response Count
Walk for fun and/or exercise	**60.4% (119)**	29.4% (58)	6.1% (12)	3.0% (6)	1.0% (2)	197
Walk for transportation	18.0% (34)	**29.1% (55)**	22.2% (42)	19.6% (37)	11.1% (21)	189
Bicycle for fun and/or exercise	**46.3% (94)**	39.9% (81)	7.4% (15)	4.9% (10)	1.5% (3)	203
Bicycle for transportation	30.1% (59)	**32.1% (63)**	19.4% (38)	9.2% (18)	9.2% (18)	196
					answered question	**207**
					skipped question	**3**

7. Are there sidewalks along the local streets in your neighborhood?

	Response Percent	Response Count
All or most of the streets have sidewalks	34.0%	70
Some sidewalks but with gaps	**34.5%**	**71**
Just a few sidewalks	9.7%	20
No sidewalks at all	21.8%	45
	answered question	**206**
	skipped question	**4**

8. Are you interested in getting more sidewalks in your neighborhood?

	Response Percent	Response Count
Yes	61.6%	125
No	27.6%	56
Not sure	10.8%	22
answered question		203
skipped question		7

9. For the following commercial/employment areas in Novi, please indicate if you currently walk and/or bicycle to the destinations and if you would be interested in doing so in the future if there was a network of sidewalks, pathways, crosswalks, bike lanes, etc.

	Currently WALK	Would Like to WALK	Would Not WALK	Currently BIKE	Would Like to BIKE	Would Not BIKE	Response Count
8 Mile and Haggerty Rd area	2.1% (3)	16.2% (23)	**44.4% (63)**	7.0% (10)	**44.4% (63)**	43.0% (61)	142
10 Mile, Grand River Ave and Haggerty area	6.4% (9)	21.4% (30)	37.9% (53)	9.3% (13)	**53.6% (75)**	33.6% (47)	140
13 Mile and Novi Rd area	6.3% (9)	19.7% (28)	38.0% (54)	9.9% (14)	**50.0% (71)**	33.8% (48)	142
Briar Point - Beck Rd and 10 Mile area	4.4% (6)	21.3% (29)	34.6% (47)	9.6% (13)	**51.5% (70)**	30.9% (42)	136
Main Street - Grand River Av and Novi Rd area	4.7% (7)	34.7% (52)	24.7% (37)	6.0% (9)	**69.3% (104)**	15.3% (23)	150
Maples Place - 14 Mile and Novi Rd area	3.0% (4)	18.2% (24)	43.9% (58)	6.8% (9)	**46.2% (61)**	40.2% (53)	132
Novi Town Center	6.0% (9)	27.3% (41)	26.0% (39)	10.0% (15)	**62.7% (94)**	20.0% (30)	150
Novi and 10 Mile area	8.8% (13)	35.4% (52)	23.1% (34)	15.0% (22)	**59.2% (87)**	19.7% (29)	147
Novi and Meadowbrook area	15.3% (22)	34.7% (50)	21.5% (31)	17.4% (25)	**56.3% (81)**	18.8% (27)	144
Oak Point - 9 Mile and Novi Rd area	4.5% (6)	27.1% (36)	33.8% (45)	15.0% (20)	**51.9% (69)**	24.8% (33)	133
Pontiac Trail and Beck Rd area	6.0% (9)	21.9% (33)	39.1% (59)	8.6% (13)	**51.0% (77)**	33.8% (51)	151
Providence Park Hospital	2.9% (4)	30.0% (42)	35.0% (49)	7.1% (10)	**49.3% (69)**	31.4% (44)	140
Twelve Oaks/West Oaks/Twelve Mile Crossing area	1.4% (2)	31.5% (46)	32.2% (47)	5.5% (8)	**56.8% (83)**	28.8% (42)	146
West Market Square area	2.4% (3)	21.0% (26)	41.9% (52)	3.2% (4)	43.5% (54)	**46.0% (57)**	124
West Park Dr and Pontiac Trail area	8.7% (13)	26.0% (39)	36.0% (54)	14.0% (21)	**45.3% (68)**	37.3% (56)	150
Wixom Rd and Grand River Ave area	2.9% (4)	22.1% (30)	35.3% (48)	8.1% (11)	**51.5% (70)**	36.8% (50)	136
					answered question		186
					skipped question		24

10. For the following communities and trails surrounding Novi, please indicate if you currently walk and/or bicycle to the destinations and if you would be interested in doing so in the future if there was a network of sidewalks, pathways, crosswalks, bike lanes, etc.

	Currently WALK	Would Like to WALK	Would Not WALK	Currently BIKE	Would Like to BIKE	Would Not BIKE	Response Count
Downtown Farmington	6.2% (9)	10.3% (15)	39.3% (57)	6.9% (10)	**42.8% (62)**	42.1% (61)	145
Downtown Northville	12.7% (21)	21.2% (35)	22.4% (37)	24.2% (40)	**55.2% (91)**	15.8% (26)	165
Downtown Walled Lake	9.9% (16)	19.8% (32)	27.8% (45)	16.0% (26)	**51.9% (84)**	24.1% (39)	162
Downtown Wixom	5.6% (8)	11.1% (16)	39.6% (57)	11.8% (17)	**48.6% (70)**	31.9% (46)	144
Huron Valley Trail System	3.3% (5)	17.1% (26)	28.9% (44)	17.1% (26)	**59.9% (91)**	18.4% (28)	152
West Bloomfield Trail	2.2% (3)	12.3% (17)	37.7% (52)	10.1% (14)	**57.2% (79)**	29.0% (40)	138
					answered question		**187**
					skipped question		**23**

11. For the following recreation areas, please indicate if you currently walk and/or bicycle to those destinations and if you would be interested in doing so in the future if there was a network of sidewalks, pathways, crosswalks, bike lanes, etc.

	Currently WALK	Would Like to WALK	Would Not WALK	Currently BIKE	Would Like to BIKE	Would Not BIKE	Response Count
I-275 Metro Trail	2.2% (3)	10.9% (15)	31.9% (44)	18.8% (26)	51.4% (71)	24.6% (34)	138
ITC Community Sports Park	3.4% (4)	17.8% (21)	28.0% (33)	1.7% (2)	61.0% (72)	28.8% (34)	118
Lakeshore Park	16.0% (26)	23.9% (39)	14.7% (24)	30.7% (50)	51.5% (84)	12.3% (20)	163
Landings Parkland	9.7% (10)	12.6% (13)	37.9% (39)	11.7% (12)	46.6% (48)	35.9% (37)	103
M-5 Metro Trail	1.6% (2)	16.3% (21)	30.2% (39)	6.2% (8)	62.8% (81)	23.3% (30)	129
Maybury State Park	11.1% (17)	20.9% (32)	17.0% (26)	22.9% (35)	58.8% (90)	11.1% (17)	153
Novi Civic Center/Novi Public Library/Ella Mae Power Park	15.3% (21)	24.1% (33)	16.8% (23)	21.9% (30)	54.7% (75)	14.6% (20)	137
Novi Ice Arena	1.7% (2)	20.0% (23)	35.7% (41)	11.3% (13)	40.9% (47)	39.1% (45)	115
Rotary Park	8.6% (11)	20.3% (26)	28.1% (36)	21.9% (28)	41.4% (53)	27.3% (35)	128
Wildlife Woods Park	4.4% (5)	22.1% (25)	30.1% (34)	5.3% (6)	54.0% (61)	31.9% (36)	113
					answered question		178
					skipped question		32

12. For those destinations on this and the previous page that you indicated that you would like to walk or bicycle to in the future, please indicate the importance of following items in making that trip actually happen in the future.

	Very Important	Somewhat Important	Not Very Important	Not Important	Response Count
Bicycle parking	25.7% (43)	**45.5% (76)**	22.8% (38)	6.0% (10)	167
Complete sidewalk / roadside pathway system	**80.0% (144)**	16.1% (29)	2.8% (5)	1.1% (2)	180
Complete bike lane system	**62.0% (106)**	27.5% (47)	7.6% (13)	2.9% (5)	171
Hands-on training on safe and effective bicycling	7.5% (12)	19.5% (31)	**36.5% (58)**	**36.5% (58)**	159
Lighting along sidewalks and pathways	23.5% (40)	**37.6% (64)**	25.9% (44)	12.9% (22)	170
Mid-block crosswalks	13.8% (22)	32.5% (52)	**37.5% (60)**	16.3% (26)	160
Map of available pedestrian and bicycle facilities	36.1% (61)	**37.3% (63)**	20.1% (34)	6.5% (11)	169
On-line customized walking and bicycling routes	25.8% (42)	**41.7% (68)**	20.9% (34)	11.7% (19)	163
Snow and ice removal from sidewalks and pathways	40.0% (68)	**40.6% (69)**	17.1% (29)	2.4% (4)	170
Wayfinding signs for suggested bicycle and pedestrian routes to key destinations	32.7% (55)	**41.1% (69)**	18.5% (31)	7.7% (13)	168
				answered question	**183**
				skipped question	**27**

13. Are you the parent of a school age child or a student yourself? If you answer yes, please fill out the relevant questions on the remainder of this page, otherwise you may proceed to the next page.

	Response Percent	Response Count
Yes	**54.1%**	**92**
No	45.9%	78
answered question		**170**
skipped question		**40**

14. Elementary Schools Which elementary school do you or your children attend and how do you typically get to school?

How do your or your children typically get to school?

	Walk	Bike	Bus	Driven	Response Count
Amerman Elementary School	0.0% (0)	0.0% (0)	**100.0% (3)**	0.0% (0)	3
Deerfield Elementary School	0.0% (0)	0.0% (0)	**50.0% (1)**	**50.0% (1)**	2
Hickory Woods Elementary School	5.3% (1)	0.0% (0)	**84.2% (16)**	10.5% (2)	19
Meadowbrook Elementary School	0.0% (0)	0.0% (0)	**100.0% (2)**	0.0% (0)	2
Novi Meadows School	10.0% (1)	0.0% (0)	**80.0% (8)**	10.0% (1)	10
Novi Woods Elementary School	0.0% (0)	0.0% (0)	**100.0% (2)**	0.0% (0)	2
Orchard Hills Elementary School	25.0% (1)	0.0% (0)	**50.0% (2)**	25.0% (1)	4
Parkview Elementary School	25.0% (1)	0.0% (0)	**75.0% (3)**	0.0% (0)	4
Thornton Creek Elementary School	**33.3% (2)**	16.7% (1)	**33.3% (2)**	16.7% (1)	6
Village Oaks Elementary School	**36.4% (4)**	9.1% (1)	18.2% (2)	**36.4% (4)**	11
				Other (please specify)	11
				answered question	55
				skipped question	155

Other (please specifiy)

Concordia Lutheran in Farmington Hills - Drive
Novi Community Preschool
West Bloomfield
st william catholic school
Farmington Schools
No children in school
walks in warm weather
Our Lady of Victory
childtime kindergarten, farmington hills...we drive there
Young Fives - walk in afternoon and ride in morning
St William Catholic School

15. Middle Schools Which middle school do you or your children attend and how do you typically get to school?

How do your or your children typically get to school?

	Walk	Bike	Bus	Driven	Response Count
Geisler Middle School	0.0% (0)	0.0% (0)	**100.0% (11)**	0.0% (0)	11
Hillside Middle School	**33.3% (1)**	0.0% (0)	**33.3% (1)**	**33.3% (1)**	3
Novi Middle School	0.0% (0)	0.0% (0)	**80.0% (12)**	20.0% (3)	15
				Other (please specify)	5
				answered question	29
				skipped question	181

Other (please specifiy)

Wyandotte Chipawa valley
Greenhills Ann Arbor
Farmington Schools
No children in school
drives in bad weather

16. High Schools Which high school do you or your children attend and how do you typically get to school?

How do your or your children typically get to school?

	Walk	Bike	Bus	Driven	Drive Themselves	Response Count
Catholic Central High School	0.0% (0)	0.0% (0)	0.0% (0)	**60.0% (3)**	40.0% (2)	5
Novi High School	12.5% (2)	0.0% (0)	**43.8% (7)**	18.8% (3)	25.0% (4)	16
Walled Lake Western High School	0.0% (0)	0.0% (0)	**61.5% (8)**	30.8% (4)	7.7% (1)	13
					Other (please specify)	4
					answered question	33
					skipped question	177

Other (please specifiy)

Chipawa Valley 9th Grade Center
Driven to Walk home
No children in school
Northville High School

17. Other Schools Which school do you or your children attend and how do you typically get to school?

How do your or your children typically get to school?

	Walk	Bike	Bus	Driven	Drive Themselves	Response Count
Franklin Road Christian School	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (1)**	0.0% (0)	1
Novi Christian School	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Novi Woods Montessori	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
St Paul's Evangelical Lutheran Church & School	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
Walsh College	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (1)**	1
Wixom Christian School	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0
					Other (please specify)	6
					answered question	2
					skipped question	208

Other (please specifiy)

Peanut Patch Preschool- Drive
Northern Walled Lake (Driven)
Treasure Box Preschool
st william school
Private Preschool not in Novi
St William Catholic School

18. Would you or your child be interested in walking or bicycling to school in the future should if there is a network of sidewalks, pathways, crosswalks, bike lanes, etc.?

	Response Percent	Response Count
Definitely	49.6%	62
Perhaps	26.4%	33
Probably Not	18.4%	23
No	5.6%	7
answered question		125
skipped question		85

19. What concerns do you or your child have about walking or bicycling to school?

	Major Concern	Somewhat of a Concern	Minor Concern	Not a Concern	Not Applicable or Not Sure	Response Count
Lack of sidewalks in the neighborhood	**52.4% (54)**	9.7% (10)	8.7% (9)	20.4% (21)	8.7% (9)	103
Lack of sidewalks or pathways along the main roads	**77.1% (84)**	8.3% (9)	0.9% (1)	4.6% (5)	9.2% (10)	109
Existing crosswalks too far out of way	**28.4% (27)**	20.0% (19)	13.7% (13)	21.1% (20)	16.8% (16)	95
Signalized intersections too busy	**49.5% (50)**	20.8% (21)	10.9% (11)	7.9% (8)	10.9% (11)	101
Too far to walk or bike	22.7% (22)	15.5% (15)	19.6% (19)	**34.0% (33)**	8.2% (8)	97
No bike racks at school	8.7% (8)	10.9% (10)	16.3% (15)	**37.0% (34)**	27.2% (25)	92
Weather	24.3% (25)	**30.1% (31)**	**30.1% (31)**	6.8% (7)	8.7% (9)	103
Poor lighting along route	26.8% (26)	**29.9% (29)**	17.5% (17)	14.4% (14)	11.3% (11)	97
Personal security concerns	**33.0% (32)**	27.8% (27)	16.5% (16)	13.4% (13)	9.3% (9)	97
					Other (please specify)	12
					answered question	**118**
					skipped question	**92**

Other (please specifiy)
Route to high school incomplete, route via 10 mile between meadowbrook and novi rd. incomplete
Need a bridge from Willowbrook Estates #3 to Village Oaks
Morning traffic at School-Young and distracted drivers-very dangerous
Attitudes of motorists towards on-street cyclists
Big concern for when they move up to Geisler MIddle school
crossing the freeway, no signals, no pathways
some paths too close to the road
PERSONAL SECURITY/SAFETY
dark mornings, crossing streets
Lockable bike storage
Pathways too narrow along South Lake & East Lake Dr to feel comfortable letting child go
corner of 10 & Taft poorly lit and busy at 7am!!!

20. Please indicate how frequently you use a roadside pathway?

	Daily	Weekly	Monthly	Rarely	Never	Response Count
As a pedestrian	12.3% (21)	**28.1% (48)**	14.6% (25)	24.6% (42)	20.5% (35)	171
As a bicyclist	4.5% (8)	**33.0% (59)**	23.5% (42)	21.2% (38)	17.9% (32)	179
					answered question	**181**
					skipped question	**29**

21. What are your concerns when walking or bicycling on a roadside pathway?

	Major Concern	Somewhat of a Concern	Minor Concern	Not a Concern	Not Applicable or Not Sure	Response Count
Overhanging vegetation	13.9% (22)	**38.0% (60)**	24.1% (38)	20.9% (33)	3.2% (5)	158
Condition of pavement	37.6% (64)	**38.2% (65)**	14.1% (24)	7.1% (12)	2.9% (5)	170
Rough pavement transitions at intersecting driveways and roadways	**34.0% (55)**	32.1% (52)	18.5% (30)	12.3% (20)	3.1% (5)	162
Conflicts with pedestrians	9.4% (15)	21.4% (34)	32.7% (52)	**33.3% (53)**	3.1% (5)	159
Conflicts with bicyclists	4.5% (7)	19.5% (30)	35.1% (54)	**36.4% (56)**	4.5% (7)	154
Being hit by motor vehicles at intersecting driveways and roadways	**40.4% (67)**	26.5% (44)	19.3% (32)	10.8% (18)	3.0% (5)	166
Snow and ice	23.0% (37)	**36.0% (58)**	22.4% (36)	16.1% (26)	2.5% (4)	161
Puddles	7.1% (11)	21.2% (33)	**40.4% (63)**	28.2% (44)	3.2% (5)	156
Lighting	19.1% (31)	21.6% (35)	**32.1% (52)**	24.1% (39)	3.1% (5)	162
Gaps in the system	**67.3% (113)**	22.0% (37)	3.0% (5)	5.4% (9)	2.4% (4)	168
					Other (please specify)	12
					answered question	**178**
					skipped question	**32**

Other (please specifiy)

Access to trail from workplace
had no idea these existed outside of the i-275 path, which is unusable with no parking/access known
Conflicts with pets, both leashed and unleashed

"Roadside paths" and so-called "safety paths" are better for pedestrians and beginner cyclists, but are not safe or recommended for cyclists generally, and do not meet AASHTO standards. There are too many blind conflicts at driveways where drivers are not watching for cyclists, who are moving much faster than pedestrians. Bike lanes are nice where there is room, but all cyclists really need is a clean, paved shoulder and the respect of other roadway users (motorists.) "Sharrows" and wayfinding can be helpful to mark designated routes, but all roads should be Complete Streets. Attempting to segregate all cyclists off to unsafe sidepaths is not acceptable.
Getting to the pathways because some roads have no sidewalks or bike lanes.
too close to the roads
Make Bicycle Lanes
No sidewalks at all on Ten Mile from Beck to Wixom Rd. Few sidewalks on Beck from Ten Mile to Grand River
SAFETY
distance signage
personal saftey
distance to and Parking at the pathways for access

22. What is your comfort level using a roadside pathway in the following contexts:

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable	Not Applicable or Not Sure	Response Count
With frequent intersecting driveways and/or roadways	14.3% (25)	**35.4% (62)**	26.9% (47)	21.7% (38)	1.7% (3)	175
When the pathway is right next to the roadway	19.4% (34)	26.9% (47)	22.9% (40)	**29.1% (51)**	1.7% (3)	175
When there is a strip of grass between the road and pathway	2.9% (5)	8.0% (14)	18.4% (32)	**69.0% (120)**	1.7% (3)	174
When there is a strip of grass and trees between the road and pathway	4.1% (7)	4.1% (7)	11.6% (20)	**77.9% (134)**	2.3% (4)	172
					answered question	177
					skipped question	33

23. How frequently do you bicycle in a designated bike lane?

	Response Percent	Response Count
Daily	7.3%	13
Weekly	24.6%	44
Monthly	16.2%	29
Rarely	25.1%	45
Never	**26.8%**	**48**
answered question		179
skipped question		31

24. What are your concerns when using or contemplating using a bike lane?

	Major Concern	Somewhat of a Concern	Minor Concern	Not a Concern	Not Applicable or Not Sure	Response Count
Debris	23.3% (37)	**32.1% (51)**	25.8% (41)	13.8% (22)	5.0% (8)	159
Condition of the pavement	32.1% (52)	**35.8% (58)**	21.0% (34)	6.8% (11)	4.3% (7)	162
Being hit by motor vehicles turning into or out of driveways or local roadways	**60.5% (104)**	23.3% (40)	10.5% (18)	2.9% (5)	2.9% (5)	172
Making left turns on busy roadways	**41.7% (68)**	31.9% (52)	16.6% (27)	6.1% (10)	3.7% (6)	163
Being hit from behind by a motor vehicle	**59.1% (101)**	23.4% (40)	11.7% (20)	2.9% (5)	2.9% (5)	171
Snow and ice	22.5% (36)	**27.5% (44)**	26.9% (43)	16.9% (27)	6.3% (10)	160
Puddles	8.2% (13)	21.5% (34)	**36.7% (58)**	29.1% (46)	4.4% (7)	158
Lighting	18.5% (29)	24.2% (38)	**29.9% (47)**	22.3% (35)	5.1% (8)	157
Gaps in the system	**60.8% (101)**	22.3% (37)	10.8% (18)	2.4% (4)	3.6% (6)	166
					Other (please specify)	12
					answered question	**173**
					skipped question	**37**

Other (please specifiy)
too close to traffic
11 Mile road between Meadowbrook and Town Center drive needs pavement improvement. And bike lanes and/or sharrows would be nice.
Bike lanes are great, but more important is that car drivers respect and share the road with cyclists.
too close to the road
often doesn't exist
Make more bike lanes
Bikes belong on the road not a sidewalk...by law
SAFETY
Very concerned with letting children ride in these areas.
South Lake Drive the bike lanes are incomplete in areas and it is dangerous given the amount of bike traffic access to the pathway
too close to bus and truck traffic

25. What is or would be your comfort level in using a bike lane in the following contexts:

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable	Not Applicable or Not Sure	Response Count
2 to 3 lane road with speeds 35 MPH or less	7.0% (12)	14.5% (25)	26.2% (45)	**49.4% (85)**	2.9% (5)	172
2 to 3 lane road with speeds 35 to 45 MPH	21.5% (37)	21.5% (37)	25.6% (44)	**27.9% (48)**	3.5% (6)	172
2 to 3 lane road with speeds greater than 45 MPH	**45.9% (79)**	25.0% (43)	13.4% (23)	12.2% (21)	3.5% (6)	172
4 to 5 lane road with speeds 35 to 45 MPH	**42.4% (73)**	18.0% (31)	18.6% (32)	17.4% (30)	3.5% (6)	172
4 to 5 lane road with speeds greater than 45 MPH	**59.6% (102)**	13.5% (23)	11.7% (20)	11.7% (20)	3.5% (6)	171
					answered question	172
					skipped question	38

26. Desired Project Outcomes

	Response Percent	Response Count
First Priority	**100.0%**	**159**
Second Priority	84.9%	135
Third Priority	66.0%	105
answered question		159
skipped question		51

27. On Wednesday, September 29 from 7:00 PM to 8:45 PM there will be a Public Workshop at the new Novi Public Library. The purpose of the workshop will be to identify key issues and review preliminary concepts. Do you plan on attending that workshop?

	Response Percent	Response Count
Yes	12.6%	21
No	**64.7%**	**108**
Not sure	22.8%	38
answered question		167
skipped question		43

28. On Tuesday, October 26 from 7:00 PM to 8:45 PM there will be a Public Workshop at the new Novi Public Library. The purpose of the workshop will be to review the draft plan. Do you plan on attending that workshop?

	Response Percent	Response Count
Yes	25.4%	46
No	27.6%	50
Not sure	47.0%	85
answered question		181
skipped question		29

29. Would you like to receive e-mail notices of future public workshops and when draft documents are available for review? If yes, please enter the contact information below.

	Response Percent	Response Count
Yes	60.2%	106
No	39.8%	70
answered question		176
skipped question		34

30. Optional Contact Information Your name and e-mail will only be used for notices related to this project.

	Response Percent	Response Count
Name	97.2%	103
e-Mail Address	100.0%	106
answered question		106
skipped question		104

7.2 September 29, 2010 Public Workshop Summary

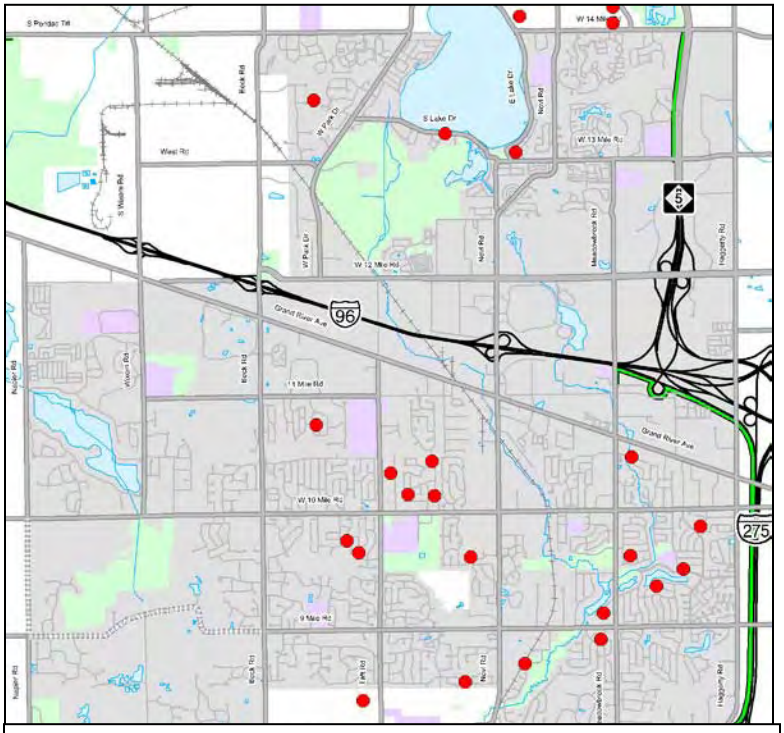
List of Figures

Public Input

A Public Workshop was held on September 29, 2010 for the City of Novi's Non-Motorized Master Plan. Thirty-three people attended. During the public workshop, participants were given the opportunity to give input. There was a series of five exercises that focused on, places of concern, corridor focus, neighborhood connector routes, regional trails and freeway crossings. The participants were also encouraged to mark additional information the on the maps.

The following pages document the input that was collected during the workshop.

1. Places of Concern Exercise
    - Input Findings
    - Summary Map
2. Corridor Focus Exercise
    - Input Findings
    - Summary Map
3. Neighborhood Connector Exercise
    - Neighborhood Connector Routes Map
    - Bike Lane Map
    - Roadside Pathways Map
    - Road Crossing Map
    - Additional Comments Map
4. Potential Regional Trails
    - Input Findings
    - Summary Map
5. Freeway Crossings
    - Input Findings
    - Summary Map



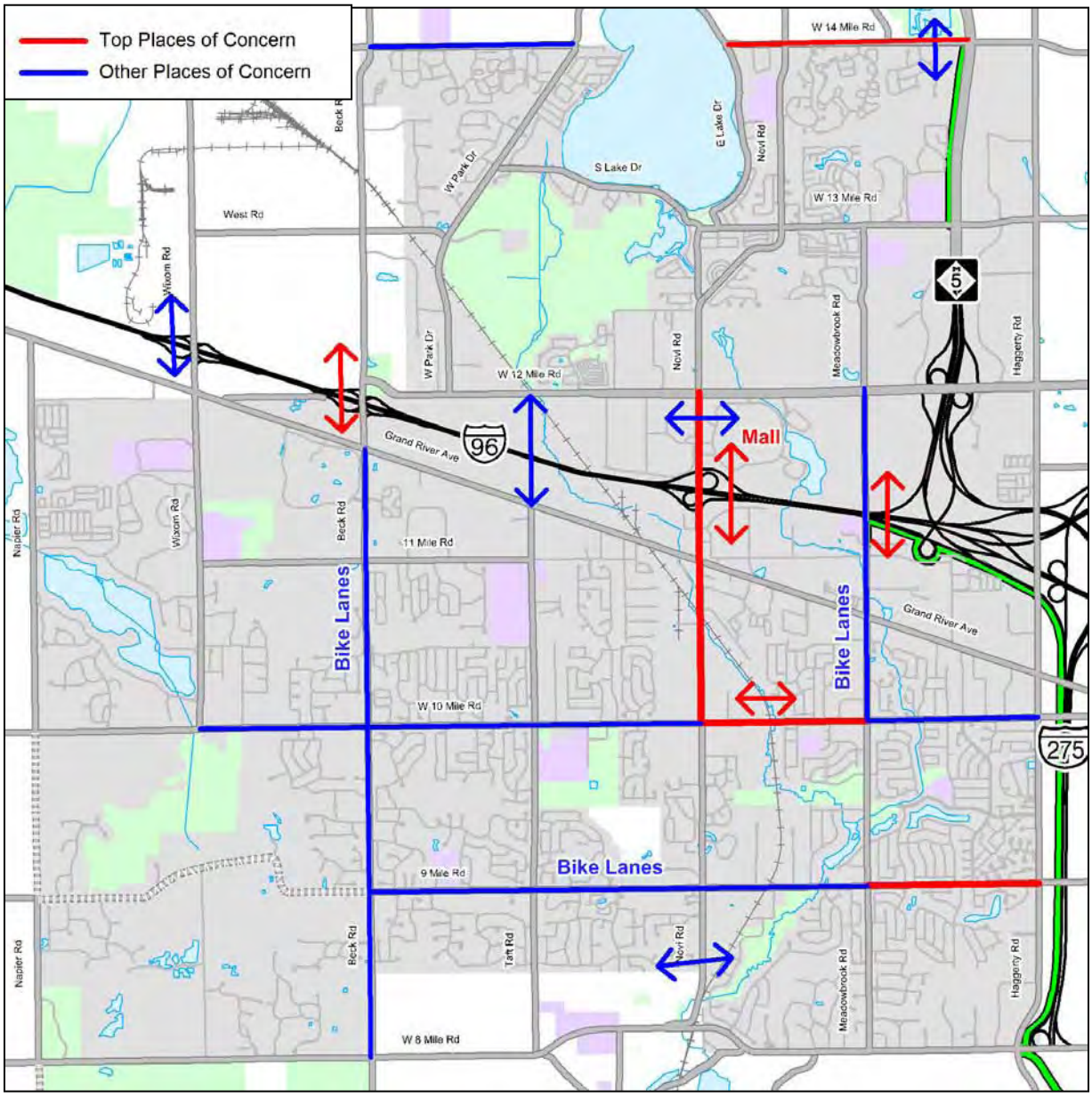
Workshop participants were asked to locate where they live with a red dot. Nine participants did not place a dot.

Places of Concern Exercise

Each participant was given a Places of Concern worksheet and was asked to list and describe three specific areas that this project should address. They then circled the locations on the worksheet map. Documented below is a list of all of the responses.

1st Place of Concern	2nd Place of Concern	3rd Place of Concern
Ten Mile between Novi Road and Haggerty	Beck Rd bewteen GR and 8 Mile	
Crossing Novi Road between 8 & 10 Mile	Path along Novi Road from 10 mile to Mall	Connect Trails to Other Cities
Crossing I-96	Path along 14 Mile	Novi Road Between Grand River and 10 Mile
Cross over I-96	Taft Road connect to 12 Mile	Connect Novi to Other Trails
Along 9 Mile between Meadowbrook and Haggerty		
Novi Road From Town Center to 12 Mile	Meadowbrok Rd from 12 Mile to Cherry Hill	12 Oaks Mall to West Oaks Mall
East/West Conectivity on 14 Mile to the Lake	Access across I-96	Access to Mall Via Bicycle
Novi Rd between 9 and 10 Mile, Sidewalk and Shoulder	Novi Rd or Meadowbrook to 14 mile need safety pathway	
10 Mile at Railroad Crossing	Meadowbrook over I-96	Novi Road North of 10 Mile
Bike Access along Novi Road from 10 mile to Grand River	Bike Access along Meadowbrook from 10 mile to 12 mile	Access to Mall Across I-96 overpass
Connect E.Lebost with Village Oaks Elementary School	Mid-block crosswalk at Lebost and 10 mile	Midblock crosswalk at Malott and Meadowbrook
Beck at I-96 SPUI	Wixom at I-96 SPUI	Novi at I-96
Southwest corner of Grand River and Meadowbrook		
Lack of berm on meadowbrook approaching bridge over I-96	Lake of Sidewalk on 10 Mile between Meadowbrook and Novi Road	Lack of berm on 8 mile road between Beck and Napier
Cannot walk or bike to Geisler Middle School, need sidewalks and crossing	Unsafe to bike/walk all the way around walld lake due to novi sidewalk not meeting up with walled lake sidewalk at wast park/pontiac trail intersection	Cross Freeway at Beck Road
10 Mile between Meadowbrook and Novi Road	9 Mile from meadowbrook to haggerty	
10 Mile crossing beck/wixom	Beck Crossing same problem, no crossing	
No Sidewalk/path on Ashbury Dr from River Bridge sub to Rotary Park. Hidden curves give this section obstruct view of walker biker	No path/bike lanes on 9 mile from Novi Road to Center Street	No Continuouis Path/Bike Lanes connecting south east section of city to Maybury Park
Meadowbrook Rd between 11 mile and 12 Mile a connection between the bike friendly northside of town an dthe population centers to the south	Connections between neighborhoods allowing cyclist and foot traffic to access attractions while minimizingthe need to use major roadways	
Crossing I-96 at Meadowbrook in Bike Lane and Safety Path	Crossing I-96 at Novi	Crossing I-96 at Beck
Improve crossing at 10 mile/Novi rd intersection	Improve access to Meijers a 8mi and Haggerty	Provide bike lane on 9 mile road
Novi road lack of access to 12 Oaks	Gaps in I-275/M-5 System/Lack of I-96 East west	Connection ot Neighboring Cities
13 Mile Rd pathway, drainages causes sand and debri on pathway most of the time	No sidewalk or pathway on south side of 14 mile rd just west of M-5	West Rd between W.Park and Beck Rd is very rough and dangerous
We need a way to get across M-5 at 14 Mile	Would like shoulders widedened where ever possible	Would like a good road from S walled Lake to Kensington
14 Mile between Novi Rd and M-5	Novi Road south of 12 Mile	Novi Road 10 and 11 mile crossing
Bike Lanes along Pontiac Trl (Beck rd to E. Lake)	Bike Lanes along Beck Rd (Pontiact Trail to 10 Mile)	Improve Crossing at Beck and Pontiac Trail
Lack of I-96 crossing Anywhere!	East/West connctions along main roads	More Sidewalks in Neighborhoods

Places of Concern Summary Map



The Top Places of Concern (ranked in order of priority)

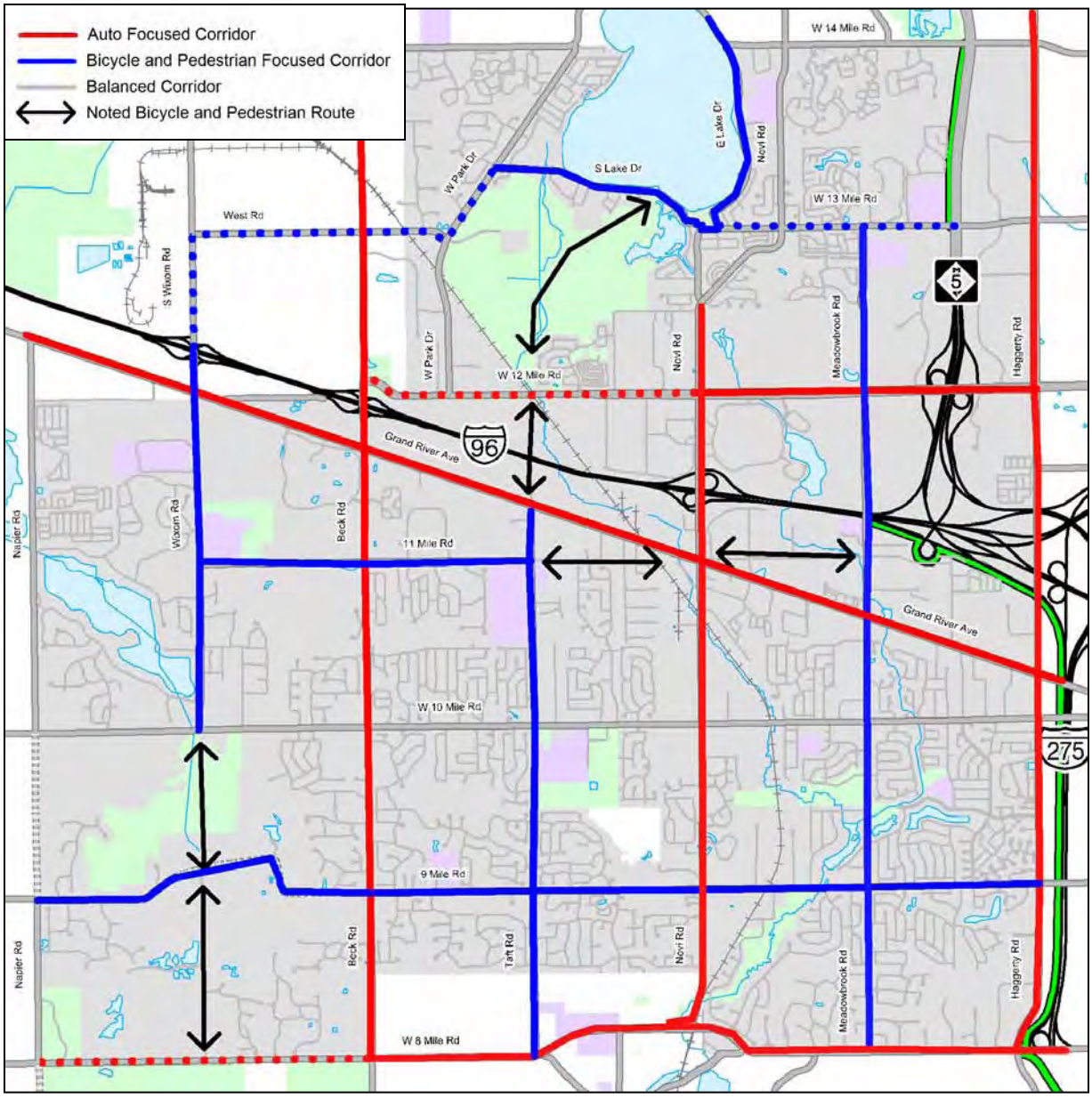
1. Connection needed on Novi Road from 10 Mile Road to 12 Mile with bicycle/pedestrian access across I-96 freeway
2. Bicycle/pedestrian crossing needed across I-96 freeway in general
3. Bicycle and pedestrian crossing needed at Meadowbrook Road across I-96 freeway
4. Need bicycle and pedestrian access to mall
5. Bike facility needed on 9 Mile Road between Meadowbrook Road and Haggerty Road
6. Improve bicycle/pedestrian connections on 10 Mile Road between Meadowbrook Road and Novi Road
7. Freeway Crossing needed at Beck Road and I-96 through S.P.U.I.
8. Connect to Other Cities
9. Provide path along 14 Mile Road to get to M-5 Metro Trail

Corridor Focus Exercise

On individual worksheets, participants were asked to indicate which corridors they thought should have a bicycle and pedestrian focus, an automobile focus and a balance of both. Documented below is a list of the number of votes for each type of corridor.

Corridor	Auto	Bike/Ped	Balance
14 MILE	2	7	**17**
13 MILE	0	12	**14**
12 MILE	13	0	**14**
GRAND RIVER	**20**	4	2
11 MILE	0	**16**	10
10 MILE	3	8	**14**
9 MILE	0	**19**	6
8 MILE	**14**	1	**14**
NAPIER	0	4	**20**
WIXOM	1	**13**	12
BECK	**14**	5	6
W PARK	0	10	**13**
TAFT	5	**20**	5
NOVI	**14**	4	7
LAKE	0	**13**	7
MEADOWBROOK	0	**22**	3
HAGGERTY	**16**	0	9

Corridor Focus Summary Map

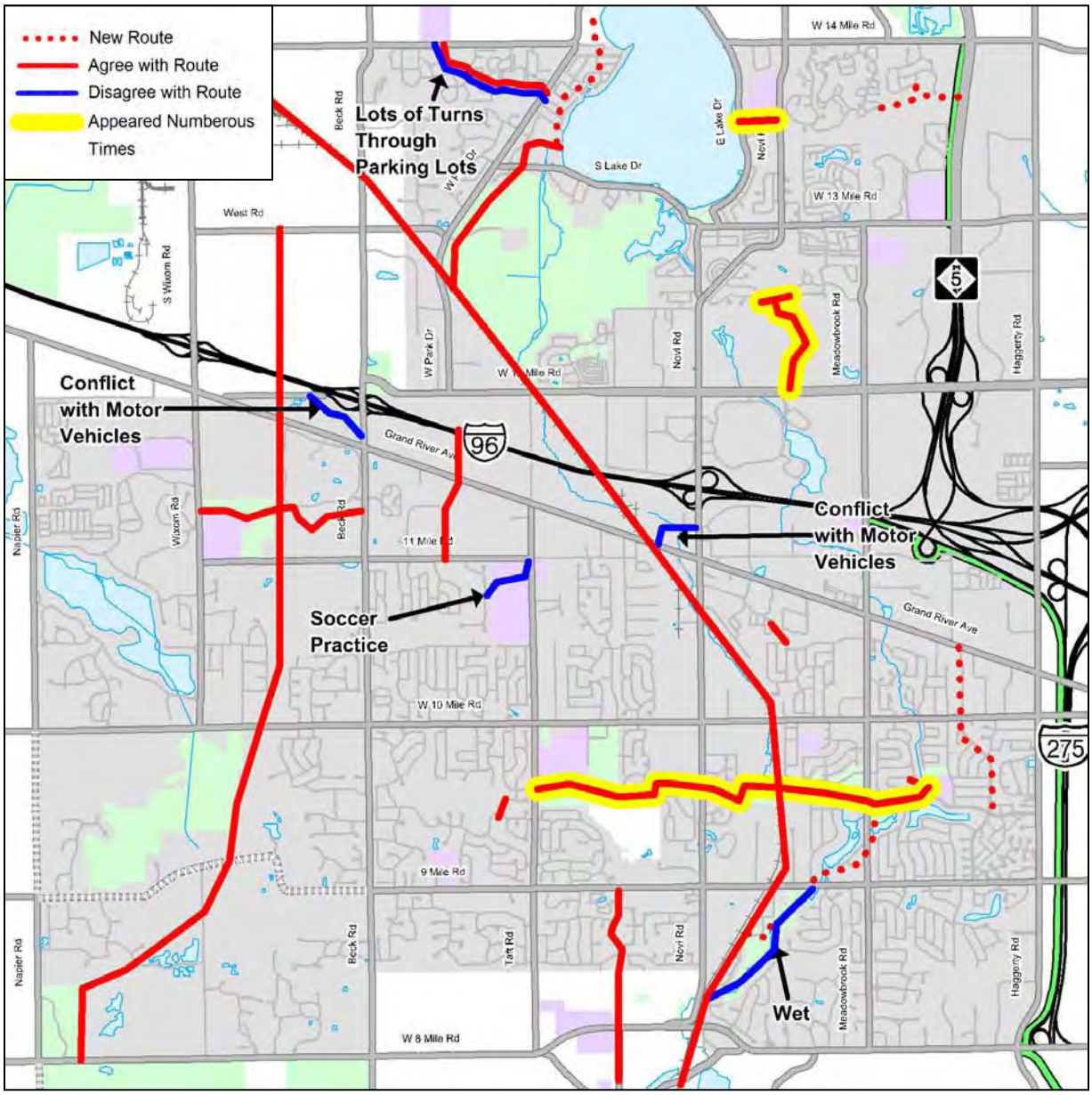


Please note that the corridors with the dotted lines had very close counts.

Neighborhood Connector Exercise

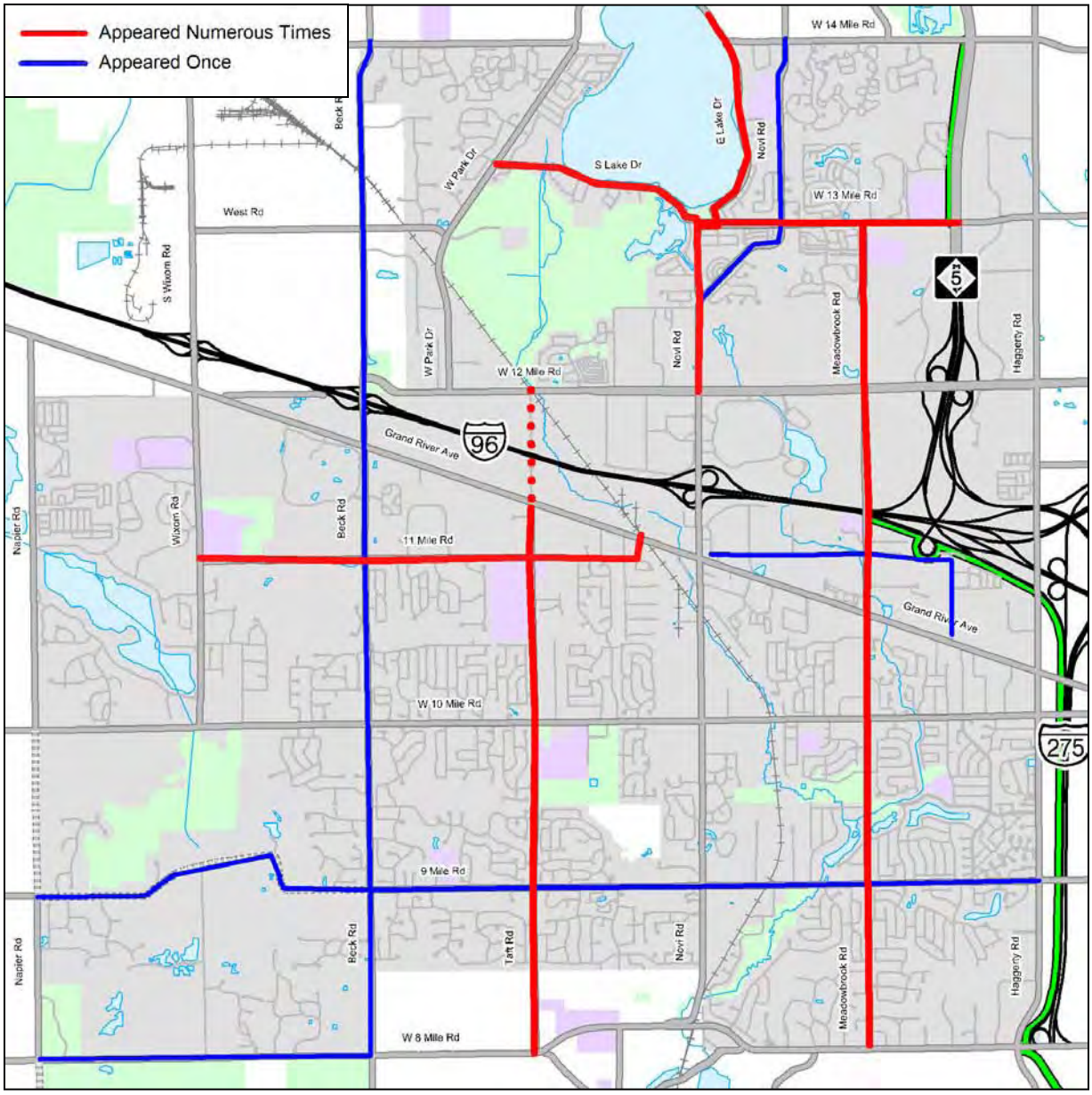
As a group, participants were asked to think about routes that would avoid bicycling or walking along the main roads. Participants were asked to evaluate the provided potential routes and note directly on the large map any changes or concerns they had with the routes. This exercise created a lot of discussion so comments were grouped into five different categories which include, Neighborhood Connectors, Bike Lanes, Roadside Pathway, Crossing Improvements, and Additional Comments. The following maps document the input.

Neighborhood Connector Routes



Please note that alternatives presented in the exercise do not include all potential routes.

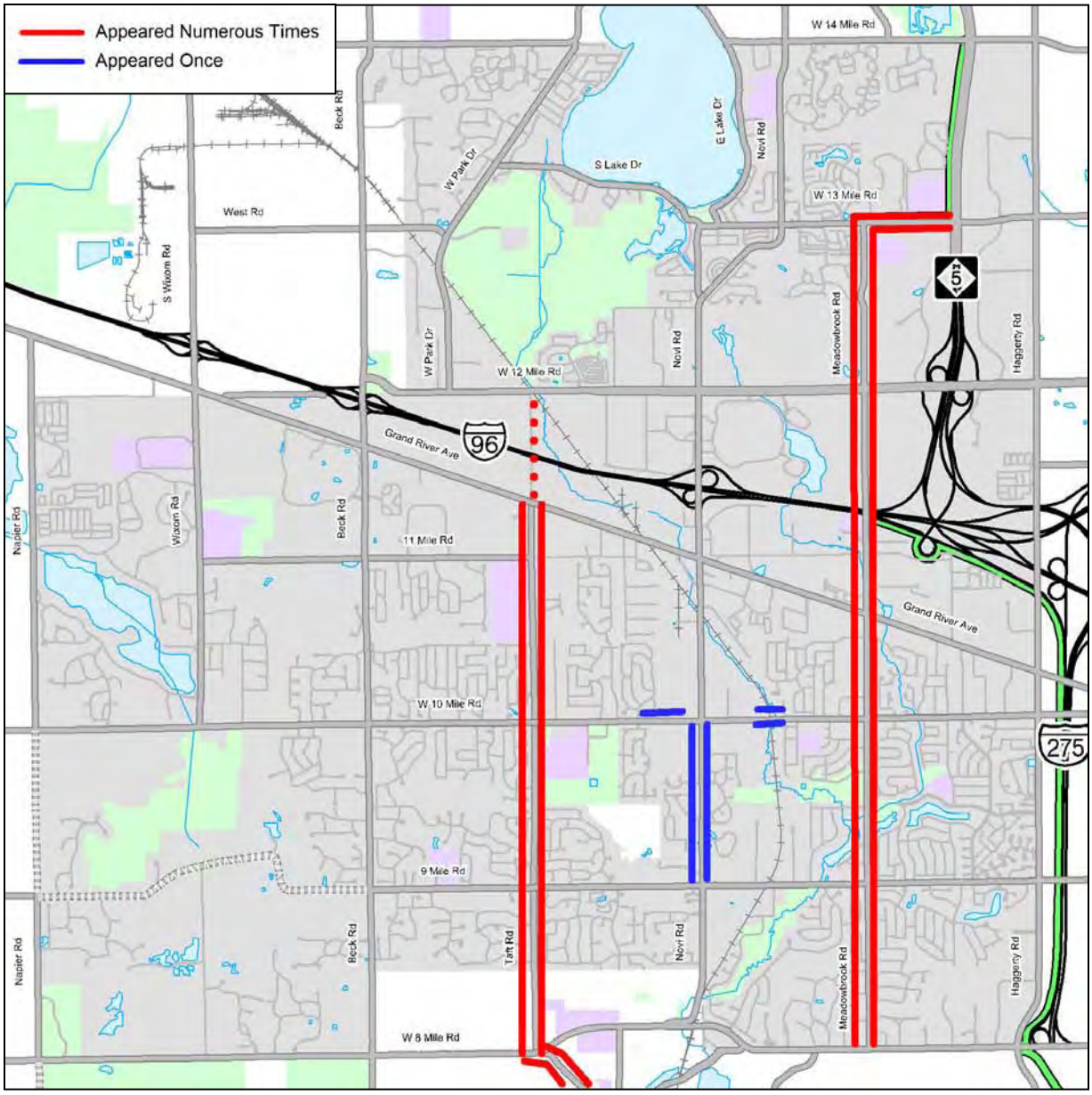
Bike Lanes



Top Bike Lanes

1. Meadowbrook Road
2. Taft Road
3. 11 Mile Road west of Grand River Avenue
4. Novi Road North of W 12 Mile Road
5. South and East Lake Drive
6. W 13 Mile Road to M-5 Metro Trail

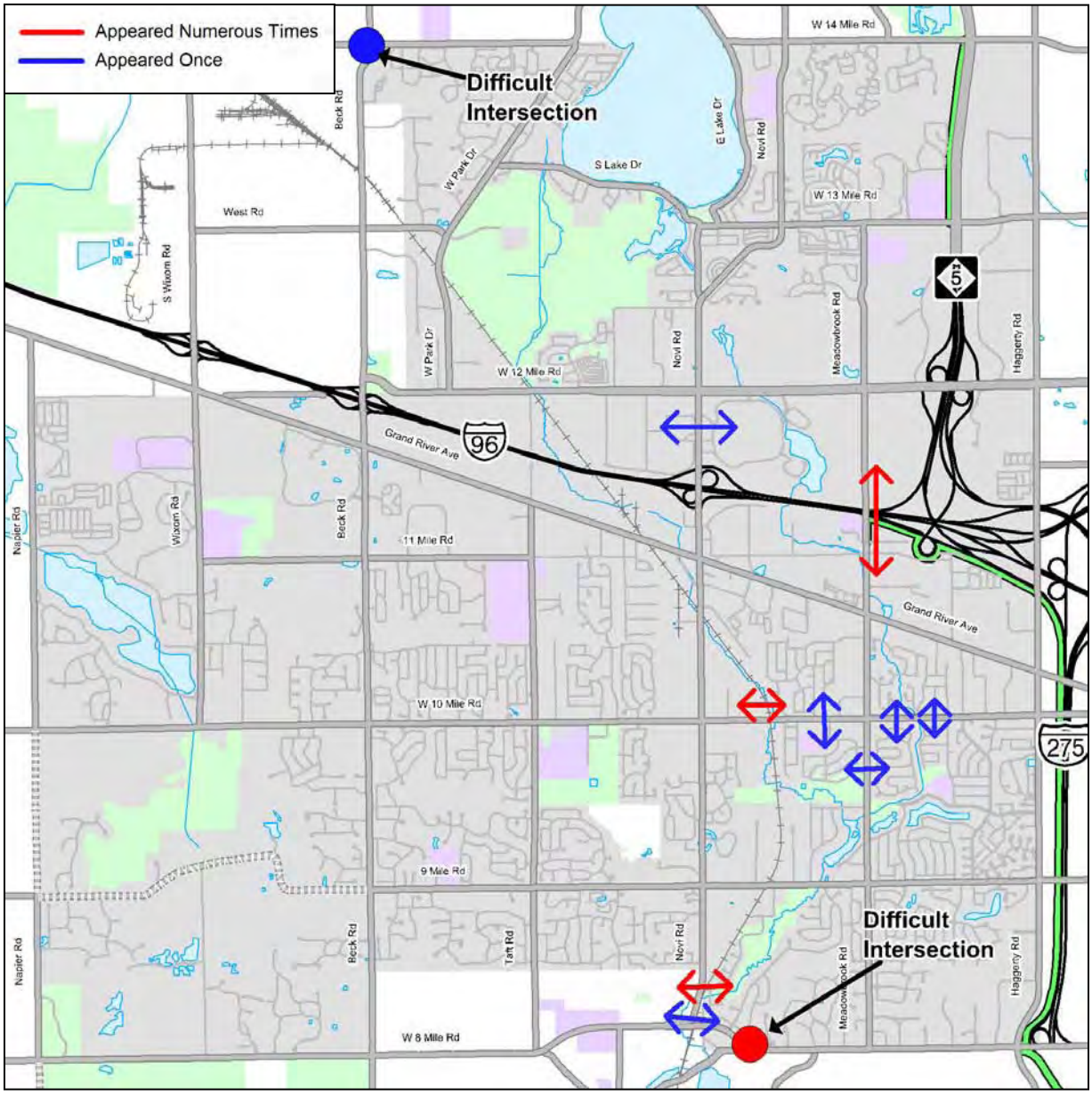
Roadside Pathways



Top Roadside Pathways

1. Along Taft Road
2. Along Meadowbrook Road and a segment of W 13 Mile connecting to M-5 Metro Trail
3. Crossing Over I-96 at Taft Road

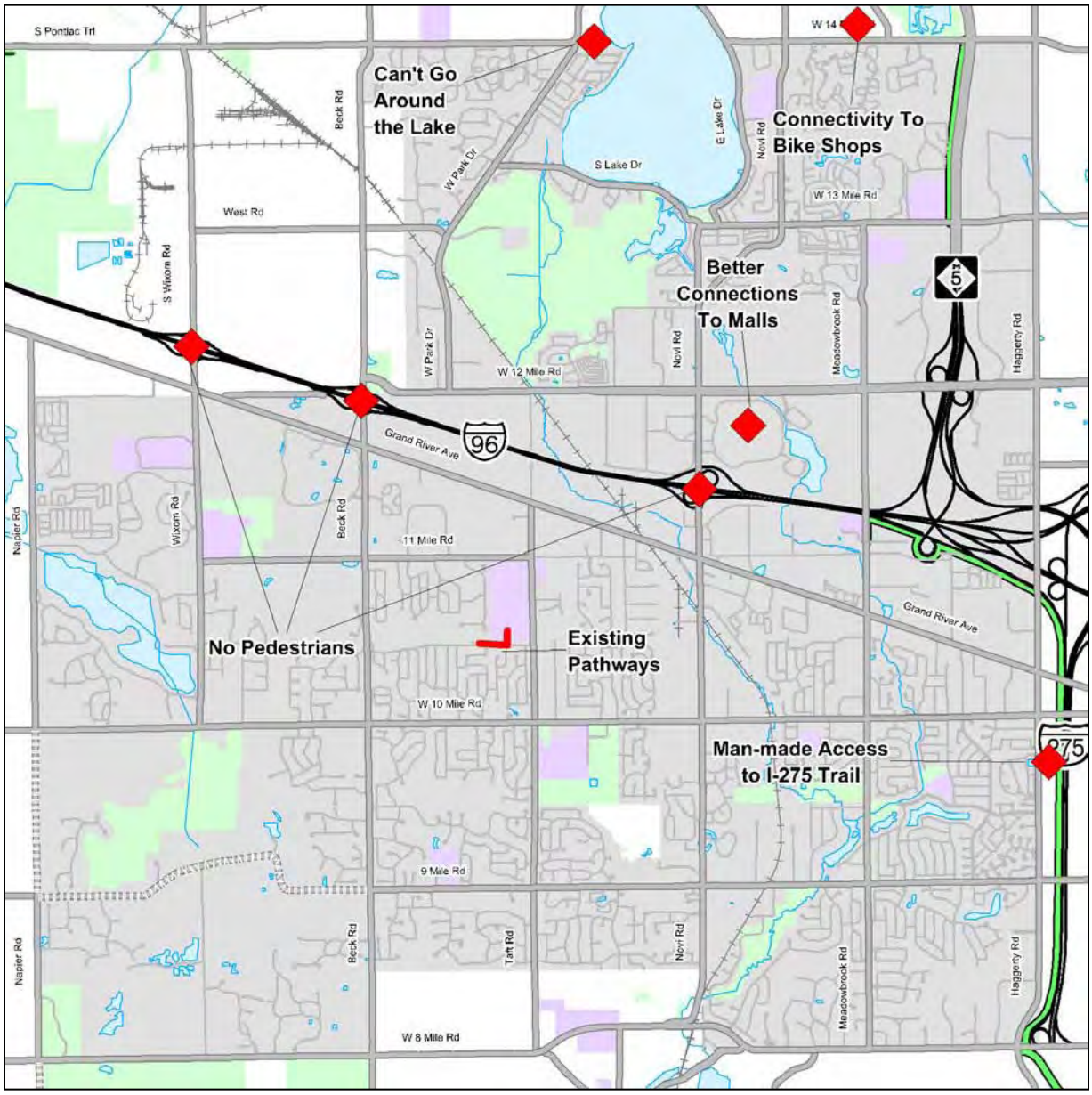
Road Crossing Improvements



Top Road Crossing Improvements

1. Crossing over I-96 at Meadowbrook Road
2. Crossing over Railroad Tracks along 10 Mile between Novi Road and Meadowbrook Road
3. Crossing Novi Road Between 9 Mile Road and W 8 Mile Road
4. Crossing at the Intersection of W 8 Mile Road and Griswold St

Additional Comments

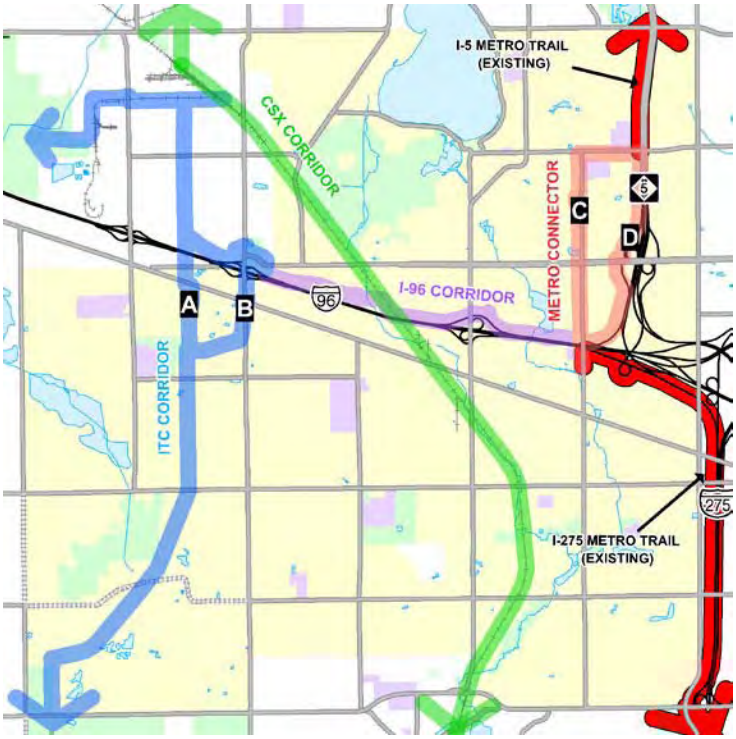


Potential Regional Trail Exercise

Participants were asked to evaluate the potential regional trails by listing pro's and con's and then ranking them in order of significance. Two Trail Corridors also had alternative routes that participates were asked to vote on. Below is documentation of the responses.

	Rank in Order of Significance (1 highest, 4 lowest)				Preferred Alternatives			
	ITC	**CSX**	**I-96**	**METRO CONNECTOR**	**A**	**B**	**C**	**D**
	4	1	3	2				
	4	2	3	1	1		1	
	4	1	3	2	1			1
	1	2	4	3	1		1	
	2	3	4	1	1		1	
	4	3	2	1	1		1	
	2	4	3	1	1		1	
	2	3	4	1	1		1	
	3	1	2	4	1		1	
	2	1	3	4	1			1
	3	1	4	2	1		1	
	2	1	4	3	1			1
	3	1	4	2				
	2	1	4	3	1		1	
	2	4	3	1	1		1	
	3	4	2	1	1		1	
	1	2	4	3	1		1	
	3	1	4	2		1	1	
	2	1	3	4		1	1	
	4	2	3	1		1		1
	2	3	4	1	1		1	
	1	2	4	3				
	2	3	4	1	1		1	
	2	4	3	1	1			1
Total	60	51	81	48	**18**	3	**16**	5
Rank	3rd	2nd	4th	1st	A Favored		C Favored	

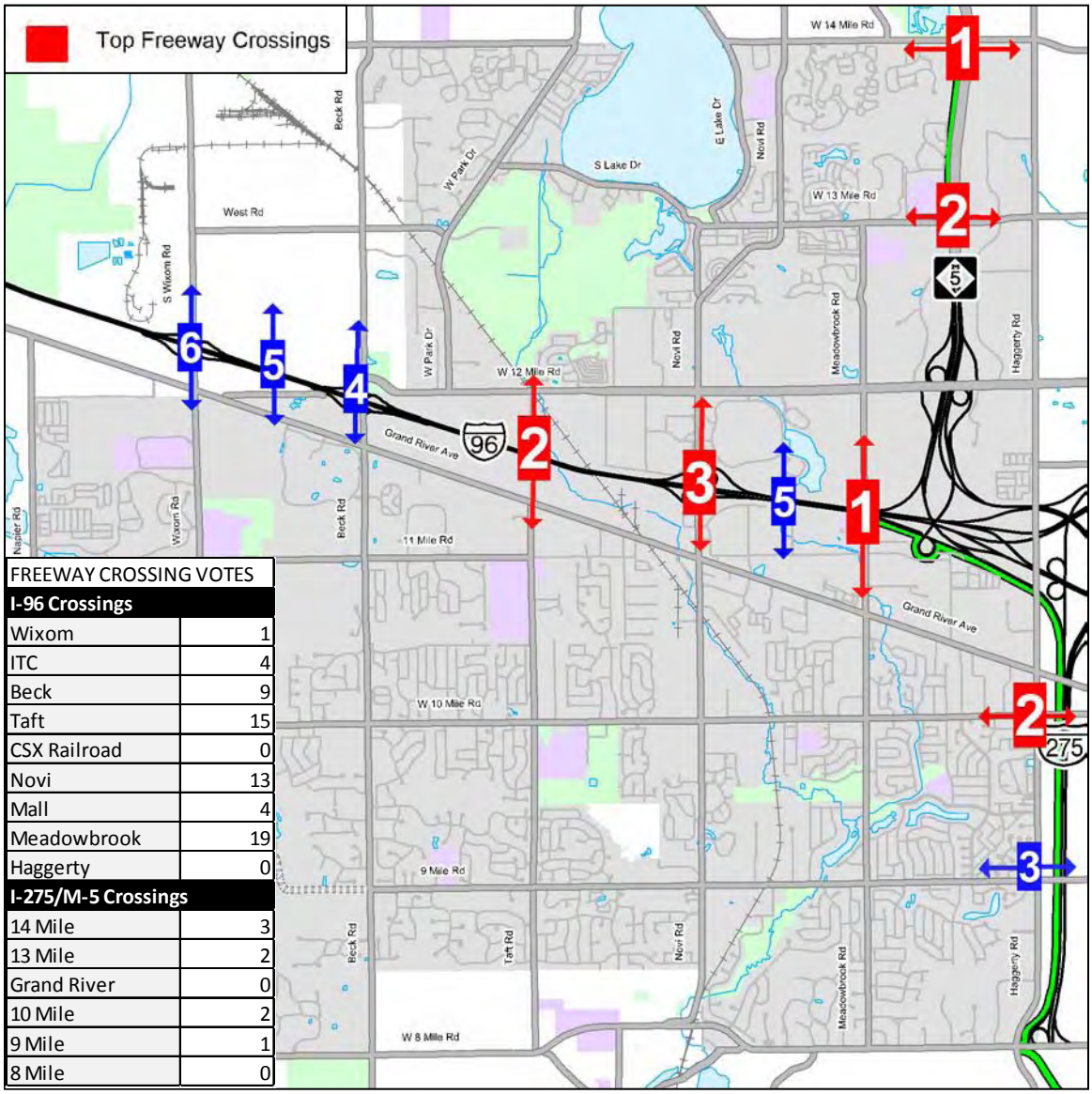
Potential Regional Trail Summary



ITC Corridor	CSX Corridor	I-96 Corridor	Metro Connector
Please Add additional Pro's and Con's to the list.			
Pro's • Connects to Maybury State Park	**Pro's** • Connects to Northville • Access to More People • Close to shopping and Lakeshore park • Middle of Town	**Pro's** • East/West Connection • Alternative to Grand River Ave • Belong to State of Michigan • Many Destinations	**Pro's** • Connects two existing trails • Potential for longer rides
Con's • Close to High Voltage Wires	**Con's** • Close to Active Railroad	**Con's** • Loud noise from nearby expressway • Pollution • Lots of Traffic	**Con's** • Parts of it may be along arterial roadways
Preferred Alternatives:			
Please circle A or B for ITC Corridor and C or D from Metro Connector			
A or B			**C or D**
Rank:			
Based on a regional and local perspective rank the four trails in order of significance from 1 to 4 with 1 being the highest and 4 the lowest			
3	**2**	**4**	**1**

Freeway Crossing Exercise

Individually, participants were asked to identify the top three locations where they thought it was important to provide a safe bicycle and pedestrian crossing over the freeway by placing a dot on the large map. The following map documents the results listed in order of significance, where 1 has the most votes.



FREEWAY CROSSING VOTES	
I-96 Crossings	
Wixom	1
ITC	4
Beck	9
Taft	15
CSX Railroad	0
Novi	13
Mall	4
Meadowbrook	19
Haggerty	0
I-275/M-5 Crossings	
14 Mile	3
13 Mile	2
Grand River	0
10 Mile	2
9 Mile	1
8 Mile	0

The Top Freeway Crossings

North/South across I-96
1. Meadowbrook Road
2. Taft Road
3. Novi Road

East/West across I-275 and M-5
1. 14 Mile
2. W 13 Mile & W 10 Mile

7.3 October 26, 2010 Public Workshop Summary

List of Figures

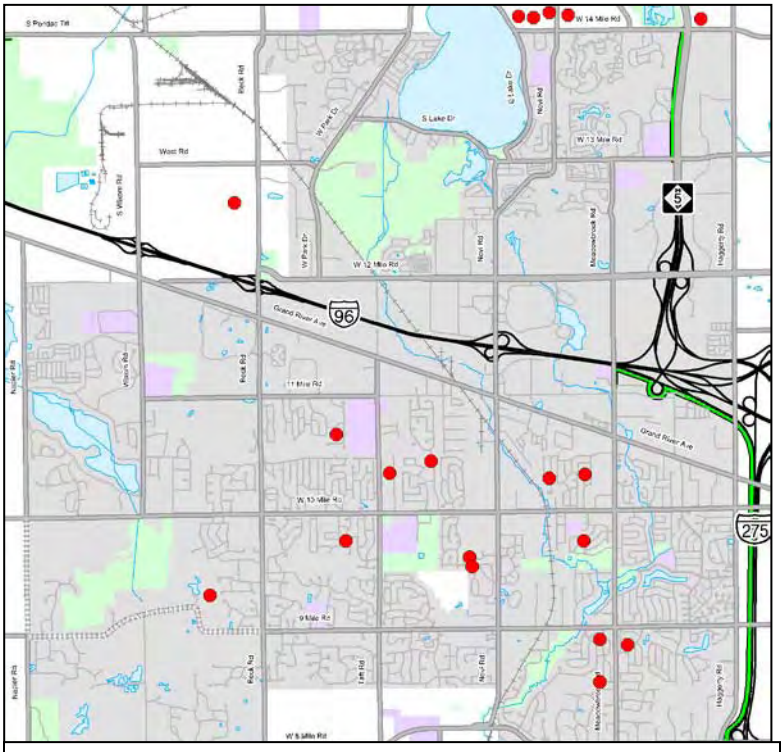
Public Input

A Public Workshop was held on October 26, 2010 for the City of Novi's Non-Motorized Master Plan. Twenty-seven people attended the entire workshop; a few people came in late. During the public workshop, participants were given the opportunity to give input. There was a series of three exercises that focused on refining the non-motorized network, phasing and prioritization. The participants were also encouraged to mark additional information the on the maps.

Please note that the following information was from a small sample of residents and all of the illustrations are drafts for discussion.

The following pages document the input that was collected during the workshop.

1. Non-motorized Network Refinement
2. Phasing Refinement
3. Prioritization Refinement
4. Additional Comments



Workshop participants were asked to locate where they live with a red dot. Eight participants did not place a dot.

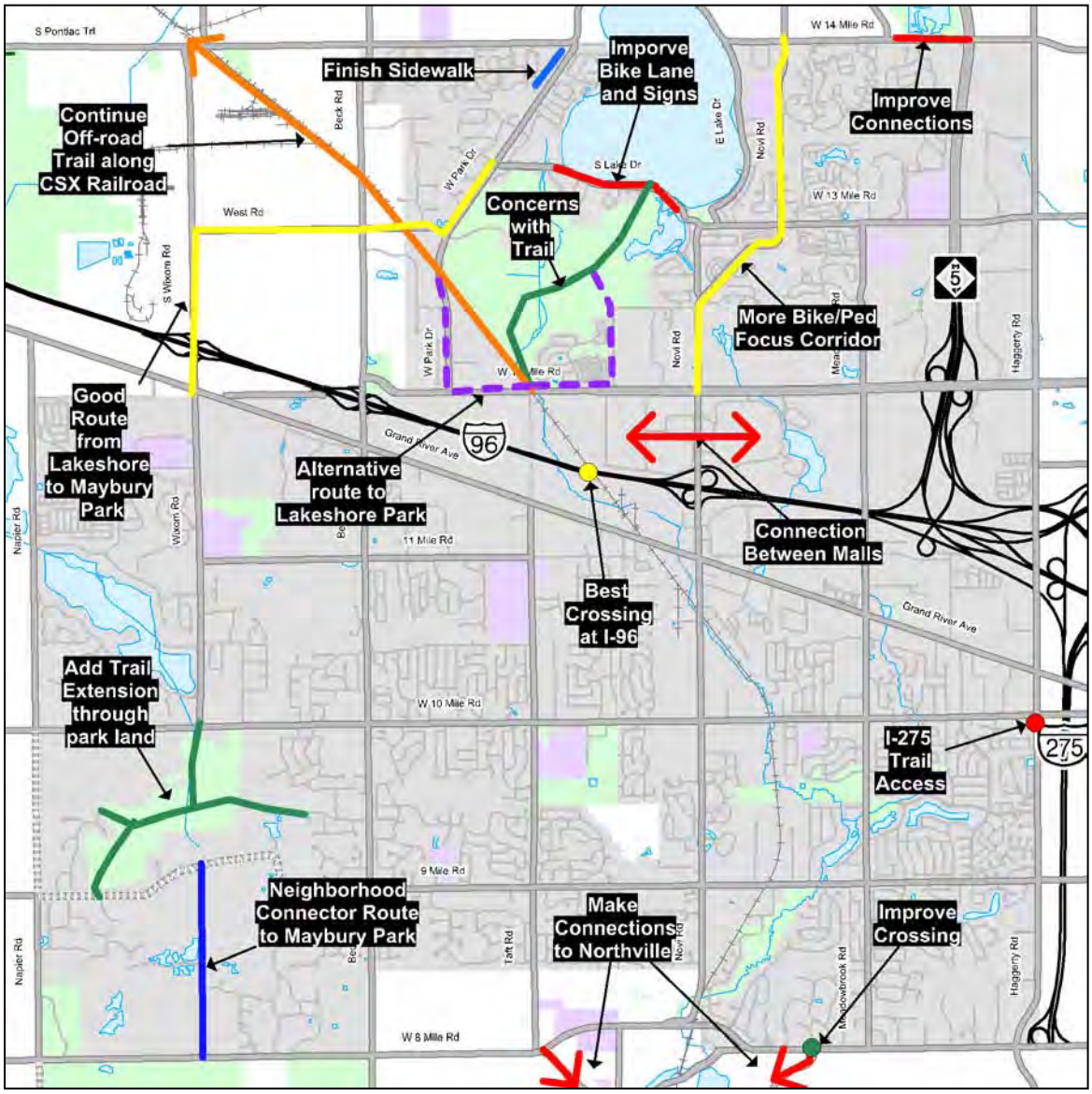
Non-motorized Network Refinement Exercise (Individual)

Each group was given a large base map of the city with the potential non-motorized routes. Participants were asked to review the non-motorized corridors and note any recommended changes and/or concerns. Below is documentation from this exercise. Comments are listed in order of frequency.

Location	Comment
Off road trail through Lakeshore Park (x6)	Major off road trail may create crossing conflicts with Mountain bikers and recreational bikes/pedestrians and impact the natural area. Use Dixon to add bike/ped path across to Taft Road, use limestone to improve existing trail and minimize impact to existing trails
8 mile and Griswold (x4)	Need better crossing and defined route to Downtown Northville (cider mill)
10 Mile and I-275 Trail (x3)	No access between them. Easy quick cheap fix – take down ROW fence on county road property
14 mile at M-5 (x2 agree)	Very important to add bike/ped lanes with new connector
Novi from 12 to 14 Mile (x2)	Could be more bike or mixed focus
Maybury State Park (2)	Access to Maybury State park via Garfield from 9 mile
ITC Trail to Lakeshore Park (x2)	Extend across Beck, West Park to Walled Lake, Western
CSX Crossing (x2)	Continue north to connect to Huron Valley Trail System
CSX Corridor	Using this to get under 96 is great!!!
CSX Corridor	ASAP
CSX Corridor	Too Expensive! Perhaps just use trail with rail for short sections under the expressway
Novi Crossing Over I-96	Just give up, route west to CSX corridor or pedestrian bridge
Crossing I-96	Cross at Meadowbrook since Bridge already wide enough to accommodate non-motorized transportation. Second choice is to use Railroad track space alongside as exists. Make regional connections
Meadowbrook over I-96	Need wider shoulder on bridge approaches
I-96 Crossing	Bridge Taft Road bike path over I-96
Neighborhood connector between west park and Pontiac trail	While this is technically on roads, this is all apartment complexes so you are going through parking lots and buildings. A real safety concern
9 ½ Mile Neighborhood Connector	Probably okay for short connections, but should primarily use mile road walks, trails
Neighborhood connector signs	Rate like ski runs to people know what they're getting onto (ex. Circle, square, diamond, double diamond)
East-west between 9 and 10 mile	Off-road neighborhood connectors: Provide unpaved pathway, parallel to paved pathway for cross country runners and joggers
Meadowbrook Road to 13 Mile	A safe Bike Route n/o Meadowbrook to 13 Mile
9 Mile between Novi and Haggerty	Should be sidewalk only, no bike corridor on road, reduce cost
9 Mile Center to Novi Road	Should be Bike Lane Only, no sidewalk
Grand River	No Bike Lanes
Overall	Phasing is backwards. Install the easy trail or neighborhood connector (laterals) first then bike corridors
12 Mile west of Novi to Beck	Should be mixed focus, necessary ease/west, north of I-96
West Park from South Lake to Pontiac Trail	Need a ped/bike focused trail way to get around lake
ITC Corridor north, through Providence to Beck Road	Connect North to Michigan Airline Trail via Providence Park and Beck Road
Beck and West Intersection	Crossing Improvements – no safe crossing for pedestrians or bikes
All Mile Road Crossing	MDOT has promised safety improvements (ex. Pedestrian activated crossing warning) when are they coming?
Speed Bumps	Remove Speed Bumps to allow bikes between bump and curb
Lakeshore and ITC Corridor	Michigan Mountain Biking Assoc. would love to consult/help!
Top 20	Keep working each year on the top 20 short lengths and safety fixes; seek grant funding for bigger projects. Future road projects should include complete streets

Non-motorized Network Refinement Exercise (Group)

After participants filled out individual sheets they shared their comments and concerns with their group. If there were any ideas that were mentioned numerous times, or a consensus on a particular recommendation the group noted it on the large map. Below is an overview from all of the groups.



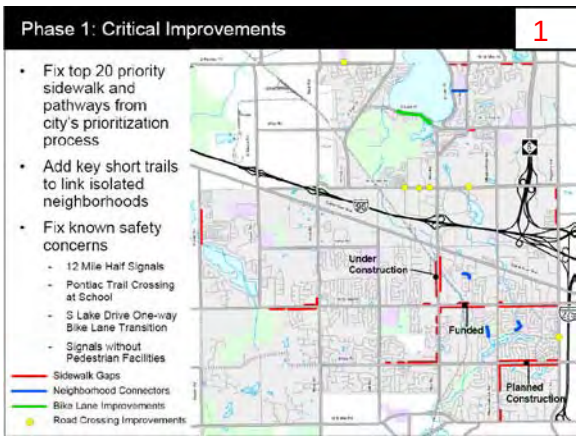
The Top Comments

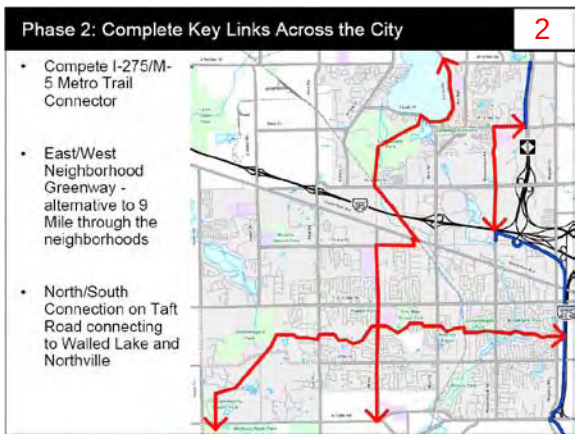
10. Pathway through Lakeshore Park conflicts with existing unpaved trails, use alternative route (5 groups agreed)
11. Continue to follow CSX railroad north through Lakeshore Park to W Park Drive instead of cutting through Lakeshore Park (4 groups agreed)
12. Use Dixon Road to access Lakeshore Park (2 groups agreed)
13. Continue CSX Railroad north into Wixom (2 groups agreed)
14. Improve Crossing at 8 Mile Road and Griswold providing access to Downtown Northville (2 groups agreed)

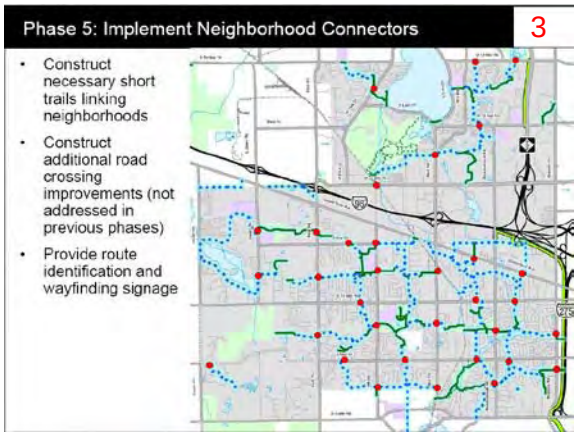
Phasing Refinement Exercise

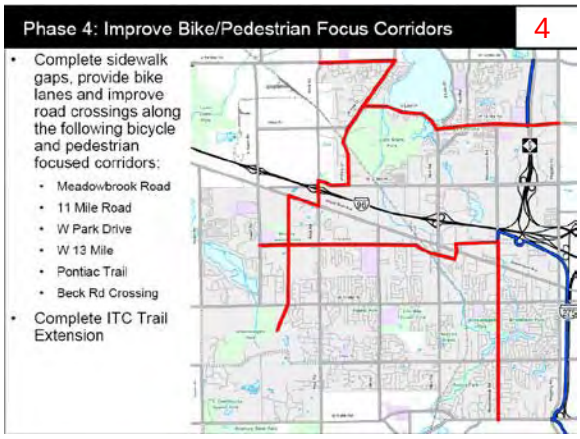
Each group was asked to review the six preliminary phases. Individually, each person voted on their top three priority phases. Then as a group everyone discussed and arranged the phases until they came to a consensus on the order in which they should be implemented. Participants were also allowed to move elements from one phase into another. Once a final order was established, each group renumbered the phases from one to six.

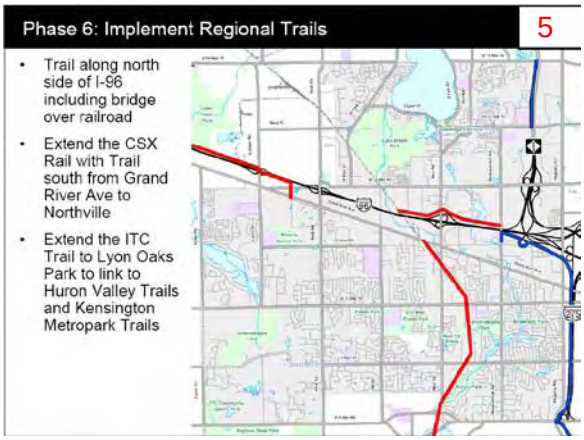
Based on group refinement, the order of the phasing was changed to: **1, 2, 5, 4, 6, 3**

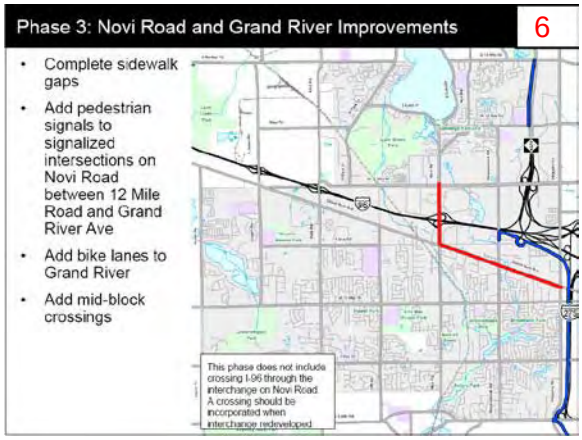






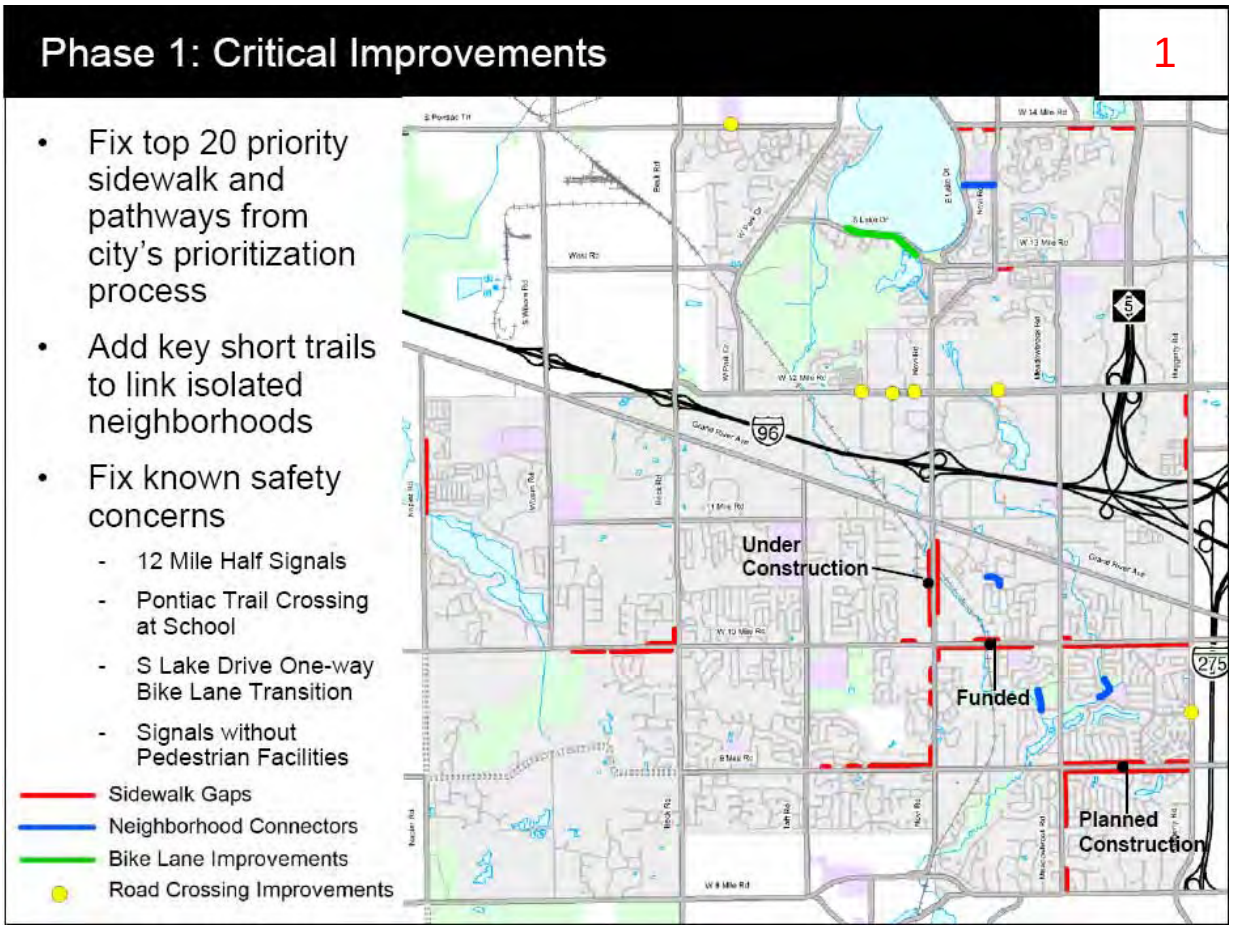






Please refer to the following documents for more details regarding the phasing.

Phase 1 Refinement



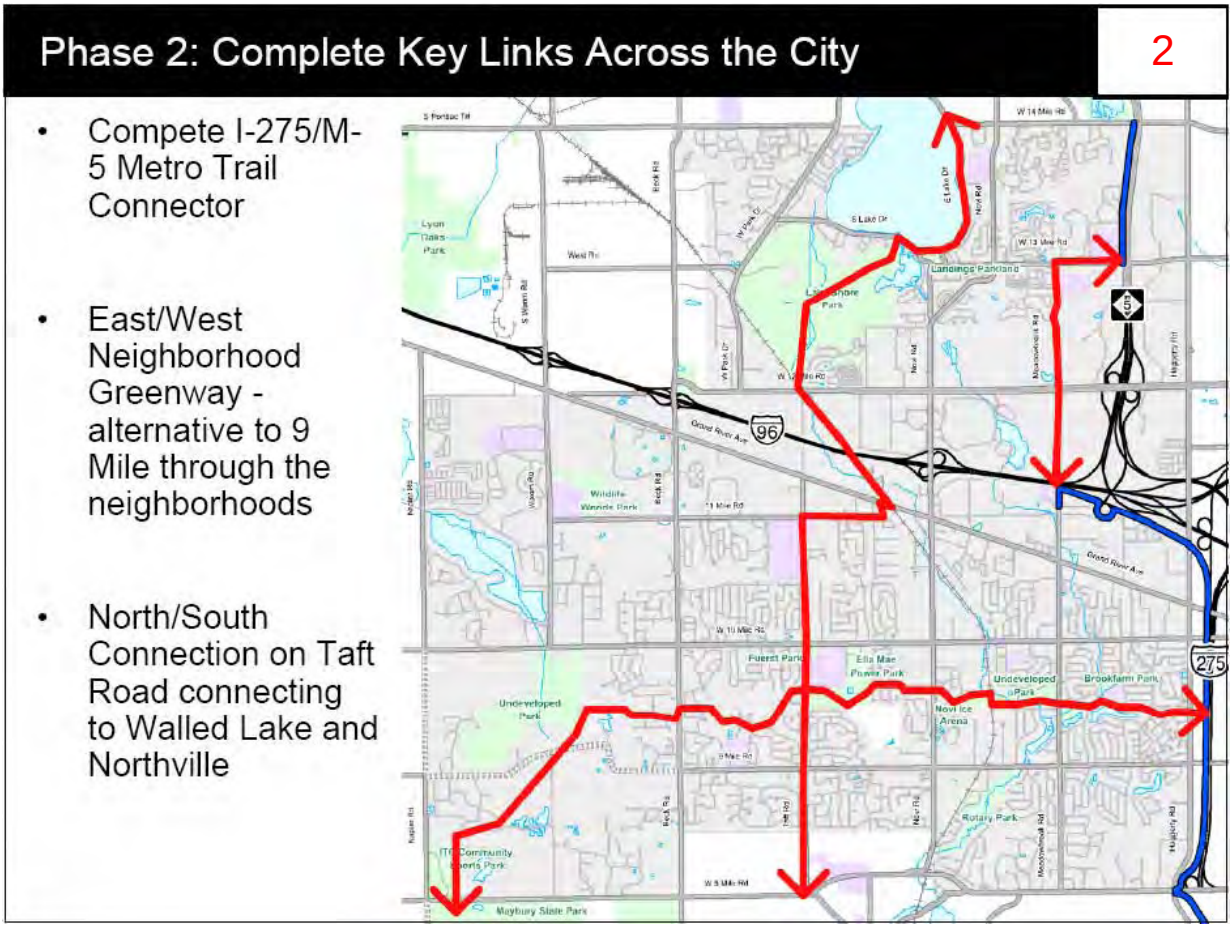
Proposed Phase: 1, 1, 1, 1, 1, 1, 1, 6

General Reasoning to keep at Phase 1: Already being implemented

Proposed Changes:

- Include on-road neighborhood connector routes
- Finish sidewalk gap on north end of W Park Drive near Pontiac Trail on west side of road
- Include Metro Trail Connection on Meadowbrook Road

Phase 2 Refinement

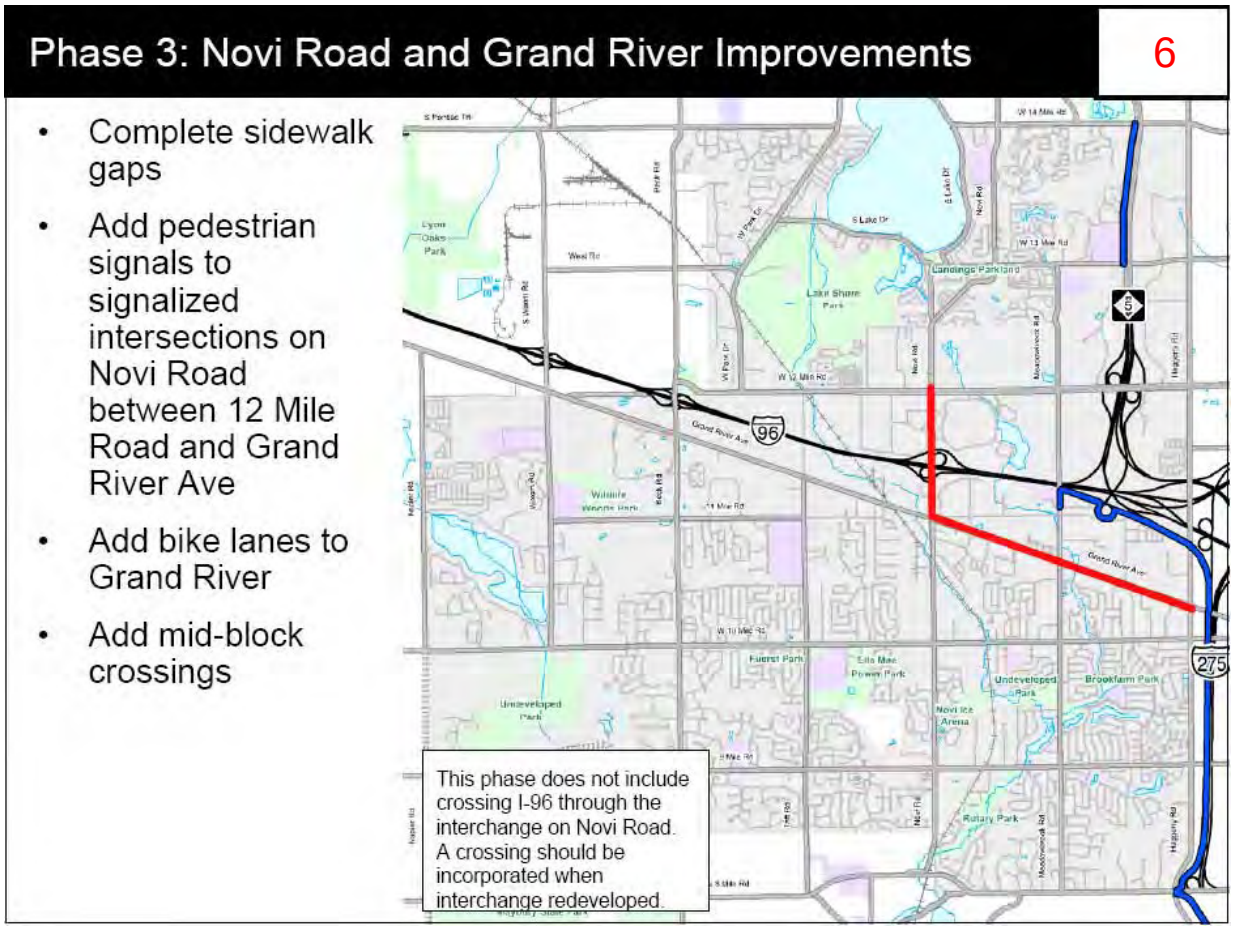


Proposed Phase: 2, 2, 2, 2, 2, 2, 3, 1

Proposed Changes:

- Avoid building trail through Lakeshore Park, use alternative routes around park
- Complete CSX Railroad south of Grand River toward Northville
- Do not construct ITC trail all the way to ITC Community Sports Park, end at 9 mile and use Garfield Road as the connection to Maybury Park instead

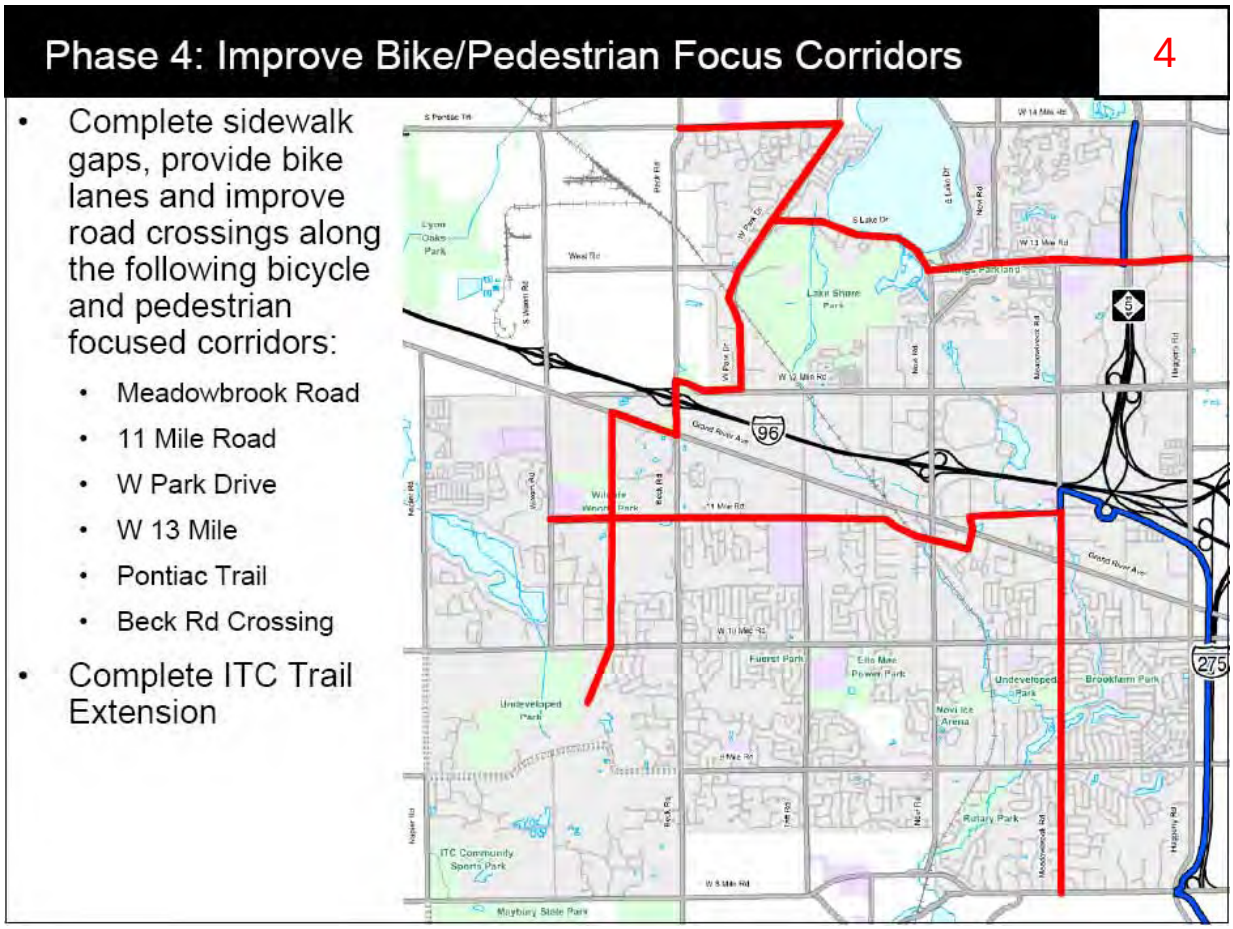
Phase 3 Refinement



Proposed Phase: 6, 6, 6, 6, 6, 6, 6, 5

General Reasoning to change to Phase 6: Not a major priority

Phase 4 Refinement

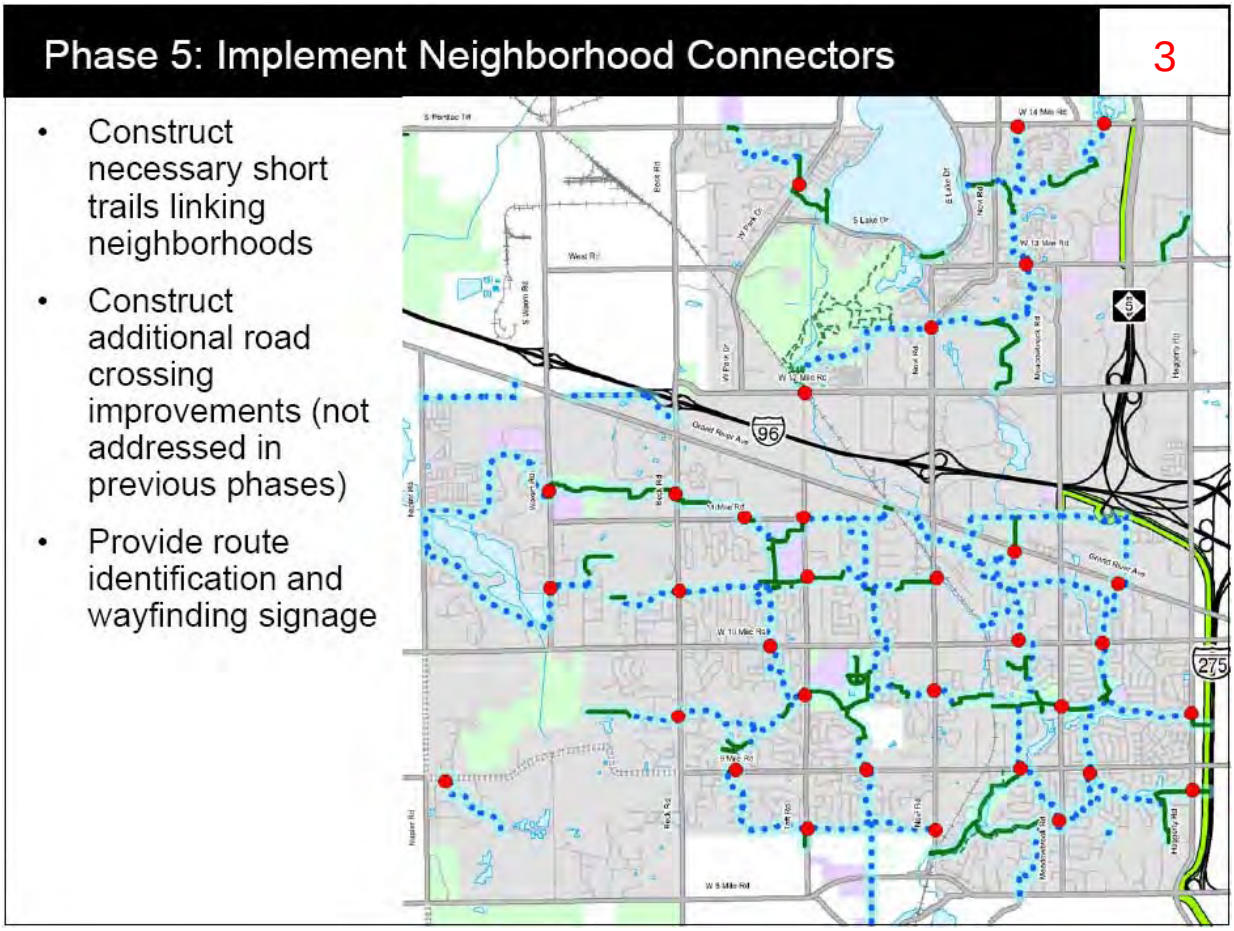


Proposed Phase: 4, 4, 4, 3, 3, 2, 2, 5

Proposed Changes:

- Include extension of the ITC Trail to Lyon Oaks Park to link to the Huron Valley Trails and Kensington Metropark Trails

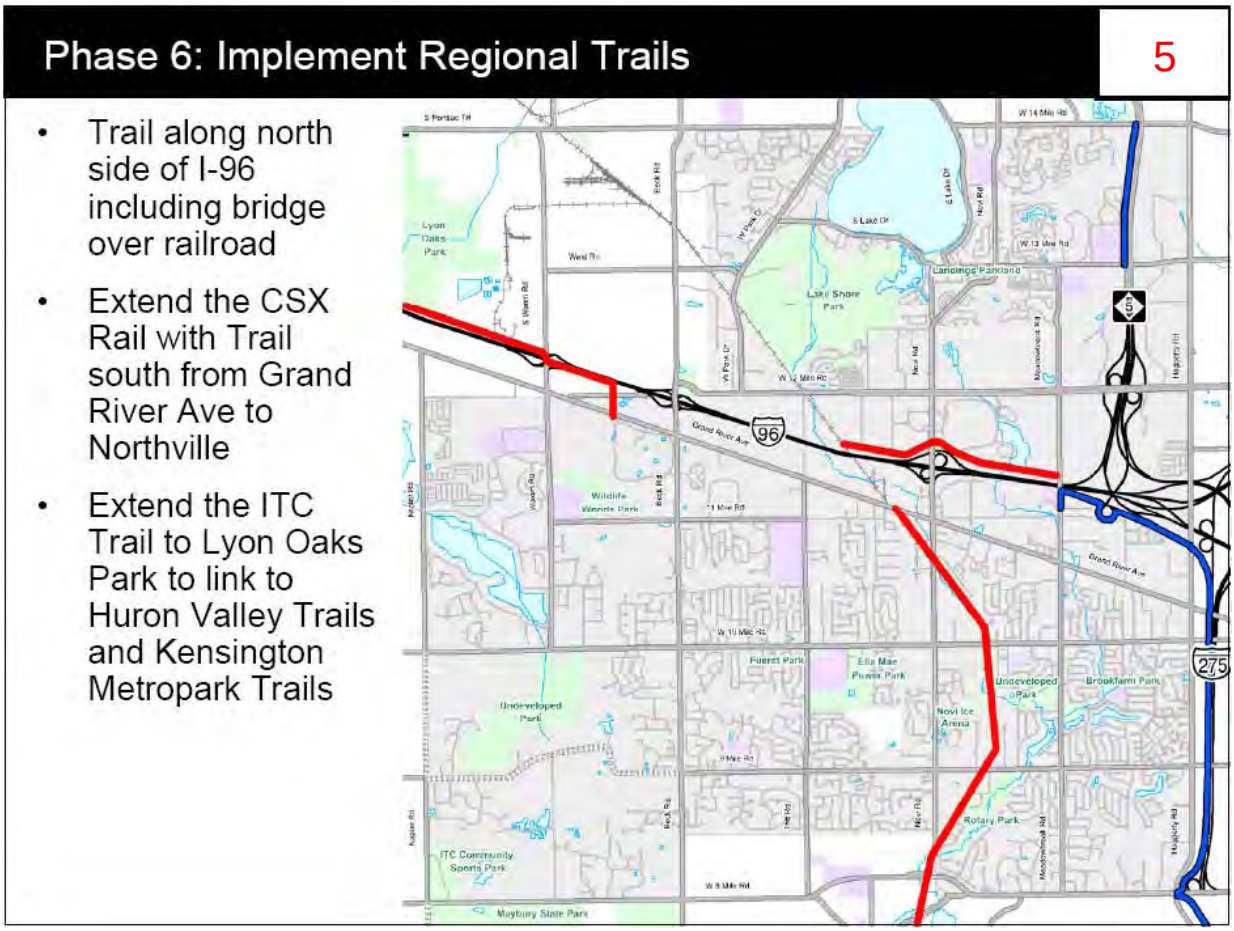
Phase 5 Refinement



Proposed Phase: 3, 3, 3, 3, 3, 5, 4, 2

General Reasoning to change to Phase 3: Affordable and easy to implements and great for kids

Phase 6 Refinement



Proposed Phase: 5, 5, 5, 5, 4, 4, 4, 6

Prioritization Refinement Exercise

Individually, each participant was asked how they would allocate $100 into the following four categories, system maintenance, completing the non-motorized network, system amenities and education and encouragement programs. Then participants were asked to determine how important they felt each line item was in each category. Below is a summary of the input.

System Maintenance:

$ 22 **Total Dollar Allocation for Category**

Line Item Prioritization (Number of Votes)

	High	Medium	Low
Snow and ice removal	7	15	7
Pavement repair	22	6	1

Completing the Non-motorized Network:

$ 52 **Total Dollar Allocation for Category**

Line Item Prioritization (Number of Votes)

	High	Medium	Low
Sidewalks & pathways along primary roadways	17	13	0
Bike Lanes along primary roadways	17	7	4
Neighborhood connectors	16	9	3
Off-road Trails	10	13	6

System Amenities:

$ 18 **Total Dollar Allocation for Category**

Line Item Prioritization (Number of Votes)

	High	Medium	Low
Lighting of pathways/bike lanes	3	11	15
Bicycle parking	2	16	11
Wayfinding signs	15	10	3
Landscaping, benches, drinking fountains, art, etc.	1	13	15

Education and Encouragement Programs:

$ 8 **Total Dollar Allocation for Category**

Line Item Prioritization (Number of Votes)

	High	Medium	Low
Education programs for school-age children	13	10	6
Police enforcement of laws related to bikes and peds.	5	9	15
Commuter challenge	1	8	20
Promotional events such as group rides and fairs	6	10	13

Additional Comments

An optional comment card was provided at the end of the meeting for participants to share any additional information with the design team. Below is documentation from these cards.

- Ensure that the latest update of the Top 20 Critical Sidewalk projects is used
- Adopt maintenance plan: owner responsibility of maintenance along pathways (e.g. landscape and tree maintenance, sight distance, drainage, etc.)
- Provide off-road unpaved pathways for cross country runners and joggers
- Like connection between Chattman and Orchard Hills Elementary and other Neighborhood Connectors
- Consider Bridging Taft over I-96 for easy north-south access to Lakeshore Park
- Thank you for your efforts! I look forward to seeing this to fruition
- PIZZA!
- Good Program!
- Funding costs and available resources need to be taken into account for phasing recommendations
- All good stuff

7.4 Maintenance and Operations Budgets

There are many other factors that can affect cost of maintenance for a non-motorized system. However, the main factor affecting cost is the difference in agencies that maintain and operate facilities. Each agency will have different labor costs, access to different machinery and equipment, and may or may not have a volunteer base to offer assistance.

Routine maintenance can be defined as maintenance that is needed to keep the facility operating in a safe and usable condition, not involving major development or reconstruction. Below is a list of typical routine maintenance activities and their associated annual cost per mile (when applicable):

- Asphalt Paved Trail - $4500 per mile annually (includes sweeping/blowing of debris, mowing of shoulders, vegetation control, asphalt sealing, and snow removal)
- Asphalt Side Path - $700 per mile annually (includes asphalt sealing, and snow removal)
- Concrete Sidewalk – 30+ year useful life with little or no yearly maintenance (assumes adjacent property owners are required to remove snow and repair broken or shifting flags as needed)
- Pedestrian Bridge – 50+ year useful life with little or no yearly maintenance (dependent on deck surface)
- Boardwalk - $18,000 per mile annually (based on power-washing, mildewcide application and sealing of decking every three years)
- Bicycle Lanes - $10,000 per mile annually (includes weekly sweeping and annual re-striping)
- Signals - $200 annually

7.5 Implementation Budget Figures

Initial Investments

Sidewalk Gaps

Segment	Priority	Location	Description		Quanti	Unit	Unit Price	Cost Estimate
121	**19**	**Nine Mile**	**South**	**Between Haggerty and Meadowbrook**				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	4985	lf	$1.75	$8,723.75
				Maintaining Traffic	4985	lf	$2.00	$9,970.00
				Concrete (6ft)	4985	lf	$24.00	$119,640.00
				Grading	1	ls	$20,000.00	$20,000.00
				ADA Ramps	14	ea	$600.00	$8,400.00
				Restoration	4985	lf	$10.00	$49,850.00
				Sub-Total				*$218,083.75*
				Mobilization (5%)	1	ls		$10,904.19
				Contingency (20%)				$43,616.75
				Construction Estimate				*$272,604.69*
				Professional Fees (25%)				$68,151.17
				TOTAL ESTIMATE				**$340,755.86**
119	**13**	**Meadowbrook**	**East**	**Between Eight Mile and Nine Mile**				
				Section 1:				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	1233	lf	$1.75	$2,157.75
				Maintaining Traffic	1233	lf	$2.00	$2,466.00
				Concrete (6ft)	1233	lf	$24.00	$29,592.00
				Grading	1	ls	$5,000.00	$5,000.00
				ADA Ramps	5	ea	$600.00	$3,000.00
				Restoration	1233	lf	$10.00	$12,330.00
				Sub-Total				$56,045.75
				Mobilization (5%)				$2,802.29
				Contingency (20%)				$11,209.15
				Construction Estimate				$70,057.19
				Professional Fees (25%)				$17,514.30
				TOTAL ESTIMATE				**$87,571.48**
				Easement Needed - Approx.	*9405*	*sf*		
				Section 2:				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	2533	lf	$1.75	$4,432.75
				Maintaining Traffic	2533	lf	$2.00	$5,066.00
				Concrete (6 ft)	2533	lf	$24.00	$60,792.00
				Enclose Drain	1089	lf	$18.00	$19,602.00
				ADA Ramps	5	ea	$600.00	$3,000.00
				Restoration	2533	lf	$10.00	$25,330.00
				Sub-Total				$119,722.75
				Mobilization (5%)				$5,986.14
				Contingency (20%)				$23,944.55
				Construction Estimate				$149,653.44
				Professional Fees (25%)				$37,413.36
				TOTAL ESTIMATE				**$187,066.80**
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 119				**$274,638.28**

83	**1**	**Nine Mile**	**North**	**Between Haggerty and Meadowbrook**				
				Section 1:				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	3155	lf	$1.75	$5,521.25
				Maintaining Traffic	3155	lf	$2.00	$6,310.00
				Asphalt (10 ft)	3155	lf	$40.00	$126,200.00
				Enclose Drain	275	lf	$18.00	$4,950.00
				Tree Removal	1	ls	$5,000.00	$5,000.00
				ADA Ramps	10	ea	$600.00	$6,000.00
				Restoration	3155	lf	$10.00	$31,550.00
				Sub-Total				$187,031.25
				Mobilization (5%)				$9,351.56
				Contingency (20%)				$37,406.25
				Construction Estimate				**$233,789.06**
				Section 2:				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	973	lf	$1.75	$1,702.75
				Maintaining Traffic	973	lf	$2.00	$1,946.00
				Asphalt (10 ft)	973	lf	$40.00	$38,920.00
				ADA Ramps	1	ea	$600.00	$600.00
				Restoration	973	lf	$10.00	$9,730.00
				Sub-Total				$54,398.75
				Mobilization (5%)				$2,719.94
				Contingency (20%)				$10,879.75
				Construction Estimate				**$67,998.44**
				TOTAL CONSTRUCTION ONLY ESTIMATE FOR ENTIRE SEGMENT 83				**$301,787.50**
84	**20**	**Meadowbrook**	**East**	**Between Nine and Ten Mile**				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	4626	lf	$1.75	$8,095.50
				Maintaining Traffic	4626	lf	$2.00	$9,252.00
				Concrete (6ft)	3680	lf	$24.00	$88,320.00
				Boardwalk (8ft wide)	916	lf	$175.00	$160,300.00
				Bridge (14 ft wide; 30 ft long)	1	ls	$70,000.00	$70,000.00
				ADA Ramps	5	ea	$600.00	$3,000.00
				Restoration	4626	lf	$10.00	$46,260.00
				Sub-Total				$386,727.50
				Mobilization (5%)				$19,336.38
				Contingency (20%)				$77,345.50
				Construction Estimate				$483,409.38
				Professional Fees (25%)				$120,852.34
				TOTAL ESTIMATE				**$604,261.72**
81	**6**	**Ten Mile**	**South**	**Between Haggerty and Meadowbrook**				
				Pre -Construction Audio Visual	1	ls	$1,500.00	$1,500.00
				Soil Erosion Control	4973	lf	$1.75	$8,702.75
				Maintaining Traffic	4973	lf	$2.00	$9,946.00
				Concrete (8ft)	4913	lf	$36.00	$176,868.00
				Adjust Manholes	1	ls	$1,000.00	$1,000.00
				Bridge (Ingersol Creek; 14x30')	1	ls	$70,000.00	$70,000.00
				Bridge (Bishop Creek; 14x30')	1	ls	$70,000.00	$70,000.00
				Tree Removal	1	ls	$5,000.00	$5,000.00
				ADA Ramps	13	ea	$600.00	$7,800.00
				Restoration	4973	lf	$10.00	$49,730.00
				Sub-Total				$400,546.75
				Mobilization (5%)				$20,027.34
				Contingency (20%)				$80,109.35
				Construction Estimate				$500,683.44
				Professional Fees (25%)				$125,170.86
				TOTAL ESTIMATE				**$625,854.30**
				Easement Needed - Approx.	*32700*	*sf*		

80B	**10**	**Ten Mile**	**North**	**East of Meadowbrook**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	215 lf	$1.75	$376.25
				Maintaining Traffic	215 lf	$2.00	$430.00
				Concrete (5ft)	215 lf	$20.00	$4,300.00
				Restoration	215 lf	$10.00	$2,150.00
				Sub-Total			$8,756.25
				Mobilization (5%)			$437.81
				Contingency (20%)			$1,751.25
				Construction Estimate			$10,945.31
				Professional Fees (25%)			$2,736.33
				TOTAL ESTIMATE			**$13,681.64**
				Easement Needed - Approx.	*11960 sf*		
90	**8**	**Ten Mile**	**South**	**Between Meadowbrook and Novi Rd**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	3337 lf	$1.75	$5,839.75
				Maintaining Traffic	3337 lf	$2.00	$6,674.00
	Includes portion planned			Concrete (8ft)	3023 lf	$36.00	$108,828.00
	by developer			Boardwalk	284 lf	$175.00	$49,700.00
				Bridge (14x30')	1 ls	$70,000.00	$70,000.00
				RR Crossing	100 lf	$100.00	$10,000.00
				ADA Ramps	4 ea	$600.00	$2,400.00
				Restoration	3337 lf	$10.00	$33,370.00
				Sub-Total			$288,311.75
				Mobilization (5%)			$14,415.59
				Contingency (20%)			$57,662.35
				Construction Estimate			$360,389.69
				Professional Fees (25%)			$90,097.42
				TOTAL ESTIMATE			**$450,487.11**
				Easement Needed - Approx.	*140850 sf*		
89	**11**	**Novi Rd**	**East**	**Between Ten Mile and Ice Arena**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	464 lf	$1.75	$812.00
				Maintaining Traffic	464 lf	$2.00	$928.00
				Boardwalk (City standard)	464 lf	$175.00	$81,200.00
				Restoration	464 lf	$10.00	$4,640.00
				Sub-Total			$89,080.00
				Mobilization (5%)			$4,454.00
				Contingency (20%)			$17,816.00
				Construction Estimate			$111,350.00
				Professional Fees (25%)			$27,837.50
				TOTAL ESTIMATE			**$139,187.50**

92	**5**	**Novi Rd**	**West**	**Between Nine and Ten Mile**			
				Section 1:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	354 lf	$1.75	$619.50
				Maintaining Traffic	354 lf	$2.00	$708.00
				Concrete (5ft)	314 lf	$20.00	$6,280.00
				Bridge (14'x40')	1 ls	$90,000.00	$90,000.00
				Restoration	354 lf	$10.00	$3,540.00
				Sub-Total			$102,647.50
				Mobilization (5%)			$5,132.38
				Contingency (20%)			$20,529.50
				Construction Estimate			$128,309.38
				Professional Fees (25%)			$32,077.34
				TOTAL ESTIMATE			**$160,386.72**
				Easement Needed - Approx.	*20000 sf*		
				Section 2:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	305 lf	$1.75	$533.75
				Maintaining Traffic	305 lf	$2.00	$610.00
				Concrete (5ft)	305 lf	$20.00	$6,100.00
				Restoration	305 lf	$10.00	$3,050.00
				Sub-Total			$11,793.75
				Mobilization (5%)			$589.69
				Contingency (20%)			$2,358.75
				Construction Estimate			$14,742.19
				Professional Fees (25%)			$3,685.55
				TOTAL ESTIMATE			**$18,427.73**
				Easement Needed - Approx.	*30000 sf*		
				Section 3:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	890 lf	$1.75	$1,557.50
				Maintaining Traffic	890 lf	$2.00	$1,780.00
				Concrete (5ft)	890 lf	$20.00	$17,800.00
				Clearing and Grubbing	1 ls	$5,000.00	$5,000.00
				ADA Ramps	3 ea	$600.00	$1,800.00
				Restoration	890 lf	$10.00	$8,900.00
				Sub-Total			$38,337.50
				Mobilization (5%)			$1,916.88
				Contingency (20%)			$7,667.50
				Construction Estimate			$47,921.88
				Professional Fees (25%)			$11,980.47
				TOTAL ESTIMATE			**$59,902.34**
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 92			**$238,716.80**

93	**12**	**Nine Mile**	**North**	**Between Novi and Taft**			
				Section 1:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	277 lf	$1.75	$484.75
				Maintaining Traffic	277 lf	$2.00	$554.00
				Concrete (6ft)	277 lf	$24.00	$6,648.00
				Restoration	277 lf	$10.00	$2,770.00
				Sub-Total			$11,956.75
				Mobilization (5%)			$597.84
				Contingency (20%)			$2,391.35
				Construction Estimate			$14,945.94
				Professional Fees (25%)			$3,736.48
				TOTAL ESTIMATE			**$18,682.42**
				Easements Needed - Approx.	*12000 sf*		
				Section 2:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	377 lf	$1.75	$659.75
				Maintaining Traffic	377 lf	$2.00	$754.00
				Concrete (6ft)	377 lf	$24.00	$9,048.00
				Restoration	377 lf	$10.00	$3,770.00
				Sub-Total			$15,731.75
				Mobilization (5%)			$786.59
				Contingency (20%)			$3,146.35
				Construction Estimate			$19,664.69
				Professional Fees (25%)			$4,916.17
				TOTAL ESTIMATE			**$24,580.86**
				Easements Needed - Approx.	*18500 sf*		
				Section 3:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	2164 lf	$1.75	$3,787.00
				Maintaining Traffic	2164 lf	$2.00	$4,328.00
				Concrete (6ft)	2164 lf	$24.00	$51,936.00
				Restoration	2164 lf	$10.00	$21,640.00
				Sub-Total			$83,191.00
				Mobilization (5%)			$4,159.55
				Contingency (20%)			$16,638.20
				Construction Estimate			$103,988.75
				Professional Fees (25%)			$25,997.19
				TOTAL ESTIMATE			**$129,985.94**
				Easements Needed - Approx.	*83000 sf*		
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 93			**$173,249.22**
62	**14**	**Ten Mile**	**North**	**Between Novi and Taft**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	283 lf	$1.75	$495.25
				Maintaining Traffic	283 lf	$2.00	$566.00
				Boardwalk (City standard)	283 lf	$175.00	$49,525.00
				Restoration	283 lf	$10.00	$2,830.00
				Sub-Total			$53,416.25
				Mobilization (5%)			$2,670.81
				Contingency (20%)			$10,683.25
				Construction Estimate			$66,770.31
				Professional Fees (25%)			$16,692.58
				TOTAL ESTIMATE			**$83,462.89**
				Easements Needed - Approx.	*22800 sf*		

25	**90**	**Haggerty Rd**	**West**	**Between Twelve Mile and I-696**				
				Section 1:				
				Pre -Construction Audio Visual		1 ls	$1,500.00	$1,500.00
				Soil Erosion Control		888 lf	$1.75	$1,554.00
				Maintaining Traffic		888 lf	$2.00	$1,776.00
				Concrete (6ft)		888 lf	$24.00	$21,312.00
				Clearing and Grubbing		1 ls	$5,000.00	$5,000.00
				Restoration		888 lf	$10.00	$8,880.00
					Sub-Total			$40,022.00
				Mobilization (5%)				$2,001.10
				Contingency (20%)				$8,004.40
					Construction Estimate			$50,027.50
				Professional Fees (25%)				$12,506.88
				TOTAL ESTIMATE				**$62,534.38**
				Easements Needed - Approx.		*31000 sf*		
				Section 2:				
				Pre -Construction Audio Visual		1 ls	$1,500.00	$1,500.00
				Soil Erosion Control		1246 lf	$1.75	$2,180.50
				Maintaining Traffic		1246 lf	$2.00	$2,492.00
				Concrete (6ft)		1246 lf	$20.00	$24,920.00
				Berm Removal		1 ls	$10,000.00	$10,000.00
				ADA Ramps		3 ea	$600.00	$1,800.00
				Restoration		1246 lf	$10.00	$12,460.00
					Sub-Total			$55,352.50
				Mobilization (5%)				$2,767.63
				Contingency (20%)				$11,070.50
					Construction Estimate			$69,190.63
				Professional Fees (25%)				$17,297.66
				TOTAL ESTIMATE				**$86,488.28**
				Easements Needed - Approx.		*45000 sf*		
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 25				**$149,022.66**
129	**50**	**Fourteen Mile**	**South**	**Between two subdivisions**				
				Pre -Construction Audio Visual		1 ls	$1,500.00	$1,500.00
				Soil Erosion Control		628 lf	$1.75	$1,099.00
				Maintaining Traffic		628 lf	$2.00	$1,256.00
				Concrete (6ft)		628 lf	$24.00	$15,072.00
				Grading		1 ls	$40,000.00	$40,000.00
				Restoration		628 lf	$10.00	$6,280.00
					Sub-Total			$65,207.00
				Mobilization (5%)				$3,260.35
				Contingency (20%)				$13,041.40
					Construction Estimate			$81,508.75
				Professional Fees (25%)				$20,377.19
				TOTAL ESTIMATE				**$101,885.94**
				Easements Needed - Approx.		*37800 sf*		
1b	**71**	**Fourteen Mile**	**South**	**Just west of M-5**				
				Pre -Construction Audio Visual		1 ls	$1,500.00	$1,500.00
				Soil Erosion Control		996 lf	$1.75	$1,743.00
				Maintaining Traffic		996 lf	$2.00	$1,992.00
				Concrete (6ft)		996 lf	$24.00	$23,904.00
				Curb and Gutter		315 lf	$25.00	$7,875.00
				Restoration		996 lf	$10.00	$9,960.00
					Sub-Total			$46,974.00
				Mobilization (5%)				$2,348.70
				Contingency (20%)				$9,394.80
					Construction Estimate			$58,717.50
				Professional Fees (25%)				$14,679.38
				TOTAL ESTIMATE				**$73,396.88**

4	**39**	**Fourteen Mile**	**South**	**Just west of Novi Rd**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	241 lf	$1.75	$421.75
				Maintaining Traffic	241 lf	$2.00	$482.00
				Concrete (5ft)	241 lf	$20.00	$4,820.00
				Restoration	241 lf	$10.00	$2,410.00
				Sub-Total			$9,633.75
				Mobilization (5%)			$481.69
				Contingency (20%)			$1,926.75
				Construction Estimate			$12,042.19
				Professional Fees (25%)			$3,010.55
				TOTAL ESTIMATE			**$15,052.73**
				Easements Needed - Approx.	*13000 sf*		
5	**54**	**Fourteen Mile**	**South**	**Just east of East Lake Dr**			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	525 lf	$1.75	$918.75
				Maintaining Traffic	525 lf	$2.00	$1,050.00
				Concrete (5ft)	525 lf	$20.00	$10,500.00
				Ped Safety	1 ls	$5,000.00	$5,000.00
				Restoration	525 lf	$10.00	$5,250.00
				Sub-Total			$24,218.75
				Mobilization (5%)			$1,210.94
				Contingency (20%)			$4,843.75
				Construction Estimate			$30,273.44
				Professional Fees (25%)			$7,568.36
				TOTAL ESTIMATE			**$37,841.80**
				Easements Needed - Approx.	*17800 sf*		
9	**9**	**Pontiac Trail**	**South**	**West of West Park Dr**			
				Section 1:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	3325 lf	$1.75	$5,818.75
				Maintaining Traffic	3325 lf	$2.00	$6,650.00
				Concrete (6ft)	3325 lf	$24.00	$79,800.00
				ADA Ramps	9 ea	$600.00	$5,400.00
				Restoration	3325 lf	$10.00	$33,250.00
				Sub-Total			$132,418.75
				Mobilization (5%)			$6,620.94
				Contingency (20%)			$26,483.75
				Construction Estimate			$165,523.44
				Professional Fees (25%)			$41,380.86
				TOTAL ESTIMATE			**$206,904.30**
				Section 2:			
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	1532 lf	$1.75	$2,681.00
				Maintaining Traffic	1532 lf	$2.00	$3,064.00
				Concrete (6ft)	1532 lf	$24.00	$36,768.00
				ADA Ramps	3 ea	$600.00	$1,800.00
				Restoration	1532 lf	$10.00	$15,320.00
				Sub-Total			$61,133.00
				Mobilization (5%)			$3,056.65
				Contingency (20%)			$12,226.60
				Construction Estimate			$76,416.25
				Professional Fees (25%)			$19,104.06
				TOTAL ESTIMATE			**$95,520.31**
				Easements Needed - Approx.	*62000 sf*		
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 9			**$302,424.61**

55	**15**	**Beck Rd**	**West**	**Just north of Ten Mile**				
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	811 lf	$1.75	$1,419.25
				Maintaining Traffic	811 lf	$2.00	$1,622.00
				Concrete (8ft)	811 lf	$36.00	$29,196.00
				ADA Ramps	1 ea	$600.00	$600.00
				Restoration	811 lf	$10.00	$8,110.00
				Sub-Total			$42,447.25
				Mobilization (5%)			$2,122.36
				Contingency (20%)			$8,489.45
				Construction Estimate			$53,059.06
				Professional Fees (25%)			$13,264.77
				TOTAL ESTIMATE			**$66,323.83**
54	**15**	**Ten Mile**	**North**	**Just west of Beck**				
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	886 lf	$1.75	$1,550.50
				Maintaining Traffic	886 lf	$2.00	$1,772.00
				Concrete (5ft)	706 lf	$20.00	$14,120.00
				Boardwalk	180 lf	$175.00	$31,500.00
				Restoration	886 lf	$10.00	$8,860.00
				Sub-Total			$59,302.50
				Mobilization (5%)			$2,965.13
				Contingency (20%)			$11,860.50
				Construction Estimate			$74,128.13
				Professional Fees (25%)			$18,532.03
				TOTAL ESTIMATE			**$92,660.16**
				Easements Needed - Approx.	*72000 sf*		
99	**17**	**Ten Mile**	**South**	**Between Beck and Wixom Rd**				
				Section 1:				
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	1074 lf	$1.75	$1,879.50
				Maintaining Traffic	1074 lf	$2.00	$2,148.00
				Concrete (8ft)	1074 lf	$36.00	$38,664.00
				Restoration	1074 lf	$10.00	$10,740.00
				Sub-Total			$54,931.50
				Mobilization (5%)			$2,746.58
				Contingency (20%)			$10,986.30
				Construction Estimate			$68,664.38
				Professional Fees (25%)			$17,166.09
				TOTAL ESTIMATE			**$85,830.47**
				Easements Needed - Approx.	*65000 sf*		
				Section 2:				
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	2211 lf	$1.75	$3,869.25
				Maintaining Traffic	2211 lf	$2.00	$4,422.00
				Concrete (8ft)	2022 lf	$36.00	$72,792.00
				Boardwalk	189 lf	$175.00	$33,075.00
				ADA Ramps	4 ea	$600.00	$2,400.00
				Restoration	2211 lf	$10.00	$22,110.00
				Sub-Total			$140,168.25
				Mobilization (5%)			$7,008.41
				Contingency (20%)			$28,033.65
				Construction Estimate			$175,210.31
				Professional Fees (25%)			$43,802.58
				TOTAL ESTIMATE			**$219,012.89**
				Easements Needed - Approx.	*73500 sf*		
				TOTAL ESTIMATE FOR ENTIRE SEGMENT 99			**$304,843.36**

44	**78**	**Napier Rd**	**East**	**Between**	**Twelve Mile and Island Lake Dr**			
					Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
					Soil Erosion Control	2685 lf	$1.75	$4,698.75
					Maintaining Traffic	2685 lf	$2.00	$5,370.00
					Asphalt (8ft)	1858 lf	$32.00	$59,456.00
					Boardwalk	827 lf	$175.00	$144,725.00
					Restoration	2685 lf	$10.00	$26,850.00
					Sub-Total			$242,599.75
					Mobilization (5%)			$12,129.99
					Contingency (20%)			$48,519.95
					Construction Estimate			$303,249.69
					Professional Fees (25%)			$75,812.42
					TOTAL ESTIMATE			**$379,062.11**
					Easements Needed - Approx.	*150000 sf*		
29		**Twelve Mile Rd**	**South**	**Between**	**Meadowbrook and Twelve Oaks Mall**			
					Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
					Soil Erosion Control	344 lf	$1.75	$602.00
					Maintaining Traffic	344 lf	$2.00	$688.00
					Concrete (8ft)	344 lf	$36.00	$12,384.00
					Restoration	344 lf	$10.00	$3,440.00
					Sub-Total			$18,614.00
					Mobilization (5%)			$930.70
					Contingency (20%)			$3,722.80
					Construction Estimate			$23,267.50
					Professional Fees (25%)			$5,816.88
					TOTAL ESTIMATE			**$29,084.38**
15		**13 Mile Rd**	**South**	**Between**	**Old Novi Rd and Martin Avenue**			
					Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
					Soil Erosion Control	335 lf	$1.75	$586.25
					Maintaining Traffic	335 lf	$2.00	$670.00
					Concrete (5ft)	335 lf	$20.00	$6,700.00
					Restoration	335 lf	$10.00	$3,350.00
					Sub-Total			$12,806.25
					Mobilization (5%)			$640.31
					Contingency (20%)			$2,561.25
					Construction Estimate			$16,007.81
					Professional Fees (25%)			$4,001.95
					TOTAL ESTIMATE			**$20,009.77**
16b		**13 Mile Rd**	**South**	**Between**	**Novi Rd and Holmes Rd**			
					Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
					Soil Erosion Control	253 lf	$1.75	$442.75
					Maintaining Traffic	253 lf	$2.00	$506.00
					Concrete (8ft)	253 lf	$36.00	$9,108.00
					Restoration	253 lf	$10.00	$2,530.00
					Sub-Total			$14,086.75
					Mobilization (5%)			$704.34
					Contingency (20%)			$2,817.35
					Construction Estimate			$17,608.44
					Professional Fees (25%)			$4,402.11
					TOTAL ESTIMATE			**$22,010.55**
					Easements Needed - Approx.	*16000 sf*		
48		**Wixom Rd**	**West**	**Between**	**Ten Mile and Island Lake**			
					Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
					Soil Erosion Control	493 lf	$1.75	$862.75
					Maintaining Traffic	493 lf	$2.00	$986.00
					Asphalt (8ft)	493 lf	$32.00	$15,776.00
					Restoration	493 lf	$10.00	$4,930.00
					Sub-Total			$24,054.75
					Mobilization (5%)			$1,202.74
					Contingency (20%)			$4,810.95
					Construction Estimate			$30,068.44
					Professional Fees (25%)			$7,517.11
					TOTAL ESTIMATE			**$37,585.55**

144	**Meadowbrook**	**West**	**Between Grand River and Ten Mile Rd**				
				Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
				Soil Erosion Control	500 lf	$1.75	$875.00
				Maintaining Traffic	500 lf	$2.00	$1,000.00
				Concrete (8ft)	500 lf	$36.00	$18,000.00
				Clearing and Grubbing	1 ls	$10,000.00	$10,000.00
				Restoration	500 lf	$10.00	$5,000.00
				Sub-Total			$36,375.00
				Mobilization (5%)			$1,818.75
				Contingency (20%)			$7,275.00
				Construction Estimate			$45,468.75
				Professional Fees (25%)			$11,367.19
				TOTAL ESTIMATE			**$56,835.94**

Neighborhood Connectors					
NC 1	**East Lake Dr to Novi Rd**				
		Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
		Soil Erosion Control	962 lf	$1.75	$1,683.50
		Asphalt (8ft)	962 lf	$32.00	$30,784.00
		Culvert	20 lf	$18.00	$360.00
		Restoration	962 lf	$10.00	$9,620.00
		Sub-Total			$43,947.50
		Mobilization (5%)			$2,197.38
		Contingency (20%)			$8,789.50
		Construction Estimate			$54,934.38
		Professional Fees (25%)			$13,733.59
		TOTAL ESTIMATE			**$68,667.97**
NC 2	**Brookfarm Park**				
		Soil Erosion Control	442 lf	$1.75	$773.50
		Asphalt (8ft)	442 lf	$32.00	$14,144.00
		Restoration	442 lf	$10.00	$4,420.00
		Sub-Total			$19,337.50
		Mobilization (5%)			$966.88
		Contingency (20%)			$3,867.50
		Construction Estimate			$24,171.88
		Professional Fees (25%)			$6,042.97
		TOTAL ESTIMATE			**$30,214.84**
NC 3	**West of Meadowbrook between Nine Mile and Ten Mile**				
		Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
		Soil Erosion Control	827 lf	$1.75	$1,447.25
		Asphalt (8ft)	660 lf	$32.00	$21,120.00
		Boardwalk	167 lf	$175.00	$29,225.00
		Clearing and Grubbing	1 ls	$10,000.00	$10,000.00
		Restoration	827 lf	$10.00	$8,270.00
		Sub-Total			$71,562.25
		Mobilization (5%)			$3,578.11
		Contingency (20%)			$14,312.45
		Construction Estimate			$89,452.81
		Professional Fees (25%)			$22,363.20
		TOTAL ESTIMATE			**$111,816.02**
NC 4	**West of Meadowbrook between 10 Mile and Grand River**				
		Pre -Construction Audio Visual	1 ls	$1,500.00	$1,500.00
		Soil Erosion Control	632 lf	$1.75	$1,106.00
		Concrete (5ft)	632 lf	$20.00	$12,640.00
		Clearing and Grubbing	1 ls	$5,000.00	$5,000.00
		Fence Gate	1 ls	$5,000.00	$5,000.00
		Restoration	632 lf	$10.00	$6,320.00
		Sub-Total			$31,566.00
		Mobilization (5%)			$1,578.30
		Contingency (20%)			$6,313.20
		Construction Estimate			$39,457.50
		Professional Fees (25%)			$9,864.38
		TOTAL ESTIMATE			**$49,321.88**
		Easements Needed - Approx.	*6320 sf*		

Major Road Crossings					
#1	**12 Mile at Caberet Dr.**				
		Hybrid Pedestrian Signal	1 ls	$120,000.00	$120,000.00
		ADA Ramps	4 ea	$600.00	$2,400.00
		Concrete (8ft)	80 lf	$36.00	$2,880.00
		Crosswalk Striping	70 lf	$4.20	$294.00
		Restoration	80 lf	$10.00	$800.00
		Sub-Total			$126,374.00
		Mobilization (5%)			$6,318.70
		Contingency (20%)			$25,274.80
		Construction Estimate			$157,967.50
		Professional Fees (25%)			$39,491.88
		TOTAL ESTIMATE			**$197,459.38**
#6	**12 Mile at Carlton Way**				
		Hybrid Pedestrian Signal	1 ls	$120,000.00	$120,000.00
		ADA Ramps	4 ea	$600.00	$2,400.00
		Concrete (8ft)	1600 lf	$36.00	$57,600.00
		Crosswalk Striping	70 lf	$4.20	$294.00
		Restoration	1600 lf	$10.00	$16,000.00
		Sub-Total			$196,294.00
		Mobilization (5%)			$9,814.70
		Contingency (20%)			$39,258.80
		Construction Estimate			$245,367.50
		Professional Fees (25%)			$61,341.88
		TOTAL ESTIMATE			**$306,709.38**
	Haggerty at Village Wood Drive				
		Signal Upgrades	1 ls	$40,000.00	$40,000.00
		ADA Ramps	4 ea	$600.00	$2,400.00
		Concrete (8ft)	80 lf	$36.00	$2,880.00
		Crosswalk Striping	100 lf	$4.20	$420.00
		Restoration	80 lf	$10.00	$800.00
		Sub-Total			$46,500.00
		Mobilization (5%)			$2,325.00
		Contingency (20%)			$9,300.00
		Construction Estimate			$58,125.00
		Professional Fees (25%)			$14,531.25
		TOTAL ESTIMATE			**$72,656.25**
	Pontiac Trail at Geisler Middle School				
		Signal Upgrades	1 ls	$15,000.00	$15,000.00
		Crosswalk Striping	50 lf	$4.20	$210.00
		Sub-Total			$15,210.00
		Mobilization (5%)			$760.50
		Contingency (20%)			$3,042.00
		Construction Estimate			$19,012.50
		Professional Fees (25%)			$4,753.13
		TOTAL ESTIMATE			**$23,765.63**

Major Corridor Development:

		Quantity	Unit	Unit Price	Cost Estimate
Meadowbrook Connector between I275 Metro Trail and M5 Metro Trail					
Pre -Construction Audio Visual		1	ls	$1,500.00	$1,500.00
Soil Erosion Control		7200	lf	$1.75	$12,600.00
Maintaining Traffic		7200	lf	$2.00	$14,400.00
Asphalt (10 ft)		7001	lf	$40.00	$280,040.00
ADA ramps		7	ea	$600.00	$4,200.00
Concrete Removal	(5ft wide)	2508	lf	$5.00	$12,540.00
Concrete Removal	(8ft wide)	1179	lf	$8.00	$9,432.00
Restripe Meadowbrook (bike & 11' lanes)		5104	lf	$5.00	$25,520.00
Shoulder Paving & Striping (5 - 6')		4819	lf	$27.00	$130,113.00
Wayfinding Signage		1	ls	$5,000.00	$5,000.00
Restoration		7200	lf	$10.00	$72,000.00
	Sub-Total				$567,345.00
	Mobilization (5%)				$28,367.25
	Contingency (20%)				$113,469.00
	Construction Estimate				$709,181.25
	Professional Fees (25%)				$177,295.31
	TOTAL ESTIMATE				**$886,476.56**
Easements Needed - Approx.	*147800 sf*				
If TE application submitted, discuss with MDOT specifics of adding width to existing 5' and 8' wide sections to accomplish 10' wide AASHTO standard, or remove existing concrete and build new 10' asphalt					
Taft Road Corridor					
Pre -Construction Audio Visual		1	ls	$8,000.00	$8,000.00
Soil Erosion Control		28800	lf	$1.75	$50,400.00
Maintaining Traffic		28800	lf	$2.00	$57,600.00
Bridge	30 ft	1	ls	$70,000.00	$70,000.00
Concrete (8ft)		658	lf	$36.00	$23,688.00
Asphalt (10ft)		8303	lf	$40.00	$332,120.00
Enclose Drain		400	lf	$18.00	$7,200.00
Grading		1	ls	$30,000.00	$30,000.00
Clearing and Grubbing		1	ls	$10,000.00	$10,000.00
Culvert		70	lf	$18.00	$1,260.00
ADA ramps		10	ea	$600.00	$6,000.00
Concrete (6ft)		11606	lf	$24.00	$278,544.00
I-96 Underpass and RR overpass		1	ls	$1,000,000.00	$1,000,000.00
Shoulder Paving (5-6ft)		14512	lf	$27.00	$391,824.00
Boardwalk (8 ft)	City Standard	401	lf	$175.00	$70,175.00
Hybrid Pedestrian Signal	12 Mile	1	ls	$120,000.00	$120,000.00
Restoration		28800	lf	$10.00	$288,000.00
Galway Dr Intersection	X	1	ls	$59,400.00	$59,400.00
Mid-block crossing	Princeton/Byrne	1	ls	$2,000.00	$2,000.00
Rectangular Rapid Flash Beacon	Princeton/Byrne	1	ls	$5,000.00	$5,000.00
Dunbarton Drive Intersection	X	1	ls	$59,400.00	$59,400.00
White Pines Dr Roundabout		1	ls	$198,750.00	$198,750.00
Addington Ln Intersection	T	1	ls	$35,800.00	$35,800.00
Traffic Island at High School		1	ls	$8,000.00	$8,000.00
Dover Blvd Intersection	T	1	ls	$35,800.00	$35,800.00
Emerald Forest Dr Intersection	T	1	ls	$35,800.00	$35,800.00
Jacob Drive Intersection	T	1	ls	$35,800.00	$35,800.00
	Sub-Total				$3,220,561.00
	Mobilization (5%)				$161,028.05
	Contingency (20%)				$644,112.20
	Construction Estimate				$4,025,701.25
	Professional Fees (25%)				$1,006,425.31
	TOTAL ESTIMATE				**$5,032,126.56**
Easements Needed - Approx.	*212500 sf*				

9 1/2 Mile Neighborhood Connector					
Pre -Construction Audio Visual		1	ls	$8,000.00	$8,000.00
Soil Erosion Control		20200	lf	$1.75	$35,350.00
Maintaining Traffic		8000	lf	$2.00	$16,000.00
Bridges (14' x 30')		2	ea	$70,000.00	$140,000.00
Bridge over RR (750' including approach ramps)		1	ls	$500,000.00	$500,000.00
Bury Electrical along RR		100	lf	$100.00	$10,000.00
Novi Rd Crossing	Mini Roundabout	1	ls	$198,750.00	$198,750.00
Meadowbrook Crossing	Crossing Island	1	ls	$8,000.00	$8,000.00
Taft Rd Crossing	Mini Roundabout	1	ls	$198,750.00	$198,750.00
Beck Rd Crossing	T	1	ls	$35,800.00	$35,800.00
Traffic Calming	Allowance	1	ls	$400,000.00	$400,000.00
Asphalt (10ft)	AASHTO	15972	lf	$40.00	$638,880.00
Clearing and Grubbing		1	ls	$50,000.00	$50,000.00
Wayfinding Signage	Allowance	1	ls	$150,000.00	$150,000.00
Boardwalk (City standard)	not AASHTO	4150	lf	$175.00	$726,250.00
	Sub-Total				$3,115,780.00
	Mobilization (5%)				$155,789.00
	Contingency (20%)				$623,156.00
	Construction Estimate				$3,894,725.00
	Professional Fees (25%)				$973,681.25
	TOTAL ESTIMATE				**$4,868,406.25**
Easements Needed - Approx.	*23000 sf*				

Subdivision Entrance Types:

		Quantity	Unit	Unit Price	Cost Estimate
Subdivision Intersection (X) Fig. 5.4AC					
Demolition		1	ls	$1,000.00	$1,000.00
Medians	(50' x 10')	2	ea	$2,500.00	$5,000.00
Speedtable Crosswalk (22')		2	ea	$1,800.00	$3,600.00
Striping		1	ls	$1,250.00	$1,250.00
Signage		1	ls	$1,250.00	$1,250.00
Ramps		14	ea	$600.00	$8,400.00
Lighting		6	ea	$4,000.00	$24,000.00
Landscaping		1	ls	$3,000.00	$3,000.00
	Sub-Total				*$47,500.00*
	Mobilization (5%)				$2,375.00
	Contingency (20%)				$9,500.00
	Construction Estimate				*$59,375.00*
	Professional Fees (25%)				$14,843.75
	TOTAL ESTIMATE				**$74,218.75**
Subdivision T-Intersection (T) Fig 5.4AB					
Demolition		1	ls	$750.00	$750.00
Median (1)	(50' x 10')	1	ls	$2,500.00	$2,500.00
Speedtable Crosswalk (22')		1	ea	$1,800.00	$1,800.00
Striping		1	ls	$1,250.00	$1,250.00
Signage		1	ls	$1,250.00	$1,250.00
Ramps		6	ea	$600.00	$3,600.00
Lighting		4	ea	$4,000.00	$16,000.00
Landscaping		1	ls	$1,500.00	$1,500.00
	Sub-Total				*$28,650.00*
	Mobilization (5%)				$1,432.50
	Contingency (20%)				$5,730.00
	Construction Estimate				*$35,812.50*
	Professional Fees (25%)				$8,953.13
	TOTAL ESTIMATE				**$44,765.63**
Compact Roundabout at Subdivision Entrance Fig 5.4AD					
Demolition		1	ls	$15,000.00	$15,000.00
Road Reconstruction	w/ 60' circle	1	ls	$45,000.00	$45,000.00
Medians	(10' x 40')	4	ea	$1,800.00	$7,200.00
Striping		1	ls	$2,500.00	$2,500.00
Ramps		16	ea	$600.00	$9,600.00
Safety Path	(8' concrete)	700	lf	$36.00	$25,200.00
Lighting		8	ea	$4,000.00	$32,000.00
Landscaping		1	ls	$15,000.00	$15,000.00
Restoration		1	ls	$5,000.00	$5,000.00
Signage		1	ls	$2,500.00	$2,500.00
	Sub-Total				*$159,000.00*
	Mobilization (5%)	1	ls		$7,950.00
	Contingency (20%)				$31,800.00
	Construction Estimate				*$198,750.00*
	Professional Fees (25%)				$49,687.50
	TOTAL ESTIMATE				**$248,437.50**

Miscellaneous Element Cost Estimates:

Neighborhood Connector Elements

Curb Bump-Outs (per corner)

Curb Removal	65	lf	$5.00	$325.00
Asphalt Pavement Removal	50	sy	$3.00	$150.00
Excavation	25	cy	$10.00	$250.00
Curb and Gutter	80	lf	$25.00	$2,000.00
Aggregate Base	25	cy	$7.50	$187.50
4" Concrete Sidewalk	100	sf	$4.00	$400.00
Topsoil	5	cy	$25.00	$125.00
Rain Garden	380	sf	$15.00	$5,700.00
Sub-Total				$9,137.50
Mobilization (5%)				$456.88
Contingency (20%)				$1,827.50
Construction Estimate				$11,421.88
Professional Fees (25%)				$2,855.47
TOTAL ESTIMATE				**$14,277.34**

Traffic Button

Asphalt Pavement Removal	75	sy	$3.00	$225.00
Excavation	37	cy	$10.00	$370.00
Curb and Gutter	60	lf	$25.00	$1,500.00
Aggregate Base	25	cy	$7.50	$187.50
6" Concrete Apron	400	sf	$6.00	$2,400.00
Topsoil	10	cy	$25.00	$250.00
Sod	320	sf	$1.50	$480.00
Sub-Total				$5,412.50
Mobilization (5%)				$270.63
Contingency (20%)				$1,082.50
Construction Estimate				$6,765.63
Professional Fees (25%)				$1,691.41
TOTAL ESTIMATE				**$8,457.03**

One Way Choker

Curb Removal	50	lf	$5.00	$250.00
Asphalt Pavement Removal	65	sy	$3.00	$195.00
Excavation	30	cy	$24.00	$720.00
Curb and Gutter	80	lf	$25.00	$2,000.00
Aggregate Base	5	cy	$7.50	$37.50
4" Sidewalk	120	sf	$4.00	$480.00
Topsoil	7	cy	$25.00	$175.00
Sod	445	sf	$1.50	$667.50
Sub-Total				$4,525.00
Mobilization (5%)				$226.25
Contingency (20%)				$905.00
Construction Estimate				$5,656.25
Professional Fees (25%)				$1,414.06
TOTAL ESTIMATE				**$7,070.31**

Speed Table

Curb Removal		20 lf	$5.00	$100.00
Asphalt Pavement Removal		100 sy	$3.00	$300.00
Aggregate Base		25 cy	$7.50	$187.50
6" Sidewalk		960 sf	$5.00	$4,800.00
	Sub-Total			$5,387.50
Mobilization (5%)				$269.38
Contingency (20%)				$1,077.50
	Construction Estimate			$6,734.38
Professional Fees (25%)				$1,683.59
TOTAL ESTIMATE				**$8,417.97**

Wayfinding Signage (per mile)

Route Signage		24 ea	$200.00	$4,800.00
	Sub-Total			$4,800.00
Mobilization (5%)				$240.00
Contingency (20%)				$960.00
	Construction Estimate			$6,000.00
Professional Fees (25%)				$1,500.00
TOTAL ESTIMATE				**$7,500.00**

Other Miscellaneous Elements			
Asphalt Trail (8ft)		$168,960.00	mi
Asphalt Trail (10ft)		$211,200.00	mi
Concrete Sidewalk (5ft)		$105,600.00	mi
Concrete Sidewalk (8ft)		$190,080.00	mi
Boardwalk (City Standard)		$175.00	lf
Boardwalk (AASHTO Standard - 14' wide)		$325.00	lf
ADA Ramps		$600.00	ea
Rectangular Rapid Flash Beacon		$5,000.00	ea
Hybrid Pedestrian Signal	HAWK	$120,000.00	ea

7.6 Evaluating Alternative Scenarios for Travel Along Road Corridors

There is no single solution for handling bicycle traffic along road corridors that will be the most appropriate facility in all cases. But the City should still strive to establish a consistent approach as possible so that motorists and bicycles have clear and consistent expectations of each other.

Restricting bicycles to a path along the side of a roadway—while potentially a legal option—is fraught with safety concerns. This diminishes the attractiveness of using a bicycle for transportation for many adult cyclists. On the other hand, there exists a great diversity of bicycling skills and comfort levels and the system should attempt to safely accommodate all users to the degree possible. Also, where a bicyclists chooses to ride has an impact on the pedestrian's experience.

Quality and Level of Service Evaluation of Alternative Scenarios

In order to evaluate the alternative approaches to accommodating bicycle and pedestrian travel along the roadway, quality/level of services models were used. The Bicycle and Pedestrian Level of Service Models are statistically reliable methods for evaluating the quality and effectiveness of pedestrian and bicycle conditions of a given roadway environment. Various models have been developed over the past decade. The Bicycle and Pedestrian Level of Service Models used for this plan, developed by Bruce Landis, PE, AICP of Sprinkle Consulting, Inc., models bicycle and pedestrian environments based on data gathered from a wide cross section of users who evaluated numerous real world scenarios. Simplified versions of these models have been incorporated in the Florida Department of Transportation's Multi-modal Quality/Level of Service Model, which is the only LOS analysis that FDOT currently accepts. The Quality/Level of Service score is a measurement of the perceived safety and comfort of pedestrians and bicyclists.

It should be noted that the Bicycle Quality/Level of Service model applies only to bicycle environments *within* the roadway. There currently are not any well-researched models for Bicycle Quality/Level of Service for Shared Use Paths. The Pedestrian Quality/Level of Service Model also does not account for the increased conflicts with bicyclists that are likely to occur on a Shared-use Path.

Pedestrian Quality/Level of Service - 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 and buffers (including parking) between pedestrians and motor vehicles
4. Motorized vehicle volume
5. Motorized vehicle speed

Bicycle Quality/Level of Service - 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

The key factors for both modes are the existence of their own space, how far that space is from the traffic, and the nature of the traffic. The Bicycle and Pedestrian Quality/Level of Service score system has been developed using the same letter grading system with the same connotations as the letter grades used in schools: A being the best and F being the worst.

Because letter-grade Level of Service assessments are typical for vehicular traffic, there may be a desire to compare Vehicular Level of Service to that of Bicycle and/or Pedestrian Level of Service. However, the two evaluation systems are quite different and should not be directly compared. One illustration of the difference is that a Pedestrian Level of Service of "E" is likely the result of there not being any accommodations for a pedestrian. A Vehicular Level of Service "E" is defined as a point along an existing facility in which operations are at or near capacity and are quite unstable.

Three Scenarios for Providing Multi-modal Road ROW's

There are three typical scenarios for accommodating pedestrians, bicycles and motorists within a road Right-of-Way:

- Sidewalk (for pedestrians) and a Shared Roadway (for bicyclists and motorists).
- Sidewalk (for pedestrians) and a Bike Lane (a separate bike-only lane in the roadway).
- Shared Use Path (for pedestrians and some cyclists) and a Shared Roadway (for other bicyclists and motorists).

The following section looks at these three different scenarios for accommodating bicyclists, pedestrians and motorists. To evaluate each of these scenarios, a generalized cross section was prepared for each scenario along three different classifications of primary roadways: Principal Arterials (e.g. Grand River Avenue), Minor Arterials (e.g. W 9 Mile), and Urban Collectors (e.g. West 11 Mile Road). While there are significant variances among different road classifications, the generalized input used for each covers most roadway situations.

The following table summarizes the input used in this analysis: along the road corridor have been explored using a Quality/Level of Service Analysis to determine which combination is the most beneficial for users

Table 7.6A. Generalized Road Conditions and Existing AASHTO Guidelines

Criteria		**Urban Principal Arterial**	**Urban Minor Arterial**	**Urban Collector**
ADT motor vehicles	Generalized Average Daily Traffic Volumes for Both Directions	30,000	20,000	10,000
Number of Lanes	Generalized Average	4 Total (2 each way)	4 Total (2 each way)	2 Total (1 each way)
Posted Speed	Generalized Average	40 MPH	35 MPH	30 MPH
Sidewalk Width	AASHTO Pedestrian Guidelines	5' Minimum 6 – 8' Preferred 10 – 15'in CBD & High Use Areas	5' Minimum 6 – 8' Preferred 10 – 15'in CBD & High Use Areas	5' Minimum
Buffer Width	AASHTO Pedestrian Guidelines (from edge of road to sidewalk)	5' Minimum 6' Preferred	5' Minimum 6' Preferred	2' Minimum 4' Preferred
Bike Lane Width	AASHTO Bicycle Guidelines	3.5' minimum (5' total width including gutter)	3.5' minimum (5' total width including gutter)	3.5' minimum (5' total width including gutter)
Shared Outside Lane	AASHTO Bicycle Guidelines	14' recommended 15' maximum	14' recommended 15' maximum	14' recommended 15' maximum

Notes:

- 4' minimum walks may be used if 5' wide passing spaces for wheelchair users are provided at reasonable intervals. Although AASHTO permits 4' foot minimum walks with passing lanes, they are not desirable and should only be used for special circumstances.
- AASHTO also provides guidelines for curb-attached sidewalks (no buffer is provided between the sidewalk and roadway). The minimum width is 6', 8 – 10' is recommended along busy Arterials.
- There are many variables that AASHTO considers that are not articulated in this simplified chart.

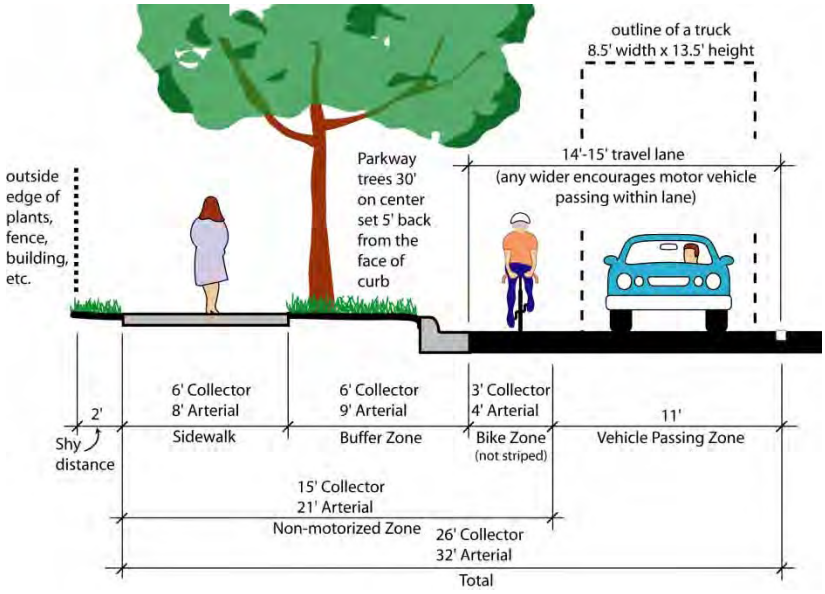
Refining the Scenarios

In comparing the different scenarios, the following design criteria were taken into consideration:

- **Widening the Buffer to Accommodate Trees** – As noted in the Pedestrian Quality /Level of Service – Key Factors, the lateral separation of pedestrians from the roadway and the presence of physical barriers such as trees, are the most important factors after the existence of a sidewalk. While trees provide benefits for pedestrian and roadway aesthetics, they are considered hazards to motorists. To minimize vehicular crashes with fixed roadside objects such as trees and light poles, current guidelines recommend placing the fixed objects at least 5' from the face of curb on urban arterials and 2' on collectors. Trees should be setback from the sidewalk at least 2' to allow for root growth and to provide a clear zone for the sidewalk users. To determine the total minimum desirable buffer with for Arterials, 6" is allocated for the width of a new tree trunk and the 18" from the face of curb to the edge of road is included. The result is that the minimum desirable buffer for Arterials is set at 9' wide. For Collectors, 4' is considered the minimum width for a planting strip that could support trees. This results in the total minimum desirable buffer for Collectors being set at 6' wide. As a general rule, the buffer should be as wide as reasonable for the conditions to minimize vehicular crashes with fixed objects, allow optimum planting conditions for trees, and improve the pedestrian environment.
- **Guidelines and Precedents for Narrow Lanes** - AASHTO guidelines and the MDOT Road Design Manual indicate that 12' lanes are most desirable and should be used where practical. They both indicate that in urban areas on low-speed roads (45 mph or less) 11' lanes are often used, and that 10' lanes may be used in restricted areas where there is little or no truck traffic.
- **Preserved Capacity with Narrower Lanes** - an 11' vehicular lane with an adjacent bike lane likely operates at near the same capacity as a 12' vehicular lane adjacent to a curb.
- **Narrow Turn Lanes -** AASHTO guidelines note that continuous two-way left-turn lanes may be as narrow as 10'.
- **Vehicle Widths** - A generalized sport utility vehicle is 6'- 4" wide, City buses and trucks are 8'- 6" wide.
- **Working Within Existing ROW** - Typical ROW Widths are 66' and 99', which means that the combined width of the sidewalk, buffer zone (space between the road and the sidewalk), bike lane (if any), and outside vehicle lane should be no wider than 33' in order to avoid the need for additional ROW. Using inside and continuous two-way left-turn lanes of 11', a four-lane road can be accommodated in 88' and a five-lane road can be accommodated in 99'.
- **Maximizing Bicycle and Pedestrian Level of Service** - Three scenarios were initially designed based on AASHTO guidelines. The scenarios were then refined by adjusting variables within the parameters of AASHTO guidelines such as the sidewalk width, the width of the buffer between the road, sidewalk and tree spacing, the bike lane width, and right lane width, all to achieve the most desirable Quality/Level of Service score possible within the typical ROW's.

The following pages include an overview of the three scenarios, their general advantages and disadvantages, and the results of the Quality and Level of Service analyses for the three road classifications.

Fig. 7.6B. Scenario A – Sidewalk and Shared Roadway



In this scenario, there are no specifically designated bicycle facilities within the roadway. Bicycles are accommodated through increased right-hand lane width (14' to 15') and reduced traffic speeds. Education and enforcement programs along with signage and potential pavement markings, such as the Shared-use Arrow, are utilized to alert motorists to the bicyclist's presence in the roadway.

Evaluation Results:

Road Classification	Pedestrian Q/LOS	On-road Bike Q/LOS	Notes
Principal Arterial	3.05 = C	4.55 = E	Extremely poor Bicycle Q/LOS
Minor Arterial	2.32 = B	4.23 = D	
Collector	2.47 = B	4.22 = D	Tied for worst Bike Q/LOS w/ scenario C

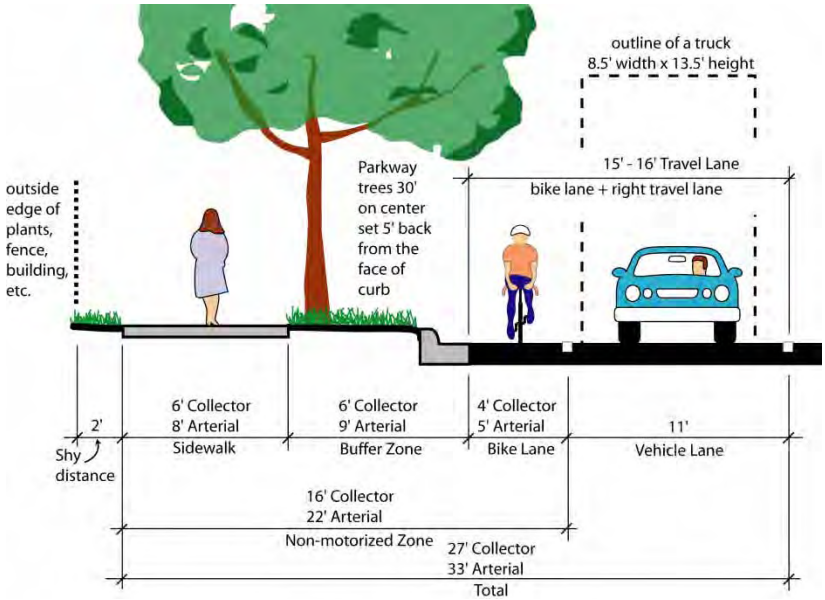
Advantages:

- Simple treatment at intersections.
- Considered by some to be the safest way to integrate bicyclists and motorized vehicles.
- Wide curb lane vs. bicycle lane studies have shown no significant safety differences in separation distances between the bicyclist and motorist.
- Appeals to experienced bicyclists who are often commuters.

Disadvantages:

- Unlikely to attract many new cyclists.
- May be viewed as a do nothing approach by many.
- Many bicyclists will still ride on the sidewalk.
- Cars tend to move further to the left and encroach into adjacent travel lanes when passing a cyclist with wide curb lanes than with bicycle lanes.
- Wider lanes may encourage higher speeds and may require traffic calming measures.

Fig. 7.6C. Scenario B – Sidewalk and Bike Lane (Preferred Option)



In this scenario, striped bicycle lanes or designated paved shoulders are provided on all collectors and minor arterials. Principal Arterials may have bike lanes or widened curb lanes, as determined most prudent for specific situations. The width of the bicycle lanes or shoulders should increase in areas with poor sight lines and/or higher vehicular speeds and volumes.

Evaluation Results:

Road Classifications	Pedestrian Q/LOS	On-road Bike Q/LOS	Notes
Principal Arterial	3.04 = C	3.47 = C	Best Bike Q/LOS, only Scenario with a C rating
Minor Arterial	2.31 = B	3.15 = C	Best Bike Q/LOS, only Scenario with a C rating
Collector	2.46 = B	3.39 = C	Best Bike Q/LOS, only Scenario with a C rating

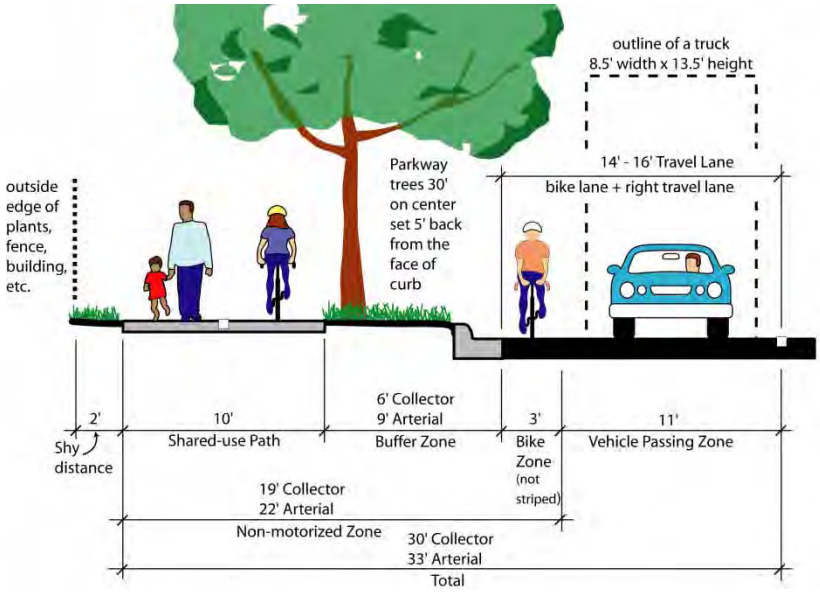
Advantages:

- Highly visible, designated facilities encourage increased bicycle use.
- Designated facilities alert motorists of the presence of bicyclists in the roadway.
- May have a slight traffic calming impact in some situations.
- Concurrent with AASHTO guidelines for most situations.
- Motorists are much less likely to encroach into the adjacent lane when passing a bicyclist.
- Motorists have less variation in their lane placement.

Disadvantages:

- Bicycle lanes require supplemental maintenance to be kept free of debris.
- Intersections must be designed carefully to minimize conflicts with turning movements.
- Presence of lanes may attract less experienced bicyclists to busier roadways.
- Some bicyclists will still ride on the sidewalk.

Fig. 7.6D. Scenario C – Shared-use Path



In this scenario, off-road shared-use paths are provided on Principal and Minor Arterials. Bicycle lanes or designated paved shoulders are provided on Collectors. Some collectors may also have shared-use paths. Driveways crossing shared use paths are modified to improve bicyclist and pedestrian safety.

Evaluation Scenarios:

Road Classifications	Pedestrian Q/LOS	On-road Bike Q/LOS	Notes
Principal Arterial	3.05 = C	4.69 = E	Worst Bike Q/LOS
Minor Arterial	2.32 = B	4.38 = D	Worst Bike Q/LOS
Collector	2.39 = B	3.89 = D	Tied for worst Bike Q/LOS w/ Scenario A

The analysis does not account for increased conflicts between bikes and pedestrians

Advantages:

- Similar to many Novi's existing non-motorized facilities.
- Do not have to modify existing roadways.
- Facilities separate from busy roads appeal to novice users and those with slower reflexes.

Disadvantages:

- Off-road facilities such as sidewalks and pathways are statistically the most dangerous places to bike due to conflicts with motor vehicles at intersections and driveways.
- Increased number of conflicts between bicyclists and pedestrians on pathways.
- Some bicyclists will still choose the roadway rather than a Shared-use Path.
- Few of the City's existing shared-use paths meet current AASHTO guidelines.
- Off-road facilities will need to be cleared of snow and have a higher maintenance standard than is currently in place to be considered a transportation facility.
- Transition between Shared-use Paths and Bike Lanes are awkward.

Scenario Observations

After reviewing the Quality/Level of Service (Q/LOS) analysis and testing alternative inputs for the alternative scenarios, a number of observations were made. These include:

- AASHTO minimum guidelines in many cases do not result in a Q/LOS grade of "C" or better.
- The Sidewalk and Bike Lane scenarios were the only scenarios that consistently achieved a Q/LOS of C or better for bicyclists and pedestrians. The other scenarios consistently had at least one mode rated a Q/LOS of D or worse.
- An 8' wide Bike Lane would be required to achieve a Bicycle Q/LOS higher than C on a typical Principal Arterial due to the traffic volumes and speeds. At that width, the Bike Lane may be misinterpreted as a travel lane and would be difficult to fit in most road ROW's.
- A 21' wide buffer would be required to achieve a Pedestrian Q/LOS higher than C on a typical Principal Arterial due to the traffic volumes and speeds. This would be difficult to accommodate in most road ROW's.
- The non-motorized zone does not vary in width much and all of the scenarios can be accommodated in standard ROW widths.
- While Bike Lanes provide additional buffer space between the vehicular travel way and the sidewalks, the difference in the Q/LOS is not significant.
- The Average Daily Traffic Volume for a 2 Lane Urban Collector would have to be below 3,500 to achieve a Bicycle Q/LOS of C.
- A Bike Lane provides an additional 4 to 5' of lateral separation between fixed objects such as trees and street lights and the motorized travel lanes increasing motorized safety.
- A Bike Lane provides a benefit to trees planted in the buffer by providing an additional 4' to 5' between the canopy of the tree and trucks that may hit the lower branches.

Conclusion

Based on these observations **Scenario B – Sidewalk and Bike Lane** is the preferred alternative for all road classifications under most circumstances. Scenario A – Sidewalks and Shared Roadway may be appropriate for lower volume (<3,500 ADT) and lower speed (<= 30 MPH) Collectors. Scenario C – Shared-use Path may be appropriate for Parkway situations where intersecting roadways and driveways are widely spaced (typically father apart than 1/2 mile). In addition, there should be little need to get to destinations on the other side of the road between intersecting roadways and marked mid-block crosswalks.

While Scenario B – Sidewalk and Bike Lane, is the preferred alternative, the City should not restrict bicycling on most sidewalks. Bicyclists will choose to ride in the road or on a sidewalk based on their individual skills and comfort riding in traffic and current conditions. Thus an individual who may typically ride in the road may choose to ride on a sidewalk if the road is icy or slushy. Also, some individuals may be comfortable riding in bike lanes on some roads but not others. It is not the City's place to dictate where a bicyclist should ride but rather provide new facilities in accordance with current best practices and retrofit existing facilities as best as possible.

The City though needs to underscore that when bicyclists ride on sidewalks they need to always yield to pedestrians. Six to eight foot wide sidewalks can accommodate moderate slower paced bicycle traffic in suburban settings. Thus Scenario B – Sidewalk and Bike Lane provides that option for both on-road and off-road bicycling in many situations. Given that some bicyclists will choose to ride on the sidewalks, the

sidewalks should be designed and maintained such to accommodate these users. This is not to say that they need to meet AASHTO Guidelines for shared-use pathways, but that sightlines at intersecting driveways and roadways should be open so that motorists and bicyclist can see each other. Sidewalk and ramp alignments should take into consideration bicycle travel. Obstructions within and immediately adjacent to the sidewalk should be avoided. Also, the sidewalk surfaces and adjacent overhanging vegetation need to be maintained with bicycle travel in mind.

There will be places in the downtown or other high density mixed use areas where the combination of high pedestrian volumes and limited sidewalk widths will dictate that bicyclists should walk their bikes when on the sidewalk. There may also be places where sidewalk bicycling may be hazardous and likewise require that bicyclists walk their bicycle. Whenever bicycles are restricted from riding on the sidewalk every effort should be made to improve bicyclists accommodations within the roadway.

Notes on the Application of the Conclusions

It should be noted that traffic volumes and speed, rather than road classifications, should determine whether to use a 4' or 5' wide bike lane. As a general rule, where volumes are expected to be over 25,000 trips per day and/or speeds are posted at 40 MPH or above, a 5' bike lane is preferred. 5' bike lanes are also preferable in situations where the vertical and horizontal curves limit sight lines.