4. 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.

Topics:

4.1 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.

List of Figures

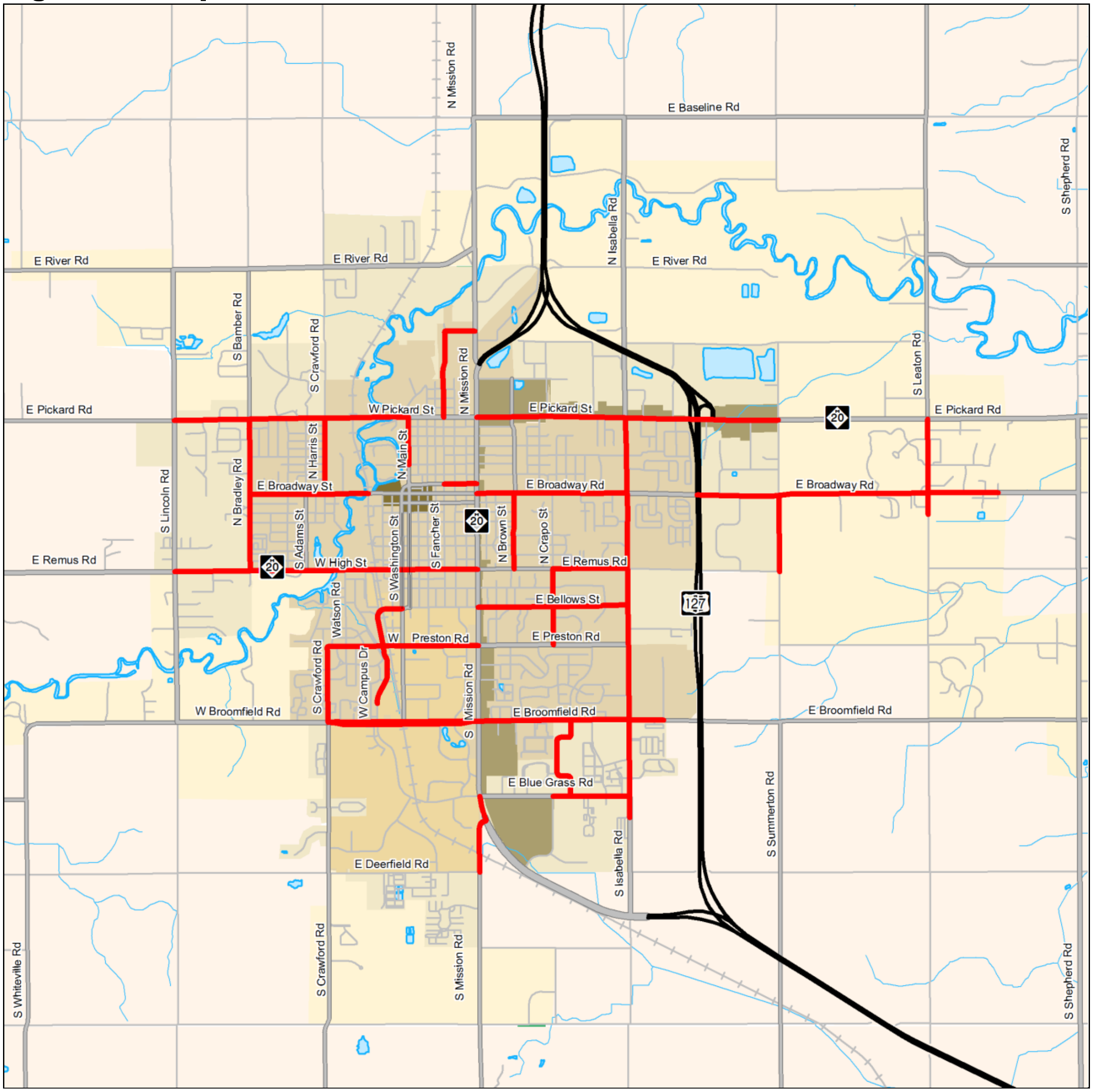
The following illustrations demonstrate the different elements that go into creating a non-motorized network along with the proposed non-motorized transportation improvements:

Fig. 4.1A. 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. The following chart gives a brief overview of some of the most common non-motorized facilities that are available.

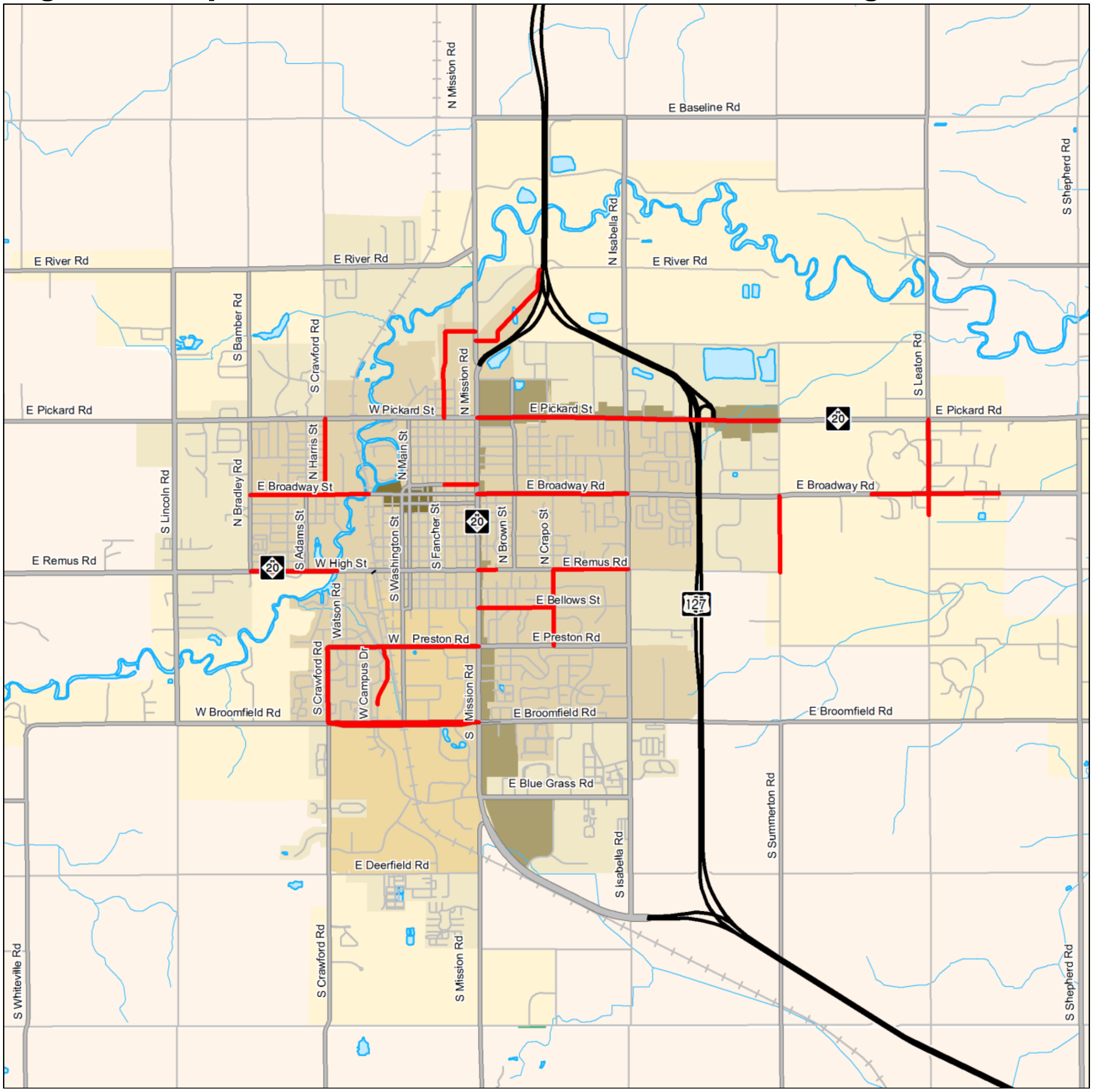
PRIMARY LINKS 	NEIGHBORHOOD CONNECTORS 	OFF-ROAD TRAILS 
TYPICAL FACILITY TYPES:		
Complete Streets that may include the following: • Bike Lanes & Sidewalks • Sidepaths • Paved Shoulders • Shared-use Arrows • Road Crossing Improvements	Complete Streets that may include the following: • Guided Routes • 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. 4.1B. Proposed Near-term Bike Lanes



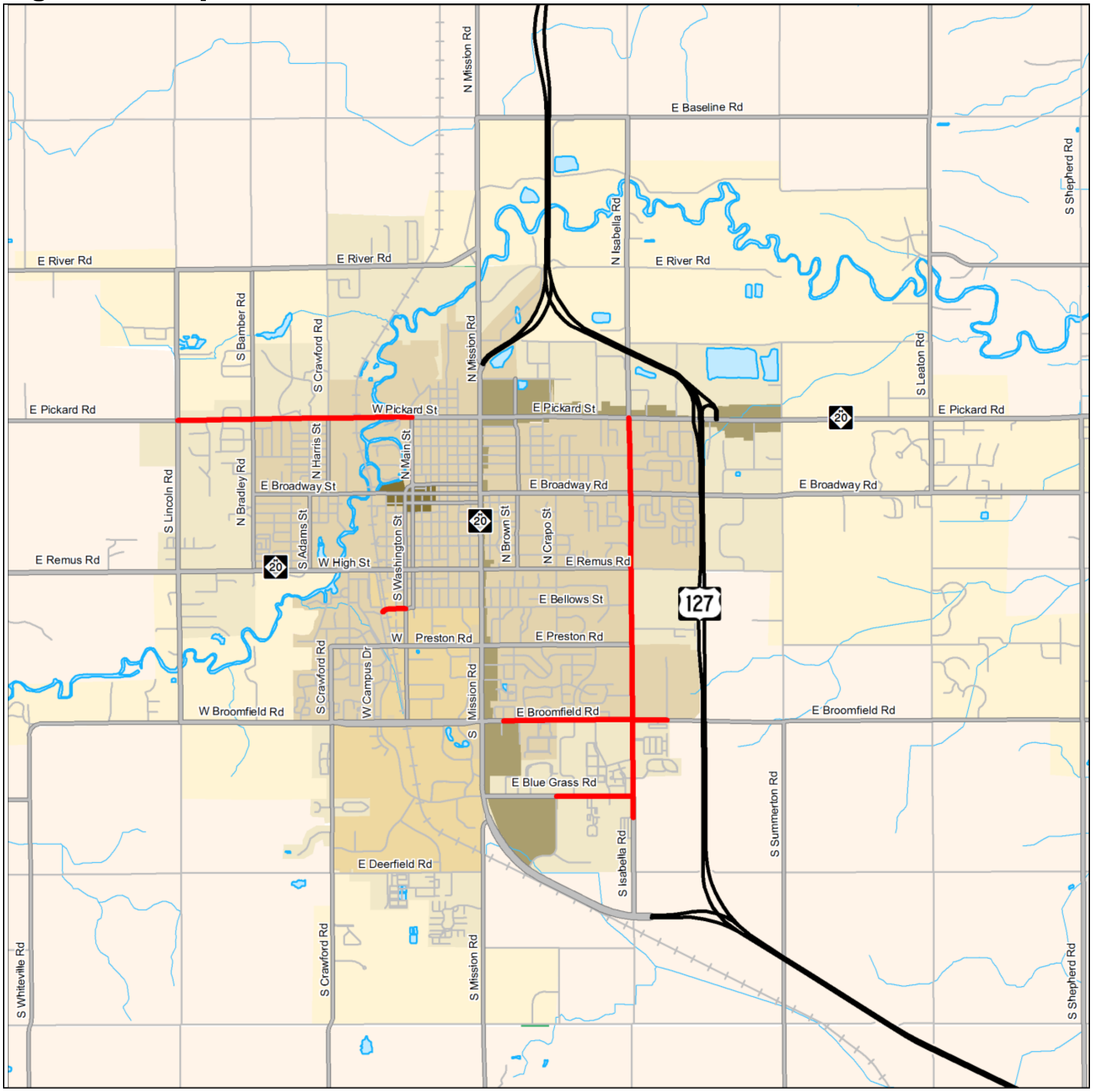
Approximatly 25 miles (40%) of the major roadways can have bike lanes added in the near term, with minor adjustments.

Fig. 4.1C. Proposed Near-term Bike Lanes via Lane Narrowing

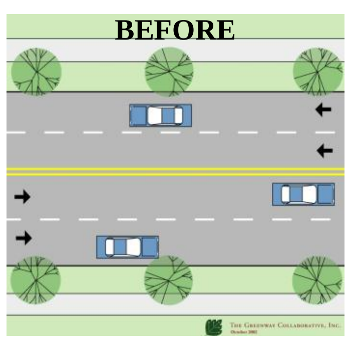


Approximatly 13 miles (20%) of the major roadways can have bike lanes added in the near term, just by restriping the roadway to narrow the lanes.

Fig. 4.1D. Proposed Near-term Bike Lanes via 4 to 3 Lane Conversions



Approximately 6 miles of bike lanes could be add in the near-term through 4 to 3 lane conversions. Please refer to Section 5.6 Modifying Existing Facilities for more information on 4 to 3 lane conversions.



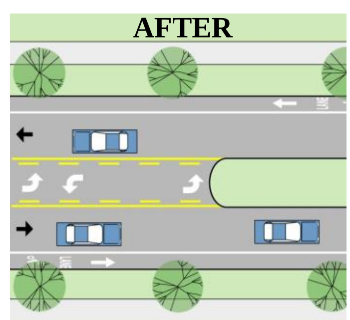
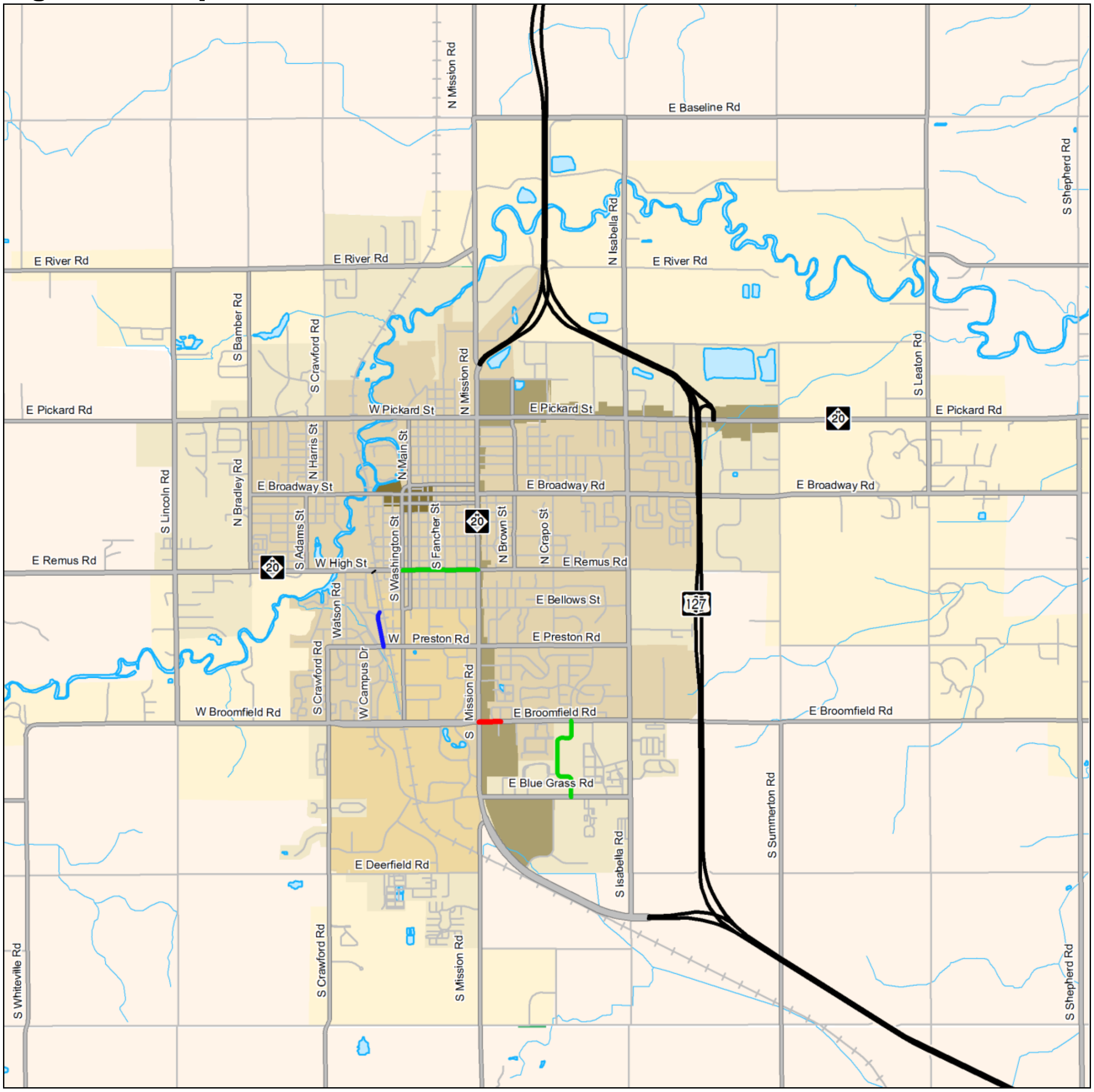


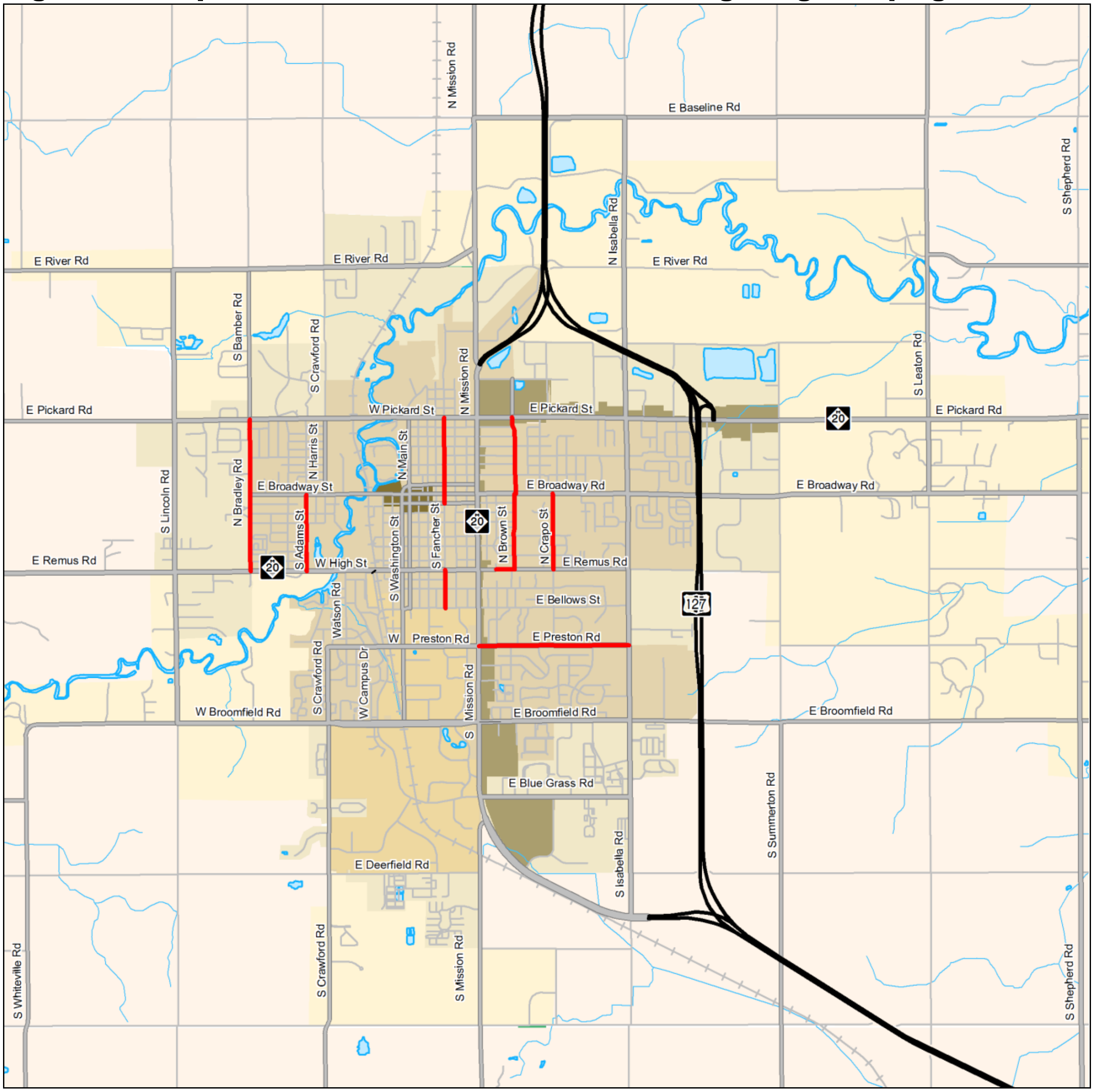
Fig. 4.1E. Proposed Near-term Bike Lanes via Other Lane Conversions



Approximately 1.5 miles of bike lanes could be add in the near-term through 5 to 3 lane conversions, 3 to 2 lane conversions and 2 to 3 lane conversions.

- 5 to 3 Lane Conversion
- 3 to 2 Lane Conversion
- 2 to 3 Lane Conversion

Fig. 4.1F. Proposed Near-term Bike Facilities through Edge Striping

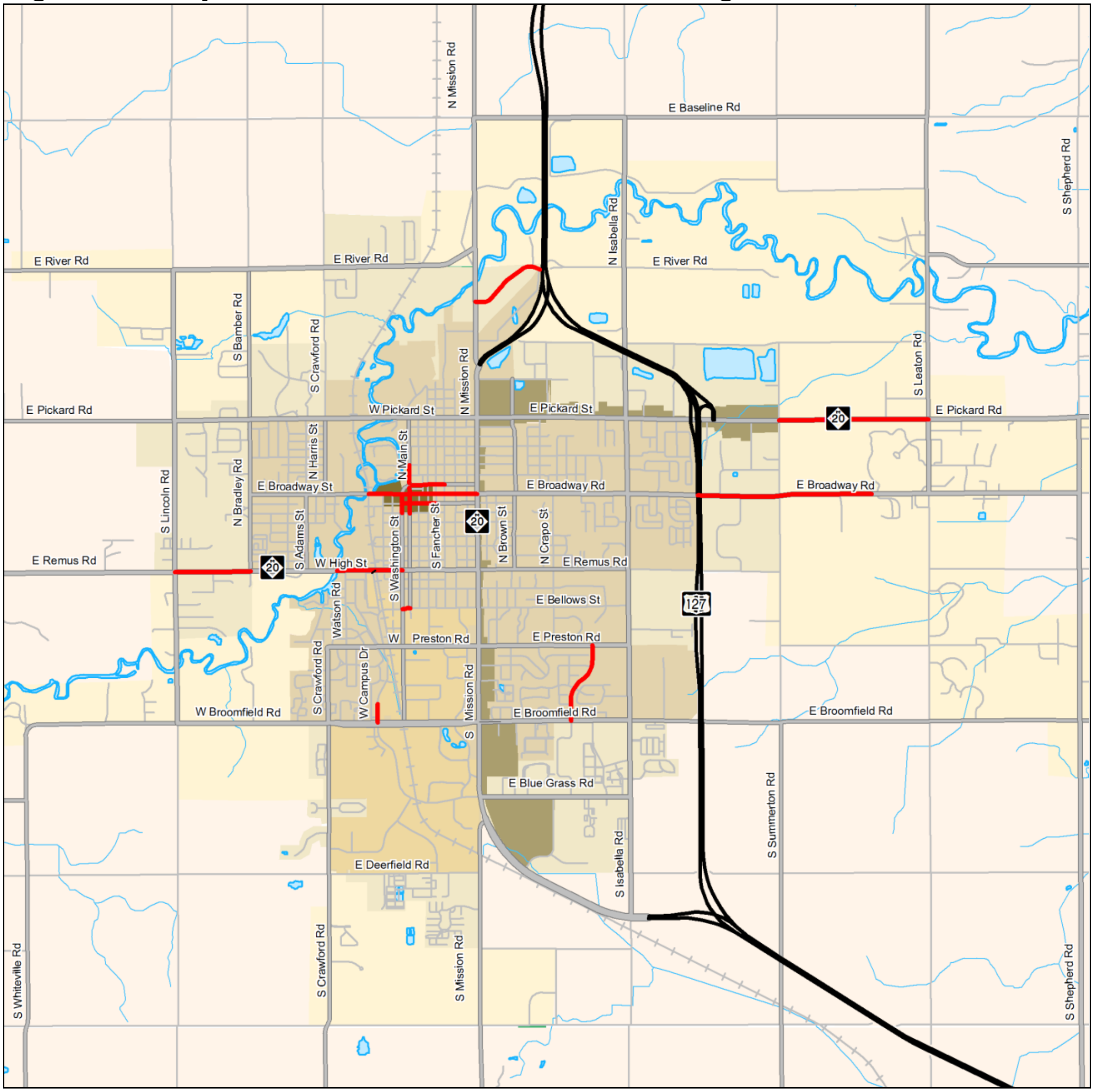


Edge Stripes are recommended for roadways that do not have enough room for a designated bike lane. These roads typically have on-street parking that is used rarely or only during certain events. On these roads, the parking area is defined with a stipe 7 to 8' from curb. Bikes may use the parking area when cars are not present. The striped off area also creates a traffic calming effect because it visually narrows the roadway.

Approximately 6.5 miles of Edge Stripe can be added in the near-term

This plan only recommends Edge Stripes along the neighborhood connector routes. However, many of the local roads in the project area are very wide with limited on street parking, and if desired Edge Stripes should be implemented on other local roads that are not identified in this plan.

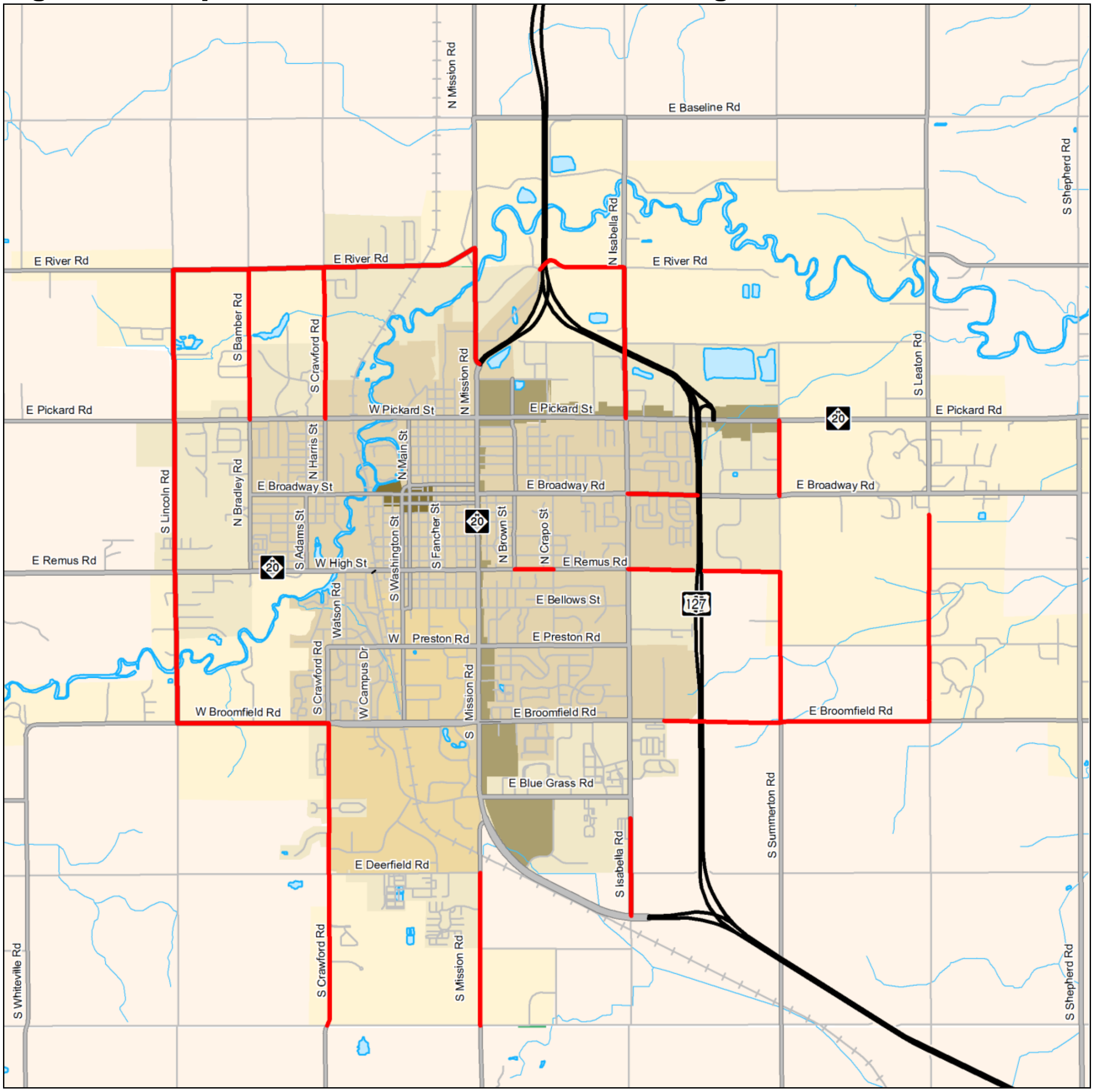
Fig. 4.1G. Proposed Near-term Shared Lane Marking



Shared Lane Markings are used for on-road bicycle facilites where the right-of-way is too narrow for designated bike lanes. The shared lane marking alerts cars to take caution and allows cyclists to safely travel in these lanes when striping is not possible. Typically they are used in downtwon streets where there is not room for a bike lane, there is on-street parallel parking and bicycles are discouraged from using sidewalks. They are often used in conjunction with a Shared the Road Sign.

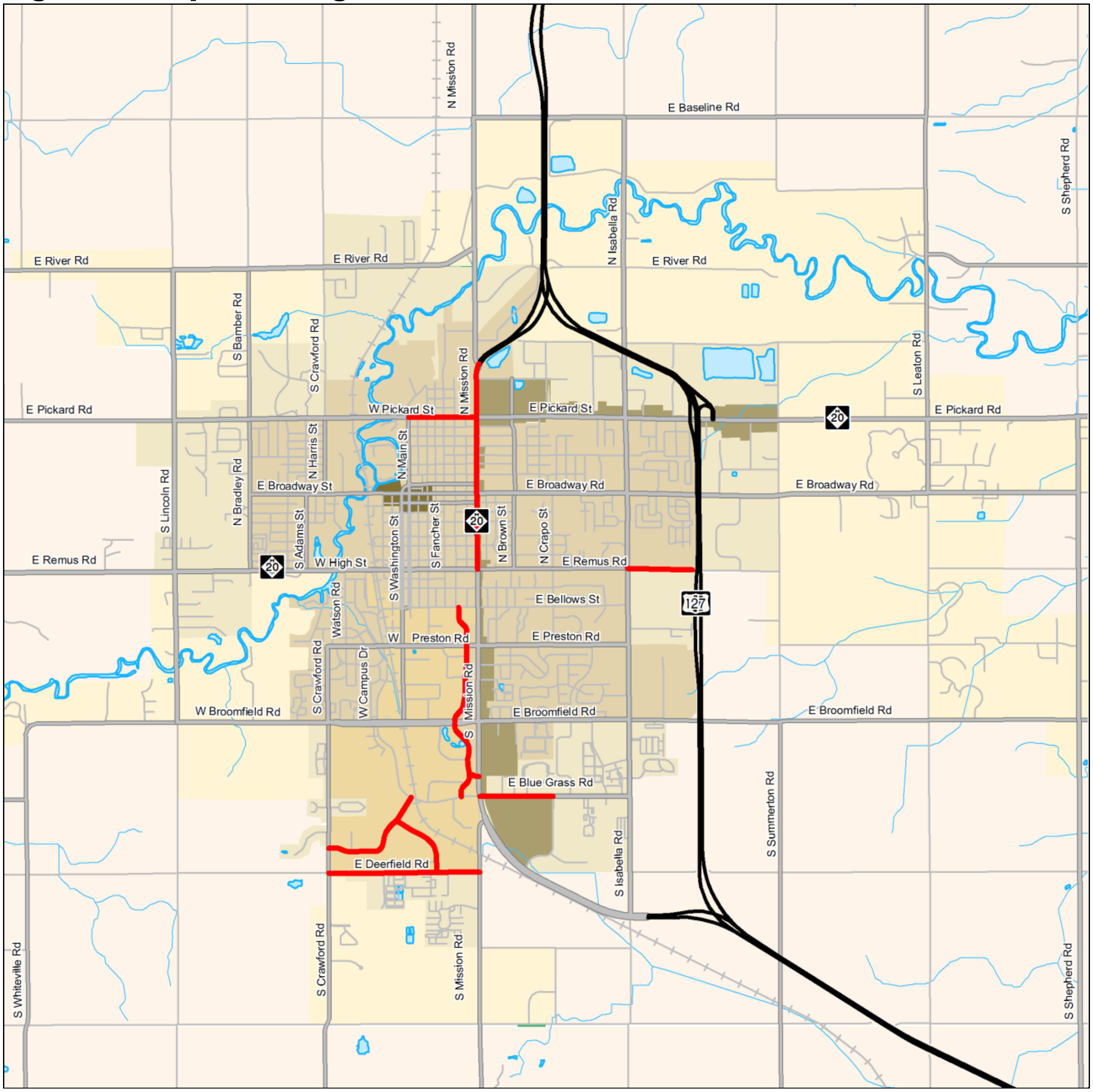
Approximately 2.5 miles of Share Lane Markings can be added in the near-term

Fig. 4.1H. Proposed Mid-term Bike Lanes via Paving the Shoulder



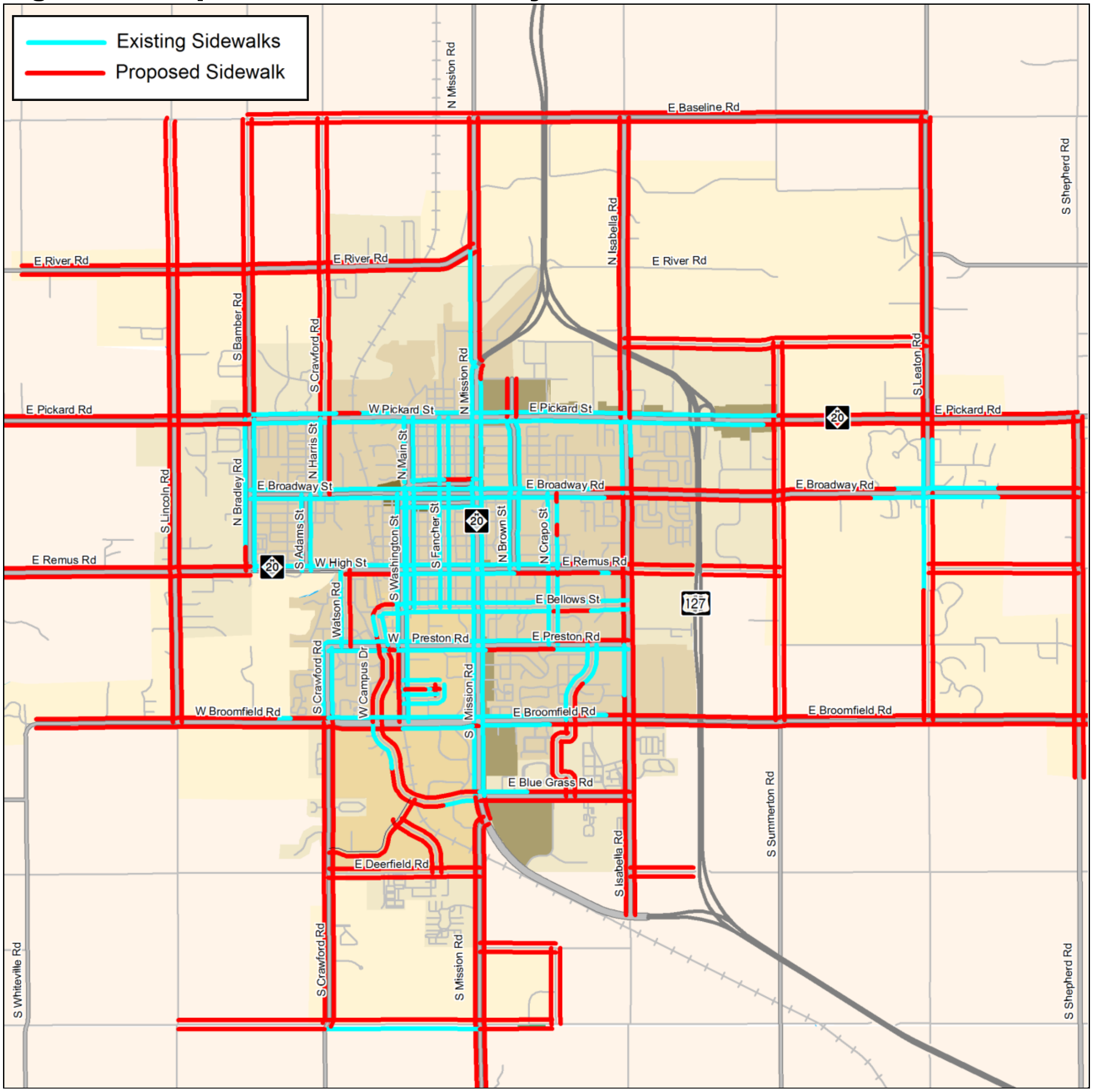
Approximately 20 miles (30%) of the primary roadways can have bike lanes added in the mid-term by paving the road shoulder.

Fig. 4.1I. Proposed Long-term Bike Lanes



Approximately 7 miles (10%) of the primary roadways can have bike lanes added in the long-term. These generally are due to a narrow roadway and bike lanes should be implemented when reconstruction occurs on the roadway.

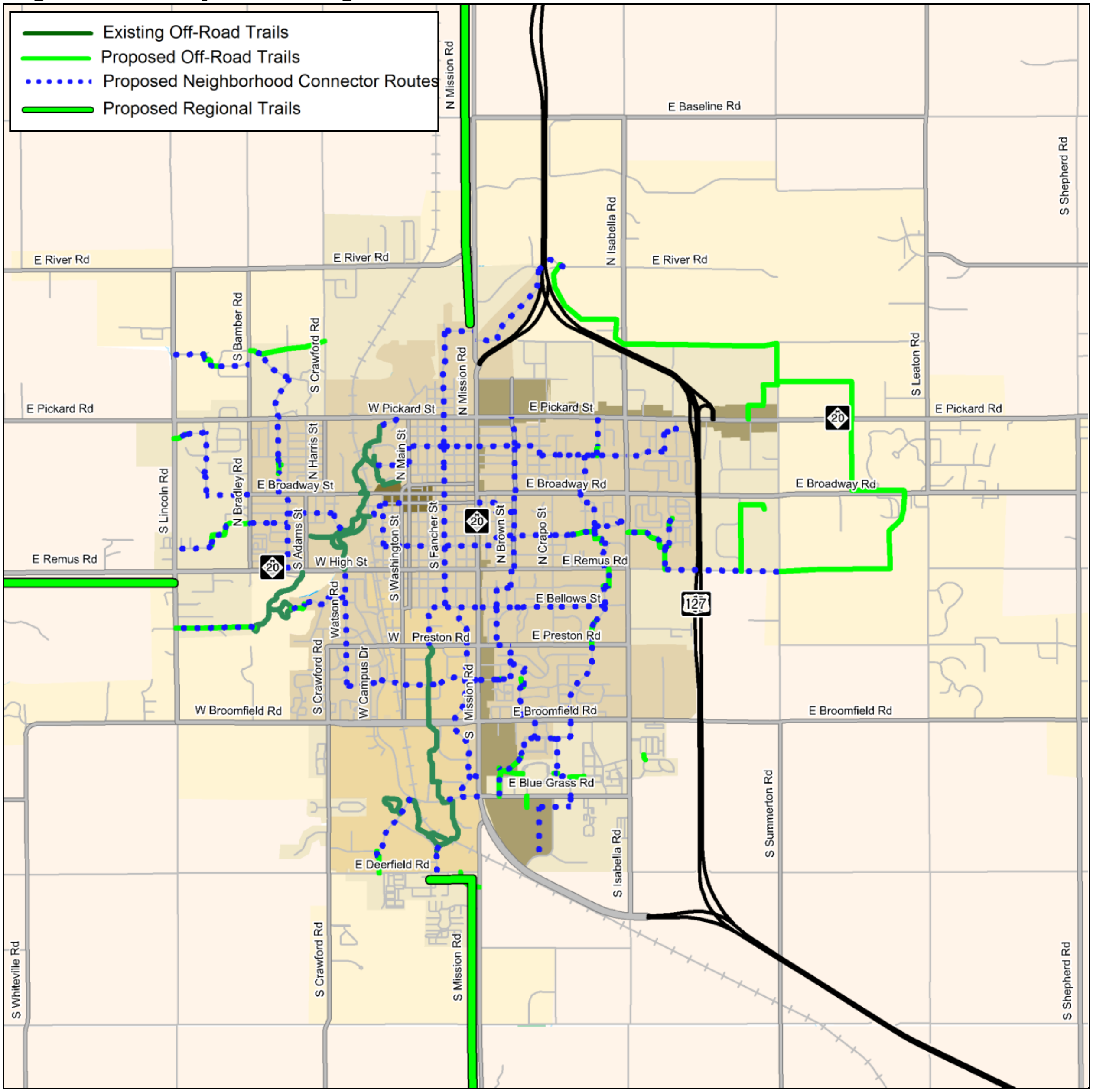
Fig. 4.1J. Proposed Roadside Pathways/Sidewalks



Ideally, all roads should have sidewalks on both sides of the street in an urban environment. In the transistion areas where new development is occuring a sidewalk should be built on at least one side of the roadway in the near-term. It is recommended that sidewalks along major collector and arterial roads have a minimum 6' wide a buffer zone and vertical elements such as trees between the sidewalk and road. Please refer to Section 8.1 and 8.4 for more details.

There are approximately 74 miles of proposed sidewalks.

Fig. 4.1K. Proposed Neighborhood Connectors and Off-Road Trails



The neighborhood connector routes and off-road 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 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.

There are approximately 23 miles of neighborhood connectors, 4 miles of short connector pathways and 5 miles of off-road trails proposed.

Fig. 4.1L. Neighborhood Connectors Examples

GUIDED ROUTES:

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

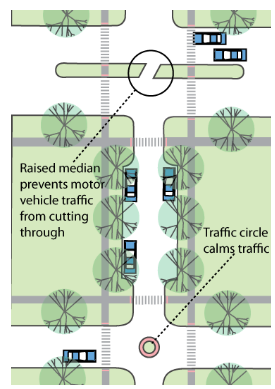
- Located primarily on low speed, low traffic volume local roads and connecting pathways
- Signs provide wayfinding by noting direction and distance to key destination such as schools, parks and the downtown
- Identify routes that may not be obvious to someone who is unfamiliar to the area
- Along the 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:

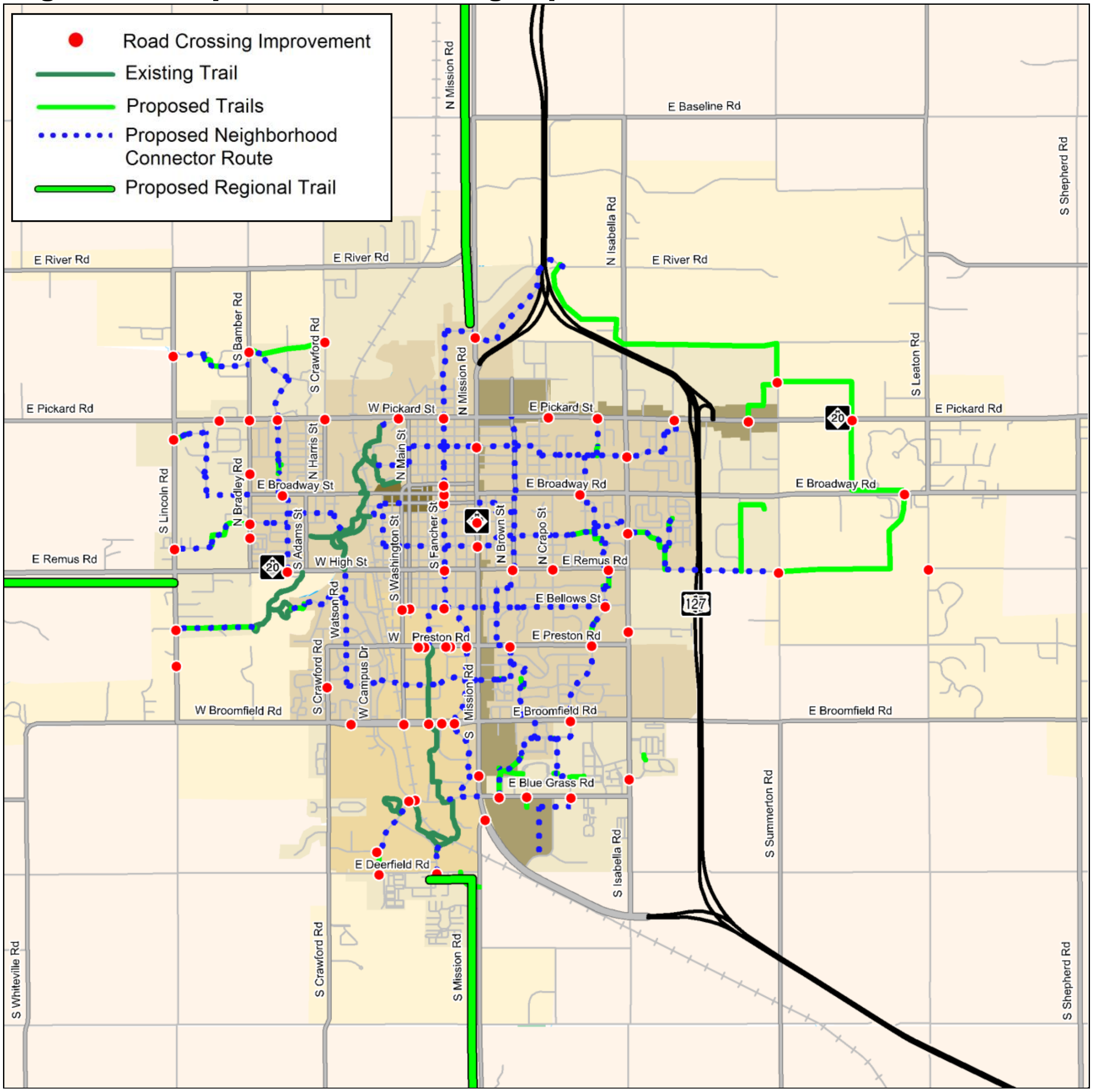
- Generally Incorporates the elements in Guided Routes, and Named Routes
- Route is optimized for bicycle travel while discouraging through motor vehicle traffic via tools such as motor vehicle diverter islands that are permeable to bicycles and pedestrians
- Motor vehicle speeds reduced through calming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



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

Fig. 4.1M. 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 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. 4.1N. Road Crossing Improvements Examples

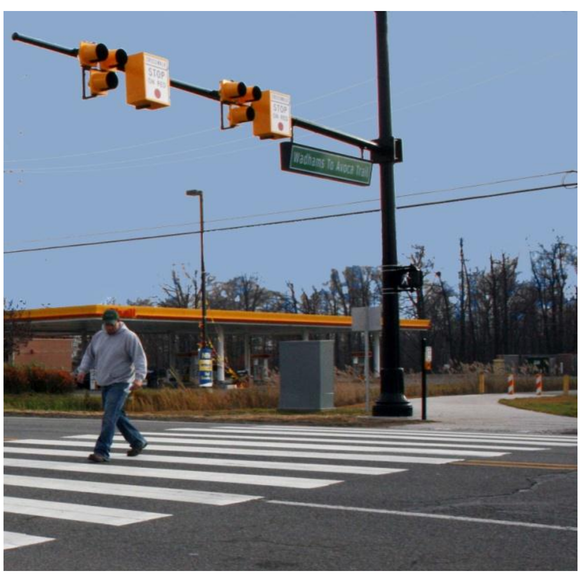
ACTUATED RECTANGULAR RAPID FLASH BEACON:

- High intensity LED flashers that are paired with crosswalk signs
- LED flashers alternate and get motorist attention when activated
- Push-button or passively activated
- Can be linked to advanced warning signs with LED flashers
- Solar powered models available
- Passive activation works best when there is a long pedestrian approach, such as a pathway

CROSSING ISLAND:

- Pedestrians only have to cross one direction of traffic at a time
- Provide Storage area for pedestrians waiting for acceptable gaps in the flow of traffic before completing the street crossing
- Can be combined with Actuated Rectangular Rapid Flash Beacons
- Good for locations where there are three or more busy lanes and/or high speed roadways

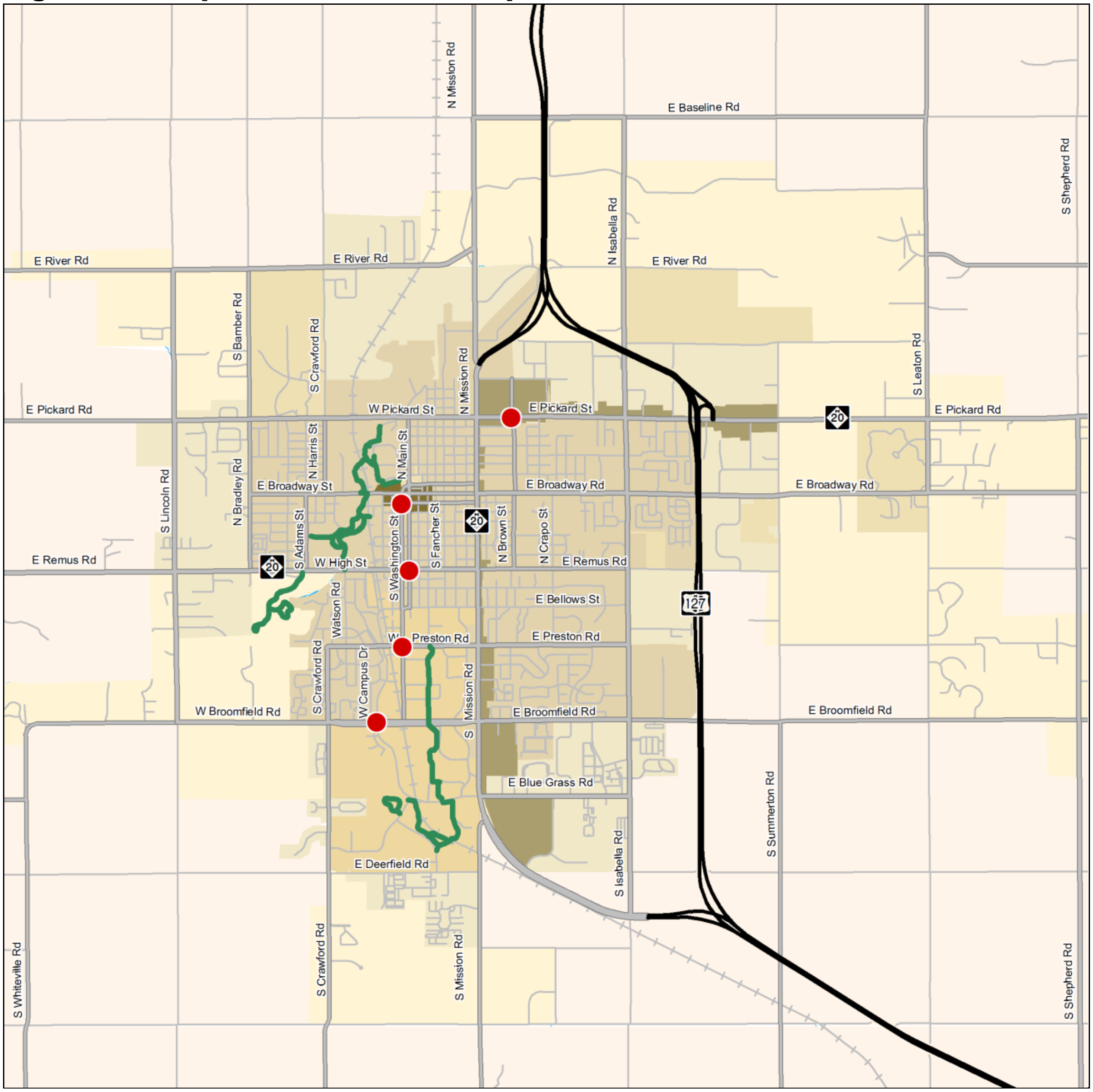
HYBRID PEDESTRIAN SIGNAL:



- Used to help pedestrians cross mid-block where a traditional pedestrian crosswalk signal would be inappropriate
- Minimizes delay to motor vehicle traffic
- Good for locations where there are few usable gaps in traffic, usually on high speed/high volume roadways when a crossing island is not feasible

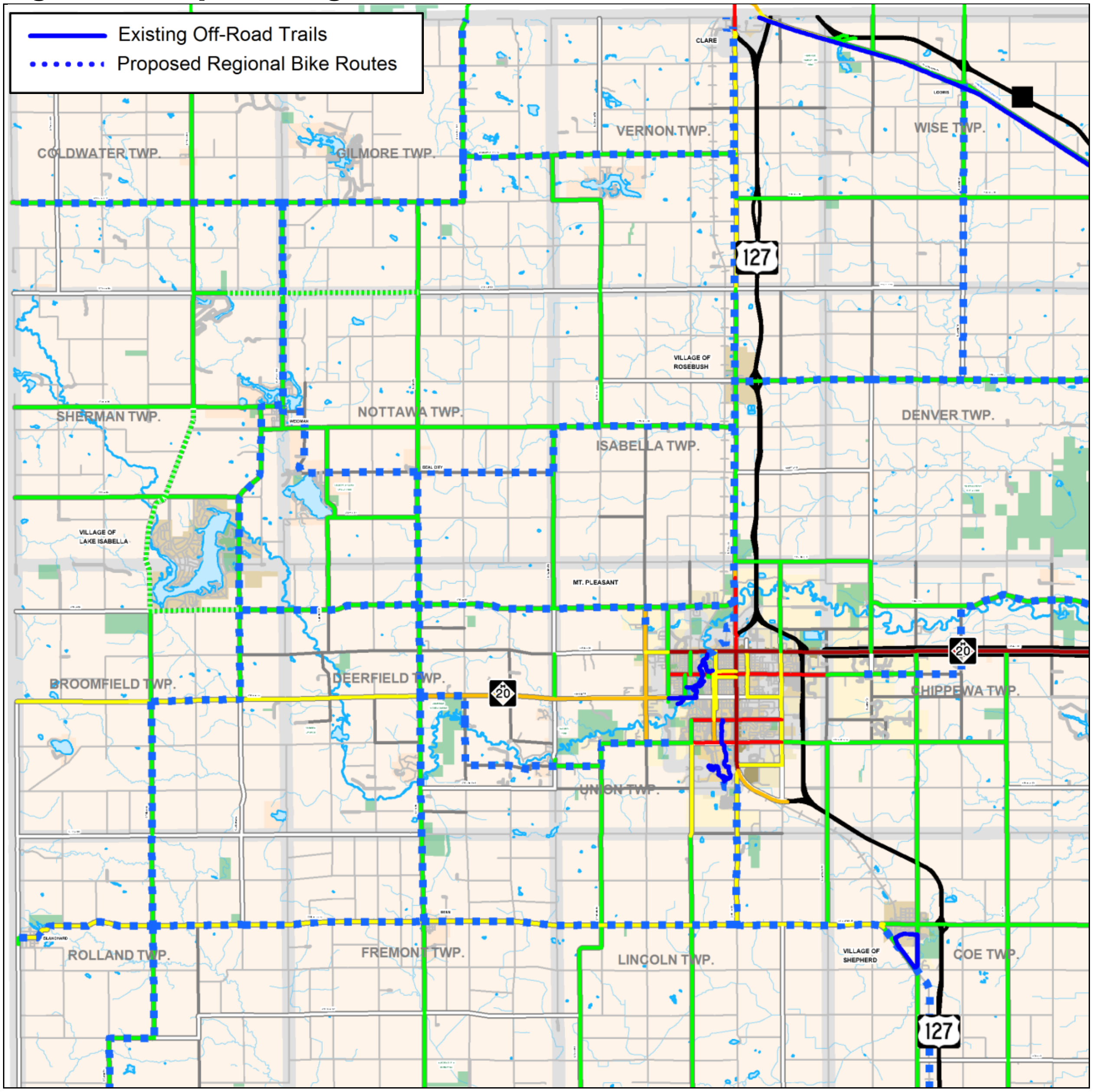
The signal is kept dark at its resting state. When a pedestrian activates the crossing button, a flashing yellow signal is displayed to motorists. This is followed by a steady yellow then a solid red at which time the pedestrian is displayed a walk signal. During the clearance interval, the motorists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

Fig. 4.10. Proposed Intersection Improvements



cImprovements at intersections need to address, directional ramps, high visibility crosswalk markings and ADA issues.

Fig. 4.1P. Proposed Regional Connections



The proposed regional connectors are generally on- road routes with some existing segments of paved shoulder. They are on paved, low-volume roads where wayfinding would be used to help with navigation across the county. There are 188 miles of proposed regional connections.

4.2 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.

Mission Road

Mission Road is a state trunk line route that passes through the center of the City of Mt. Pleasant. It is bordered by commercial centers and serves as the US-127 Business Route through town. It is a five lane road with extremely high traffic volumes and numerous driveway intersections. Overall this corridor is not a bicycle and pedestrian friendly environment, although the recently added edge stripe and improved intersections have improved the corridor significantly.

According to the public workshops and surveys, this corridor presents the most challenges for bicyclist and pedestrians who want to navigate this corridor. With business and residential neighborhoods on both sides of the street and a major university to the west, there is a lot of demand for non-motorized travel both along and across the street.

Currently, there are very few opportunities to add medians for mid-block crossings. Even with access consolidation it may be difficult to find locations for crossing islands because there are so many driveways and generally short blocks. Much of the cross-corridor pedestrian and bicycle demand is at intersection streets.

Mission Street will likely never be a pedestrian and bicycle focused corridor because it was designed to move vehicles. In the near and mid-term focus should be on providing safe crossings, alternative routes and improving the pedestrian environment of redevelopments. Also, continue the mixed-use, short set-back development proposed in city plans.

Recommendations for Near and Mid-term Improvements include:

- Provide parallel routes East and West of Mission Road along the local neighborhood roads that provide connection to the business district from behind
- Improve the buffer between the street and sidewalk by adding pedestrian scale lighting and street trees
- Improve the Signalized Crosswalks by including countdown signals, high visibility crosswalks and directional ramps
- Add crossings between signals

Example: Stadium Blvd in Ann Arbor, Michigan

Locations along Mission Street Slated for Road Crossing Improvements

Below are locations that were identified based on public input, proposed routes and demand based on land use.

Intersections:

- Andre Avenue
- Wisconsin Avenue
- Maple Road
- Mission Road at US 127Business Route

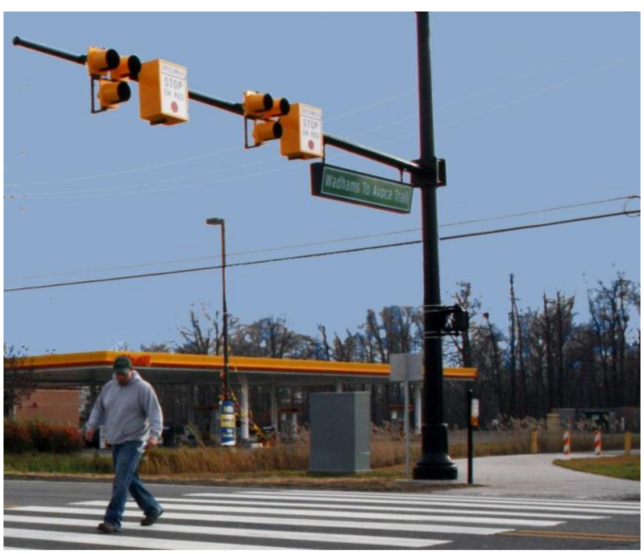
Midblock:

- Mission Mall – A crossing island could be incorporated here

Crossing Improvement Options at Road Intersections

<u>Eliminate Left Turn Lane</u>
There is potential to eliminate one left-turn movement and add a Crossing Island at intersections. Since there is a short distance between intersections, vehicles would only have to go an extra block to make the turn. A similar example of this can be seen on High Street where the Washington and Main Street intersect High Street. This could work at Lincoln Street, Wisconsin Street and Maple Street

<u>Pedestrian Hybrid Beacon</u>
There is potential to add Pedestrian Hybrid Beacon, although these would probably require mitigating measures as they generally should not be used at intersections. Pedestrian Hybrid Beacons are generally good for locations where a crossing island is not feasible. They generally should not be used within 100' of an intersection, but may be used if validated by engineering study. This could work at Lincoln Street, Wisconsin Street and Maple Street



Example: Waddams to Avoca Trail in St. Clair County

<u>Toucan Crossing</u>

Toucan Crossings are essentially a Pedestrian Hybrid Beacon but placed in the middle of the cross street. They eliminate through traffic and left turns for vehicles. Bicyclists and pedestrians cross the intersection at the middle of the road. The signal is only for bicyclists and pedestrians and is activated through a push button or passive detection. Bicyclists respond to a bicycle signal and use a special lane when crossing the roadway. Pedestrians get a standard WALK indication and have a separate, adjacent crosswalk. Motorists receive a standard signal. NO TURN ON RED should be implemented to prevent motorist from making a right turn in order to allow bicyclist to safely merge back onto the roadway after crossing the intersection.

Example: From Tucson, Arizona at, www.tocsonaz.gov

Toucan Crossings are placed at locations of heavy bicycle and pedestrian crossing activity and where roadways are prioritized for non-motorized uses, such as neighborhood connectors. A benefit of the Toucan Crossing is that motorized traffic in not allowed to proceed through the signal, decreasing the number of cars on the neighborhood street, thus enhancing the neighborhood connector route for bicyclists and pedestrians.

Numerous installations have been done in Arizona, but this would be the first in Michigan. This could work at Andre Avenue, Wisconsin Street and Maple Street.

Typically, Pedestrian Hybrid Beacons are not recommended to be used at the intersection of roadways, however, given that the Toucan configuration mitigates many of the concerns of Hybrid Pedestrian Signals at intersections, it can be justified with an engineering study.

4.3 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 the Greater Mt. Pleasant Area potential to increase the number of people walking and bicycling, it is helpful to look at the areas current bicycling and walking trends compared 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 the Mt. Pleasant area compares to other cities between 20,000 and 40,000 in population, its pedestrian and bicycle commute numbers are the highest. The percent that commute by bike, 1.5%, is well above the peer city average of 0.3% and the national average of 0.5% and. The percent that walk, 15.9% is significantly higher the peer city average of 3.4% and the national average of 2.8%. These numbers can likely be attributed to the presence of CMU and MMCC in combination with the relatively compact nature of the city.

[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 4.3A Commute to Work Comparison (20,000 to 40,000 Population)

			% of Commuters Who:				Percent
					Use	Don't	Households
Rank	Place	Pop.	Bike	Walk	Transit	Drive	W/O Car
1	Ypsilanti	22,403	0.4	15.6	4.6	20.6	14.1
2	Mount Pleasant	26,101	1.5	15.9	0.7	18.2	10.0
3	Holland	35,211	0.5	7.8	1.1	9.3	7.5
4	Hamtramck	22,976	0.2	4.9	3.6	8.7	20.5
5	Port Huron	32,363	0.9	3.9	1.8	6.6	13.9
6	Adrian	21,497	0.3	5.5	0.7	6.5	10.2
7	Jackson	36,316	0.4	3.1	1.5	5.0	15.6
8	Inkster	30,115	0.6	2.2	2.2	5.0	14.9
9	Bay City	36,817	0.4	3.1	1.2	4.7	11.3
10	Monroe	22,349	0.1	2.6	1.1	3.8	11.8
11	Ferndale	22,105	0.3	1.9	1.3	3.4	8.2
12	Oak ParK	29,793	0.2	2.1	1.2	3.4	9.6
13	Okemos	22,686	0.5	1.6	1.3	3.4	3.6
14	Eastpointe	34,077	0.1	1.3	1.0	2.5	7.8
15	Walker	21,795	0.1	1.4	0.9	2.3	5.6
16	Southgate	30,136	0.1	1.3	1.0	2.3	8.1
17	Wyandotte	28,006	0.2	1.9	0.2	2.3	7.8
18	Romulus	22,979	0.1	1.7	0.4	2.2	7.1
19	Madison Heights	31,101	0.3	1.1	0.7	2.0	8.6
20	Garden City	30,047	0.3	1.4	0.2	1.9	5.2
21	Allen Park	29,376	0.1	1.2	0.5	1.7	6.8
22	Burton	30,308	0.1	1.2	0.4	1.7	5.1
23	Saginaw Township North	25,061	0.2	0.5	0.5	1.2	8.2
24	Plymouth Township	27,650	0.1	0.7	0.1	0.9	4.3
25	Forest Hills	20,931	0.2	0.6	0.1	0.9	1.4
	Averages	**27,688**	**0.3**	**3.4**	**1.1**	**4.8**	**9.1**

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

Probable Mode Shift Due to Environmental Change

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

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

Table 4.3B Existing to Proposed Conditions Comparison

Existing Conditions		
Primary Motorized Routes		
Freeways	10	Miles
Principal Arterials	5	Miles
Minor Arterial	22	Miles
Collectors	17	Miles
Total	**54**	**Miles**
Primary Pedestrian Routes		
Sidewalk / Roadside Path*	26.2	Total miles divided by two
Off-Road Trails	2.5	Miles
Total	**28.7**	**Miles**
Primary Bicycle Routes		
Bike Lanes	7.2	Miles
Edge Stripe	0	Miles
Shared Lane Marking	0	Miles
Bike Routes	0	Miles
Off-Road Trails	2.5	Miles
Total	**9.7**	**Miles**
Proposed Conditions		
Primary Pedestrian Routes		
Sidewalk / Roadside Path*	36.8	Total miles divided by two
Off-Road Trails	5.2	Miles
	42	**Miles**
Primary Bicycle Routes		
Bike Lanes	52.6	Miles
Edge Stripe	6	Miles
Shared Lane Marking	2	Miles
On-Road Bike Routes	32	Miles
Off-Road Trails	5.2	Miles
	97.8	**Miles**
* equals the equivalent of a road with sidewalks on both sides		
Comparisons		
Pedestrian		
Existing Miles of Pedestrian Routes	53%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Ped. Routes	131%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Ped. Routes	246%	of Existing Miles of Pedestrian Routes
Bicycle		
Existing Miles of Bicycle Routes	18%	of Existing Miles of Motorized Routes
Exist. + Prop. Miles of Bike Routes	199%	of Existing Miles of Motorized Routes
Proposed Miles of Bicycle Routes	1108%	of Existing Miles of Bicycle Routes

To determine the probable mode shift, a variation of the Caltrans approach has been used. Table 4.3B, Existing to Proposed Conditions 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 0.48 of the total of primary motorized routes. When looking at peer cities, the Greater Mt. Pleasant Area already has the highest walking mode share of 15.9% for commuters, the city of Ypsilanti is close behind at 15.6%.

Existing primary bicycle routes are 0.17 of the existing primary motorized routes. When completed the primary bicycle route system will be 1.9 of the primary motorized routes. Even when the system is only partially completed, the change will be significant. Looking at the peer cities, the Greater Mt. Pleasant Area already has the highest bike mode share of 1.5 %. Since the ratio is greater than 0.35 it seems reasonable that the Caltrans approach of a 2% mode share should be used once a bicycle system becomes substantially complete.

An 18% pedestrian and 4% bicycle mode share will be used for the targets. This represents 2.1% mode shift for pedestrians and a 2.5% mode shift for bicycles.

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 types 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, the Mt. Pleasant Area could expect to daily replace over 13,000 miles of automobile trips with bicycle or pedestrian trips. This would require on average for each person in the City to replace about 1/3 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 34 fewer barrels of oil being used and 7 tons less of CO2 being released into the environment each day – that translates into about 12,402 barrels of oil and 2,520 tons of CO2 per year. The active transportation choices will also improve resident's health in many other ways.

Table 4.3C Estimated Trip and Greenhouse Gas Reduction

Vehicle Miles Traveled (VMT)						
Greater Mt. Pleasant Area Population	39,854	City Estimate				
Daily Trips per Person	4.03	2010 National Household Travel Survey				
Daily Total Number of Trips	160,612					
Average Vehicle Trip Length	10.10	2010 National Household Travel Survey				
Daily Total Vehicle Miles Traveled	402,525	Miles				

Reduction in Vehicle Miles Traveled By Walking Trips:

Trip by Type	Daily Total of Trips	Percent of Total	Reduction Goal	Trip Reduction	Trip Length	VMT Reduction
To or From Work	25,216	16%	2%	504	1	504
Work Related Business	4,818	3%	0%	-	0.25	-
Shopping	31,640	20%	1%	316	0.25	79
All Other Family & Personal Business	38,707	24%	2%	774	0.5	387
School/Church	15,740	10%	2%	315	0.5	157
Social and Recreational	42,723	27%	3%	1,282	2	2,563
Other	1,285	1%	0%	-	1	-
	160,130	100%	2.0%	3,191		**3,691**

Reduction in Vehicle Miles Traveled By Bicycle Trips:

Trip by Type	Daily Total of Trips	Percent of Total	Reduction Goal	Trip Reduction	Trip Length	VMT Reduction
To or From Work	25,216	16%	2%	504	2	1,009
Work Related Business	4,818	3%	0%	-	0.5	-
Shopping	31,640	20%	1%	316	1	316
All Other Family & Personal Business	38,707	24%	2%	774	1	774
School/Church	15,740	10%	2%	315	1	315
Social and Recreational	42,723	27%	3%	1,282	6	7,690
Other	1,285	1%	0%	-	2	-
	160,130	100%	2.0%	3,191		**10,104**

Reduction in Vehicle Miles Traveled	13,795	Miles Per Day
	3.4%	Total Reduction in VMT
	0.35	Miles Per Person/Per Day
	5,035,297	Total Reduction in VMT Per Year
Projected CO2 Reductions		
CO2 Emission Factor	454	Grams Per Mile
Daily CO2 Reduction	6,263,081	Grams (based on 454 grams per mile)
Daily CO2 Reduction	6.90	Tons
Yearly CO2 Reduction	2,520	Tons
Projected Fuel Savings		
Daily motor gasoline savings	680	Gallons of Gasoline (based on avg. of 20.3 mi. / gal.)
Daily Oil Savings	34	Barrels of Oil (based on20 gallons of gas per barrel)
Yearly Oil Savings	12,402	Barrels of Oil