TOOLE DESIGN

CITY OF WAUWATOSA NEIGHBORHOOD GREENWAY IMPLEMENTATION GUIDANCE AND ASSESSMENTS

June 2020

ENVISIONING WHAT COULD BE, THEN BUILDING IT

ACKNOWLEDGEMENTS

Bicycle and Pedestrian Facilities Committee

Chris Brannin
Angela Ebeling
Samantha Foley
Laura Geisler
Mark Hill
Kayla Janowski
Tom Martin
Mike Morgan
Maura Riordan
Ryan Wallace
Jason Wilke

City Management Team

Paulette Enders, Development Director
Stephanie Wilson, Landscape Architect
Bill Wehrley, City Engineer

Toole Design

Kevin Luecke
Evan Moorman
Eric Mongelli

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Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Planning-level cost opinions include a 20 percent contingency to cover items that are undefined or are typically unknown early in the planning phase of a project. Unit costs are based on 2019 dollars and were assigned based on historical cost data from the Wisconsin Department of Transportation and the City of Wauwatosa. Cost opinions do not include easement and right-of-way acquisition; permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. A cost range has been assigned to certain general categories such as utility relocations; however, these costs can vary widely depending on the exact details and nature of the work. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group, LLC makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

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WHAT IS A NEIGHBORHOOD GREENWAY?

INTRODUCTION TO NEIGHBORHOOD GREENWAYS

Neighborhood greenways, also commonly called bicycle boulevards, are streets with low vehicular volumes and speeds and allow for a low stress environment for bicyclists. Neighborhood greenways prioritize bicycle travel through different treatments ranging from signage and markings at the low end, to vehicular traffic calming and traffic diversion at the high end. Neighborhood greenway design also frequently prioritizes pedestrian movement, and some neighborhood greenways include green infrastructure to manage stormwater. Because neighborhood greenways are designed for lower traffic speeds and volumes, residents living along the street benefit from reduced noise and pollution. The City of Wauwatosa identified 21 miles of planned neighborhood greenways in the *2014 City of Wauwatosa Bicycle & Pedestrian Facilities Plan.*

Who are Neighborhood Greenways For?

Neighborhood greenways benefit people walking and bicycling along the street, but also residents who live on the street. Neighborhood greenways are designed to be comfortable for bicyclists of all ages and abilities, including children and seniors. In many instances, these streets are also attractive to more skilled and confident bicyclists where they provide a lower stress and time-efficient alternative to higher volume, parallel arterials. Neighborhood greenways can provide critical connections to neighborhoods, schools, parks, business districts, major bicycle corridors, major transit corridors, employment centers, and other key destinations.

Siting a Neighborhood Greenway

Grid pattern street networks are ideal for neighborhood greenways because parallel streets provide multiple routing options and are simple and intuitive for bicyclists to follow. It is more challenging to designate neighborhood greenways along suburban streets that form loose grids and have multiple dead-end streets (e.g., cul-de-sacs). In these areas, neighborhood streets can be combined with shared use path segments to make continuous connections. Most neighborhood greenways are located on residential streets, although some cities like Austin, Texas and Berkeley, California place them on commercial streets.

The neighborhood greenways proposed in the *2014 City of Wauwatosa Bicycle & Pedestrian Facilities Plan* are displayed in Figure 1.

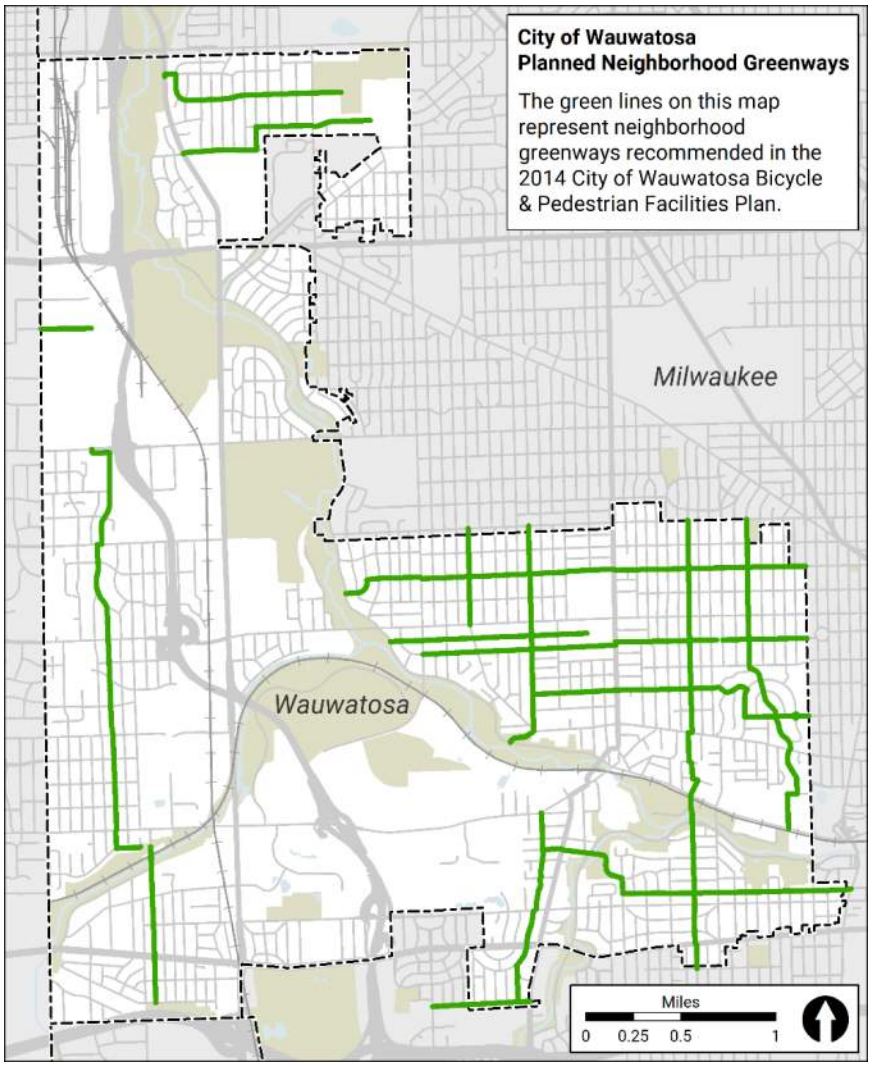

Figure 1: Neighborhood greenways in the 2014 City of Wauwatosa Bicycle & Pedestrian Plan.

NEIGHBORHOOD GREENWAY BASIC PRINCIPLES

There are a number of criteria that should be met to help ensure that neighborhood greenways are comfortable and attractive for a wide range of people bicycling.

Manage Motorized Traffic Volume and Speeds

The volume and speed of traffic has a significant impact on the comfort and safety of people bicycling on the street. A low speed differential between people driving and people bicycling enhances the comfort and safety of bicyclists and reduces severity should a collision occur.

The frequency of motorists passing bicyclists increases significantly with traffic volumes (Figure 2) and with vehicle speeds. Figure 3 shows volume and speed thresholds for a neighborhood greenway to minimize motor vehicle passing and the resulting risk of conflict. The design of the street should result in the preferred traffic volumes and operating speeds being achieved at **all times of the day**. Traffic calming strategies should be considered when these volumes and speeds are exceeded. Speed studies should also evaluate the frequency and speed differential for the 15% of traffic which exceeds the 85th percentile speed, which has the greatest negative impact on bicyclists.

Figure 2: Relationship between average daily traffic (ADT) volumes and passing rates[1]

Figure 3: Preferred, acceptable, and maximum volume and speed threshold for neighborhood greenways

Minimize Motorized Through Traffic Volumes and Speed Differential			
	Hourly Traffic Volume	Daily Traffic Volume	Speed
Preferred	50 vehicles/hr	1,000 ADT	15 mph
Acceptable	75 vehicles/hr	2,000 ADT	20 mph
Maximum	100 vehicles/hr	3,000 ADT	25 mph

Recommendation: Neighborhood Greenways in Wauwatosa should seek to have less than 1,500 ADT.

Prioritize Bicycling Right-of-Way at Local Street Crossings

Most of the streets a bicyclist will cross on a neighborhood greenway are local streets. These intersections are commonly all-way stop, two-way stop, yield-controlled with signs, yield-controlled with mini-circles (no signs), or fully uncontrolled.

Efficient neighborhood greenways should be designed to minimize the need for bicyclists to stop at crossings of local streets. Frequent stopping along a route can increase the total ride time by 33 percent or more and may result in reduced stop sign compliance where stops are closely spaced. This is a particularly important consideration along neighborhood greenways that are intended to provide a preferential alternative to a larger parallel street with right-of-way priority over cross streets.

More information about providing right-of-way along neighborhood greenways is provided later in this document.

Recommendation: Wauwatosa's neighborhood greenways should prioritize bicycle right-of-way at local street crossings.

[1] Toole Design & Portland Bureau of Transportation, 2015

Provide Safe and Convenient Crossings at Major Streets

Major street crossings along neighborhood greenways can be significant barriers for people walking and bicycling. At intersections where a neighborhood greenway crosses an arterial street, or any other major street where the neighborhood greenway is stop- or yield-controlled, an uncontrolled crossing of the major roadway is common. Where traffic signals are not present, other crossing measures may be needed. Appropriate treatments depend on factors such as traffic speed, visibility, traffic volume and number of lanes, yielding rates, and the frequency of gaps in vehicular traffic. Gaps are defined as safe crossing moments and are measured per hour. When neighborhood greenways cross major streets, they should have at least 60 crossing opportunities, or gaps an hour (120 is preferred).

More information about improving crossings of major streets provided later in this document.

Recommendation: Neighborhood Greenways should provide additional crossing treatments at major street crossings to assist people bicycling and walking with crossing the street.

LEVELS OF NEIGHBORHOOD GREENWAYS

The design of a neighborhood greenway often involves a collection of different design treatments that may vary significantly depending on the context. Neighborhood greenways can be divided into two main groups: those that use signage and markings only (basic neighborhood greenways); and those that also use traffic calming and diversion (enhanced neighborhood greenways).

Where traffic volumes or speeds do not meet the criteria specified in Figure 3, traffic calming and diversion should be considered. Where major street crossings are a barrier and/or there are inadequate gaps in cross traffic, an evaluation of crossing treatments is recommended.

SIGNS AND MARKINGS

Along neighborhood greenways a combination of pavement markings, signs, and wayfinding can slow traffic, improve visibility and safety, and give a unique identity to the corridor.

Shared Lane Markings

Shared lane markings (SLMs or "sharrows") should be used to emphasize the presence of people bicycling on a neighborhood greenway. In many cases it is preferable to place the markings in the center of the travel lane to encourage motorists to yield the right of way to bicyclists. SLMs also can provide supplemental wayfinding guidance.

The National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and the *Manual on Uniform Traffic Control Devices* (MUTCD) provide guidance on the placement of SLMs for neighborhood greenways:

- For low-traffic bicycle routes, shared lane markings should be placed up to 250 feet apart. Along higher-volumes streets, or to bridge discontinuous bicycle facilities (e.g., a gap in a shared us path), SLMs should be placed every 50-100 feet.
- Should be placed immediately after an intersection and if bi-directional, can be staggered to improve continuous visibility.
- Should be laterally placed at least 11 feet from the curb face when a parking lane is present to prevent people bicycling from being hit by opening car doors ("dooring"). In high-turnover locations, that width should be increased to 12-13 feet, according to the 2019 Draft AASHTO Guide. When no parking is present, SLMs should be placed at least 4 feet from the curb, and with enough clearance from gutters, seams, and other obstacles.
- According to the 2019 Draft AASHTO Guide, "where it is desirable for bicyclists to control travel lanes less than 14 ft in width, the SLMs should be located within the center of travel lanes." Where lanes are wider than 14 feet, SLMs should not be placed in the center of the lane.
- On streets with a posted 25 mph speed limit or lower, place SLMs in center of the travel lane to encourage bicyclists to occupy the full lane (and minimize wear and tear on the markings).
- Although the official SLM is comprised of a bicycle symbol and chevrons, many communities use a SLM with a person riding a bicycle to humanize people bicycling, as shown in Figure 4.

Figure 4: Example of signs and shared lane markings using the silhouette of a person placed at the beginning of a block.

- Chevron orientation can indicate direction or turns (FHWA experimentation may be required).
- Color and dotted lines can enhance visibility of SLMs (FHWA experimentation may be required).

Figure 5: The chevrons on a SLM can be angled to indicate a turn in the route as shown in this example from Portland, OR, which may require FHWA experimentation.

National guidance does not provide direction on when streets may be too wide or too narrow to place SLMs effectively. While streets being "too wide" for SLMs is not an issue, narrower "yield streets" can present placement issues. Yield streets are streets that are too narrow for drivers to pass each other while remaining in their travel lane and one driver must yield to the other by pulling partially into the parking lane (regardless of if the parking lane is marked). Typically a yield street exists on streets that are less than 32 feet wide with parking allowed on both sides, or streets that are less than 24 feet side with parking allowed on one side. In these situations, rather than using a SLMs in each direction that must be placed immediately next to each other, it may be desirable to use single SLMs placed in the center of the street that have chevrons in both travel directions (Figure 6). Typically this practice should be reserved for streets with moderate to high parking utilization. This practice is in use in Seattle, Portland, Pittsburgh, and other cities across the country. NACTO provides more detailed SLM guidance here.

The following SLM placement guidelines are recommended, based on best practices from the City of Seattle:

	Street Width	
	Less than 32'	**32' or Greater**
Parking on Both Sides	Bi-directional SLM in center of street	SLM 12' (min.) from edge of street, each direction
Parking on One Side	SLM 12' (min.) from side with parking; 4' (min) from edge of street on side with no parking	SLM 12' (min.) from side with parking; 4' (min) from edge of street on side with no parking
No Parking	SLM 4' (min.) from edge of street, each direction	Not likely to occur

Figure 6: Example of a bi-directional SLM, which may require FHWA experimentation.

Recommendation: Neighborhood greenways should include SLMs at the beginning and end of each block and every 200-250 feet between these markings. SLMs should typically be placed in the center of the travel lane. On streets less than 32 feet wide with parking allowed on both sides, or less than 24 feet wide with parking allowed on one side, a single SLM with chevrons in both directions may be placed in the center of the travel lane depending on parking utilization. SLMs with angled chevrons may be used to indicate turns in the neighborhood greenway.

Identification Signs

Neighborhood greenways should include identification signs at the beginning of each block to identify the route and emphasize the shared use of the street. MUTCD-compliant signs consist of a D11-1 sign panel with a bicycle symbol and the text “BICYCLE BOULEVARD” (or “NEIGHBORHOOD GREENWAY” in Wauwatosa) (Figure 7).

Many communities have taken the opportunity to provide unique branding for their neighborhood greenway / bicycle boulevard network. Signs for these networks often include unique colors and graphics. For example, Madison’s Bicycle Boulevard signs are blue, include an image of an adult bicycling with a child, and include the message that Bicycles May Use Full Lane (see next section) (Figure 8).

Neighborhood greenways can also be identified on street signs at intersections, which highlights to people bicycling when they are crossing a neighborhood greenway (Figure 9). The signs also alert people driving that there may be more people bicycling on the cross street. Sign “toppers” can also be added to standard street signs to identify neighborhood greenways (Figure 10); this method is more flexible in that it doesn’t require modifying street signs.

Figure 7: MUTCD-compliant identification sign

Figure 8: Madison’s branded identification sign

Figure 9: Madison’s branded street sign

Figure 10: Street sign topper example

Recommendation: Neighborhood greenways should include identification signs at the beginning of each block. Unique street signs should be stongly considered along neighborhood greenways.

Bicycles May Use Full Lane Signs

To emphasize bicyclist priority on a neighborhood greenway, the BICYCLES MAY USE FULL LANE sign (R4-11) may be used in situations where motorists must wait behind slower moving bicyclists or change lanes to safely pass a bicyclist. R4-11 signage can be used on streets without bike lanes where travel lanes are too narrow (less than 14 feet wide) to operate side-by-side. Some communities, such as Madison, have incorporated the R4-11 message into their standard bicycle boulevard identification sign (Figure 6). The R4-11 sign can be used independently or with SLMs.

Recommendation: Neighborhood greenways should include R4-11 signs on each block; the signs may be integrated into the identification sign to minimize sign clutter.

Wayfinding

Wayfinding signs are not required for neighborhood greenways, but they help bicyclists identify and follow designated neighborhood greenway routes. This can be especially helpful where the route requires multiple turns. Wayfinding signs along neighborhood greenways can direct users along the route as well as direct them to nearby destinations that may not be readily apparent from the neighborhood greenway.

The MUTCD includes bicycle wayfinding signs in the D1-series (Figure 11). However, many communities have implemented bicycle wayfinding that includes more unique branding and colors along neighborhood greenways or bicycle boulevards. Some of these signs are based on the MUTCD signs but are not fully compliant (Figures 12 and 13), while others offer more unique designs (Figures 14 to 16). The City of Milwaukee and the Milwaukee County Parks Department are currently collaborating on a wayfinding plan for city- and county-managed

bikeways, including on-street bicycle route segments. Wauwatosa could collaborate with this wayfinding effort in the coming years.

NACTO provides additional information about sign designs, locations, and spacing for wayfinding here.

Figure 11: MUTCD-compliant wayfinding sign near BWI Airport

Figure 12: MUTCD-based wayfinding sign in South Bend, IN

Figure 13: MUTCD-based wayfinding sign in Dane County, WI

Figure 14: Fort Collins, CO branded wayfinding sign

Figure 15: Omaha, NE branded wayfinding sign

Figure 16: Davis, CA branded wayfinding sign

Recommendation: The City should consider coordinating with the City of Milwaukee and Milwaukee County on an integrated bicycle wayfinding system, and should examine ways to tie in wayfinding efforts to the current city- and county-run effort. The neighborhood greenways could provide an initial network for signs.

TRAFFIC CALMING AND DIVERSION STRATEGIES

Traffic calming / traffic diversion comprises the second tier of neighborhood greenways (enhanced neighborhood greenways). Traffic calming slows traffic and brings motor vehicle speeds closer to those of bicyclists while traffic diversion reduces traffic volumes.

The preferred maximum operating speed for motor vehicles along a neighborhood greenway is 15 mph, but should not exceed 25 mph. While signs are important in communicating acceptable speeds, people typically drive at speeds they perceive as safe. Street design, especially street geometry and cues in the surrounding environment, impact actual speed. Traffic calming can help control traffic speeds.

The recommended maximum ADT on a neighborhood greenway is 3,000, although significantly lower volumes are required for the street to serve as an all-ages-and-abilities bicycling facility. Where traffic volumes exceed desired limits, traffic diversion can help maintain appropriate volumes. Traffic diversion can also reduce or eliminate “cut-through” vehicular traffic, which benefits all residents along a street.

Traffic Calming Strategies

Reducing traffic speeds can be accomplished by creating a sense of enclosure, and with horizontal or vertical treatments that require motorists to reduce speeds. Traffic calming treatments are most effective when they are deployed at regular intervals ranging from 200-400 feet. Treatments can vary through a corridor.

Traffic calming treatments can cause through traffic to divert to nearby streets, so traffic calming and diversion should be considered from a network perspective. Traffic calming strategies can be divided into three groups:

Creating Enclosure

- On-street parking
- Narrow (yield) streets
- Street trees (these narrow drivers’ field of view)
- No center line markings (except at approaches to controlled intersections)
- Neckdowns and one-lane pinch-points (usually applied at mid-block locations)
- Curb extensions / bulb-outs (at intersections)
- Pedestrian crossing islands

Horizontal Deflection Treatments

- Chicanes
- Mini traffic circles at intersections

Vertical Deflection Treatments

- Speed humps
- Speed tables
- Raised crosswalks
- Raised intersections

Figure 17: Speed humps along a neighborhood greenway can help reduce motorized traffic speeds and volumes.

Recommendation: The City should continue considering traffic calming elements where there are concerns about traffic speeds from residents or people bicycling.

Neighborhood Traffic Management Program Calming Guidelines

The City of Wauwatosa has an existing program to calm traffic on residential streets throughout the city. Local streets are identified for inclusion based on resident requests. Additionally, the streets must fulfill the following requirements:

- Be a residential neighborhood or collector street under the City's jurisdiction.
- Report traffic volumes between 300 and 5,000 vehicles daily.
- Have a posted speed limit of 30 mph or less.
- Be at least 1,000 feet in length.
- Not be on a cul-de-sac.

After fulfilling the above requirements and receiving support from the Traffic Calming Committee (TCC), DPW, the local Alderperson, and surrounding residents, the City uses a four-step process to modify behavior: Education; Enforcement; Encouragement; and Engineering. The first three are classified as "Level One Options," while engineering efforts are classified as "Level Two Options." Engineering efforts include the installation of speed tables, traffic circles, or traffic diverters, and are usually considered only after "Level One Options" have been applied. Additional information on the program can be found here.

Recommendation: The City should continue to implement the neighborhood traffic management program based on requests from residents.

Traffic Diversion Strategies

Traffic diversion treatments are used to reduce through traffic on neighborhood greenways. They may consist of "soft" treatments which rely on compliant behavior (e.g., posting turn restrictions) or "hard" treatments, which use design to force compliant behavior. Diversion strategies will typically maintain local motor vehicle access to residences and businesses along the neighborhood greenway while diverting motorists on through trips.

Figure 18: Example of a curb extension used as a traffic diverter on the Kendall Avenue Bicycle Boulevard in Madison, WI. The curb extension allows space for bicyclists to enter the street, but a DO NOT ENTER sign prohibits vehicular traffic.

Examples of traffic diversion include:

- Regulatory signs (including mandatory turn signs such as R3-1, or R3-2), or DO NOT ENTER signs (R5-1). These signs should include an EXCEPT BICYCLES plaque and should be combined with markings.
- Major street pedestrian crossing island (using a crossing island to restrict through motor vehicles).
- Diagonal diverter (requires vehicular traffic to turn 90 degrees at the intersection but allows through bicycle traffic).
- Forced turns (does not allow through vehicular travel but does allow through bicycle travel).

Recommendation: The City should consider traffic diversion where traffic volumes exceed the recommendations of this memorandum or there are concerns from residents about "cut-through" traffic.

Further Guidance

For more complete guidance on traffic calming and diversion strategies, use AASHTO's *Guide for the Development of Bicycle Facilities* or NACTO's *Urban Bikeway Design Guide*.

STREET CROSSINGS

TREATMENTS FOR MINOR STREET CROSSINGS

Along a neighborhood greenway, it is desirable to limit locations where people bicycling must stop to less than one location per half mile. This improves the speed of people bicycling and has been shown to increase stop compliance at locations where stop controls are used. Reducing stop locations along a neighborhood greenway often requires changing typical patterns of stop signs at every other intersection and removing certain stop signs for neighborhood greenway users. Where some type of control is necessary along the neighborhood greenway, yield control is preferable to stop control. This allows bicyclists to slow and assess cross traffic without having to stop and restart. Because bicyclists move slower, they have a wider field of vision than motorists, allows for safer yielding.[2]

Figure 19: Example of a supplementary sign warning people to look for bicycle traffic at a location where the stop control was "flipped" from the neighborhood greenway to the local cross street.

If there are concerns of too many stop signs on cross streets, utilizing roundabouts or mini traffic circles can be an effective solution (while also slowing traffic).

Parking restrictions (up to 20 feet from the intersection) can improve sightlines at locations where stop signs are removed or yield control is provided. Stop or yield signs can be supplemented with one of the following:

- CROSS STREET TRAFFIC DOES NOT STOP (W4-4P) plaque.
- Neighborhood greenway wayfinding sign (to highlight the presence of the neighborhood greenway to crossing traffic).

Stop sign removal can result in increased motor vehicle speeds and volumes or induce cut-through traffic when the neighborhood greenway parallels a congested arterial or is the primary route through an area. Traffic calming or diversion treatments may be necessary to mitigate this.

Recommendation: Stop controls along neighborhood greenways should be minimized at local street crossings. When stop controls are removed, additional measures such as yield control of mini circles should be considered.

[2] NACTO, 2012

TREATMENTS FOR MAJOR STREET CROSSINGS

The presence of a neighborhood greenway implies increased safety, and that safety must extend to the crossing of major streets. Major street crossings are likely to be used by families and children, and by pedestrians. Therefore, these intersection crossings should combine the below strategies in a context-sensitive manner.

High Visibility Markings

High visibility crosswalk and bike markings greatly improve the visibility of crossings for people walking and bicycling, which in turn can improve safety. Continental style crosswalk markings (wide bars parallel to traffic) are recommended for all uncontrolled crossings of major streets, and can also be appropriate crossing minor streets, particularly near schools, parks, and in high pedestrian areas. Similarly, wide green bars can be used to highlight bicycle crossings along neighborhood greenways or connecting bicycle lanes. Figure 20 displays planned high visibility crosswalk and bike markings to be included in the 2020 reconstruction of Wauwatosa Avenue at the Hillcrest Drive Neighborhood Greenway. This pavement marking pattern can be used as a standard for pedestrian and bicycle crossings of major streets at uncontrolled locations.

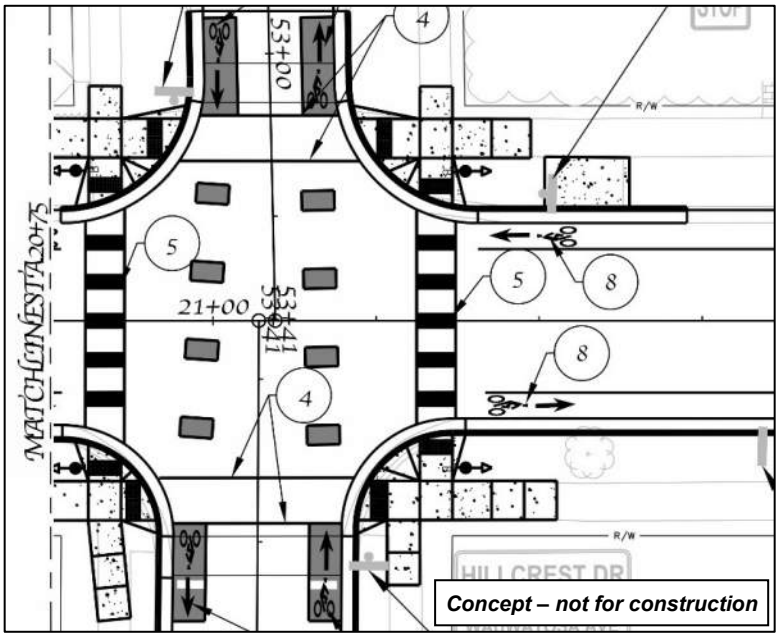

Figure 20: Example of high visibility crosswalks and bike crossings of a major street.

Traffic Signals and Beacons

Major street crossings can be a significant barrier along neighborhood greenways. Local streets will typically have stop control at the approach to the major street, while the major street will be uncontrolled. In some instances, rectangular rapid flash beacons (RRFBs), pedestrian hybrid beacons, or full traffic signals may be present to control the major street. At intersections with neighborhood greenways, it may be desirable to allow coordinated traffic signals to operate on half signal cycle lengths or to operate in “free” or uncoordinated mode during off-peak hours to reduce delays for all users.

Figure 21: Pedestrian hybrid beacons can provide traffic control across major streets

For planned neighborhood greenways, it might be necessary to consider *installation* of an RRFB, pedestrian hybrid beacon, or traffic control signal. In these cases, *projected* pedestrian and bicycle volumes should influence appropriate warrants.

Other Treatments for Major Crossings

A variety of other treatments should also be considered for major crossings. Treatments could include:

- Bicycle signal heads
- Bike boxes
- Crossing warning signs
- Advanced yield lines
- Parking restrictions
- Appropriate lighting levels
- Curb extensions
- Pedestrian refuge islands
- Raised crossings
- Narrowing or removing travel lanes

Figure 22: Example of a pedestrian refuge island combined with high visibility crosswalk markings, an advance yield line, and crossing warning signs

The Federal Highway Administration (FHWA) has published guidance for appropriate crossing treatments for unsignalized locations (Figure 23, next page). While intended to improve pedestrian safety, these treatments are also appropriate to improve the safety of people crossing major streets on bicycles.

Recommendation: Treatments to improve pedestrian and bicyclist safety should be considered at all crossings of major streets and should be based on the guidance provided by FHWA.

Figure 23: Guidance for Bicycle and Pedestrian Safety Improvements at Unsignalized Intersections

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

\# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

RESOURCES

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- AASHTO Guide for the Development of Bicycle Facilities. American Association of State Highway and Transportation Officials. (2012).
- Berkeley Bicycle Boulevard Signage System. City of Berkeley Transportation Division. https://www.cityofberkeley.info/Public_Works/Transportation/Bicycle_Boulevard_Signage_System.aspx
- Manual of Uniform Traffic Control Devices. U.S. Department of Transportation, Federal Highway Administration. 2009 Edition with Revisions No. 1 and 2 Incorporated (May 2012). https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm
- NACTO Urban Bikeway Design Guide. National Association of City Transportation Officials. https://nacto.org/publication/urban-bikeway-design-guide/
- Portland's Neighborhood Greenways Assessment Report. Toole Design & Portland Bureau of Transportation (2015). https://www.portlandoregon.gov/transportation/article/735768

NEIGHBORHOOD GREENWAY ASSESSMENTS

ASSESSMENTS OVERVIEW

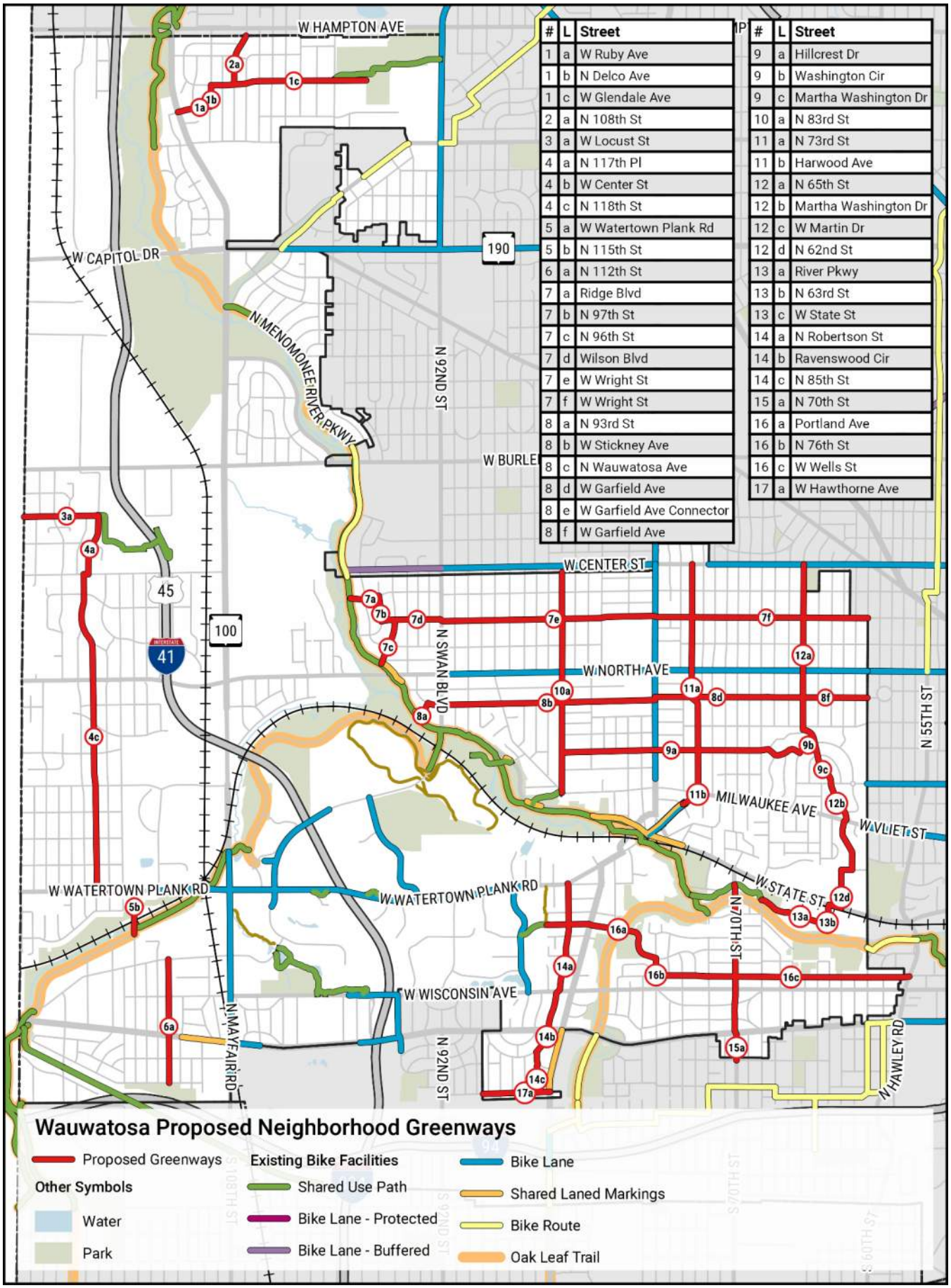
The City of Wauwatosa adopted the *City of Wauwatosa Bicycle & Pedestrian Facilities Plan* in April 2014 as the City's first comprehensive bicycle and pedestrian plan. The plan included a recommendation for approximately 20 miles of Neighborhood Greenways—low-traffic, low-stress connectivity for people bicycling throughout the city. This project assessed the recommended Neighborhood Greenways to provide the City with clear steps to implement the routes.

Each corridor assessments included a review of speed limits, traffic counts where available, connections to existing bikeways, major barriers, and notes about other relevant information such as parking utilization. Each corridor was initially reviewed using online mapping and street imagery tools and was then driven by the project team to confirm the online data and examine intersections and crossings of higher traffic streets. Based on current conditions, some routes were adjusted from the originally recommended corridors.

Following the field assessment, each corridor assessment was updated to include recommendations to implement a Neighborhood Greenway in the corridor. The recommendations include pavement markings, signage, changes to traffic control, and other treatments. The corridor assessments also provide a planning-level opinion of probable cost to implement the recommendations for each corridor based on cost data provided by the City. The opinion of probable cost to implement all of the Greenways is presented below:

Item	Unit Type	Unit Cost	Total Units	Total Cost
Greenway Sign - New Post	Per Sign	$250	119	$29,750
Greenway Sign - Existing Post	Per Sign	$100	198	$19,800
Shared Lane Marking (SLM)	Per Marking	$250	292	$73,000
High Visibility Crosswalk	Each	$2,500	39	$97,500
High Visibility Bike Crossing	Each	$2,500	26	$65,000
Curb Extension	Each	$7,500	11	$82,500
Rapid Flash Beacon	Each	$15,000	27	$405,000
Sidewalk	Per Mile	$475,000	0.26	$28,500
Shared Use Path	Per Mile	$800,000	0.50	$400,000
			Subtotal	**$1,201,050**
			Contingency (20%)	$240,210
			Total Estimated Cost	**$1,441,260**

A map of the corridors is provided on the following page, with the individual corridor assessments following the map.



#	L	Street
1	a	W Ruby Ave
1	b	N Delco Ave
1	c	W Glendale Ave
2	a	N 108th St
3	a	W Locust St
4	a	N 117th Pl
4	b	W Center St
4	c	N 118th St
5	a	W Watertown Plank Rd
5	b	N 115th St
6	a	N 112th St
7	a	Ridge Blvd
7	b	N 97th St
7	c	N 96th St
7	d	Wilson Blvd
7	e	W Wright St
7	f	W Wright St
8	a	N 93rd St
8	b	W Stickney Ave
8	c	N Wauwatosa Ave
8	d	W Garfield Ave
8	e	W Garfield Ave Connector
8	f	W Garfield Ave

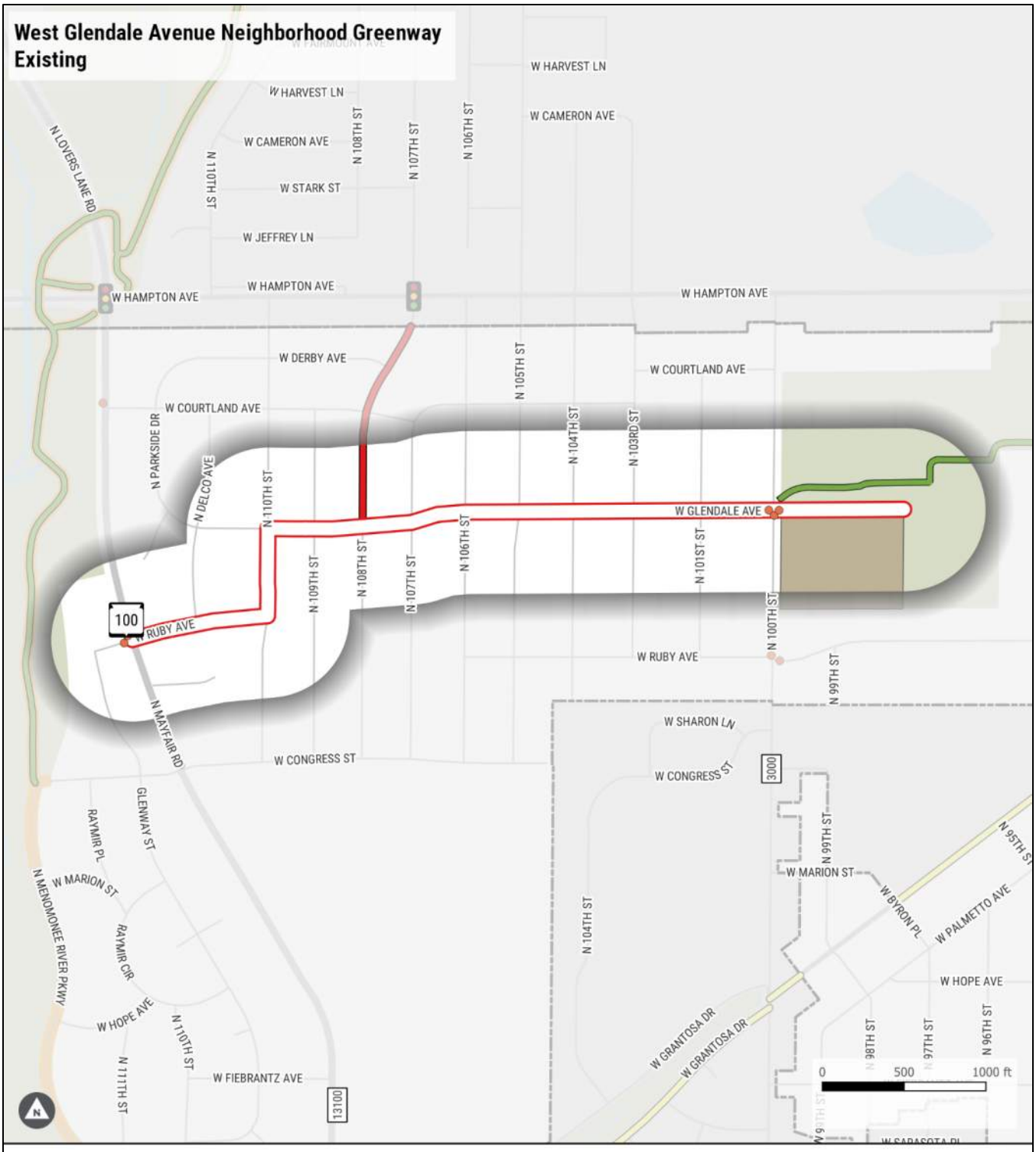
#	L	Street
9	a	Hillcrest Dr
9	b	Washington Cir
9	c	Martha Washington Dr
10	a	N 83rd St
11	a	N 73rd St
11	b	Harwood Ave
12	a	N 65th St
12	b	Martha Washington Dr
12	c	W Martin Dr
12	d	N 62nd St
13	a	River Pkwy
13	b	N 63rd St
13	c	W State St
14	a	N Robertson St
14	b	Ravenswood Cir
14	c	N 85th St
15	a	N 70th St
16	a	Portland Ave
16	b	N 76th St
16	c	W Wells St
17	a	W Hawthorne Ave

1. WEST GLENDALE AVENUE

Length: 1.01 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Menomonee River Parkway, Webster Park, Madison Park
Connectivity to Schools	• Madison Elementary School • Portion of the greenway is along a designated Safe Route to School
Connectivity to Existing Bikeways	• Madison Park Path behind Madison Elementary School • Proposed Neighborhood Greenways on N 108th Street
Connectivity to Transit	• Intersects with Routes 28 and 85 on N Mayfair Road, and with Route 85 on N 100th Street
Major Barriers	• N Mayfair Road (high traffic)

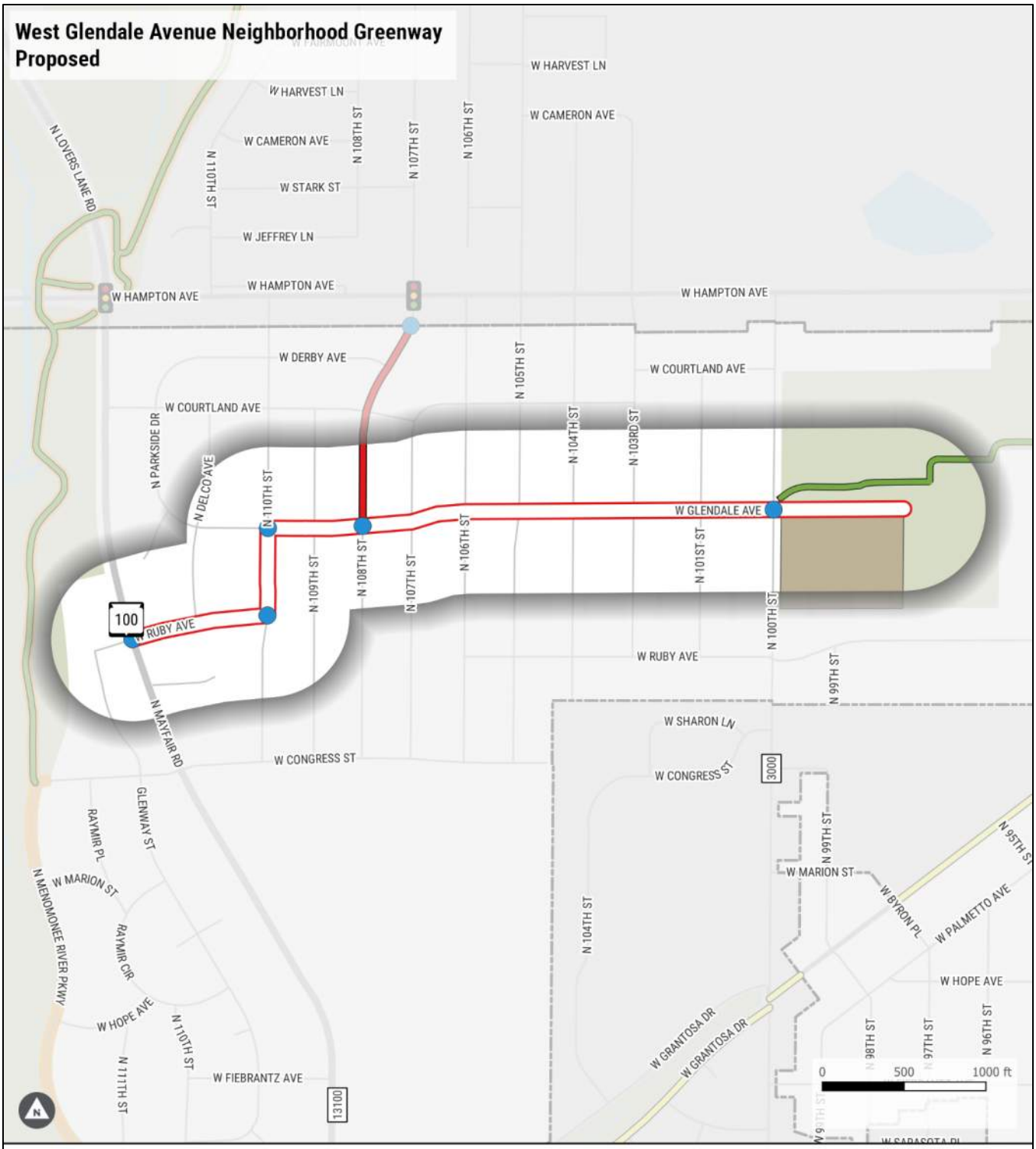
Existing crossing of Mayfair Road at Ruby Avenue



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

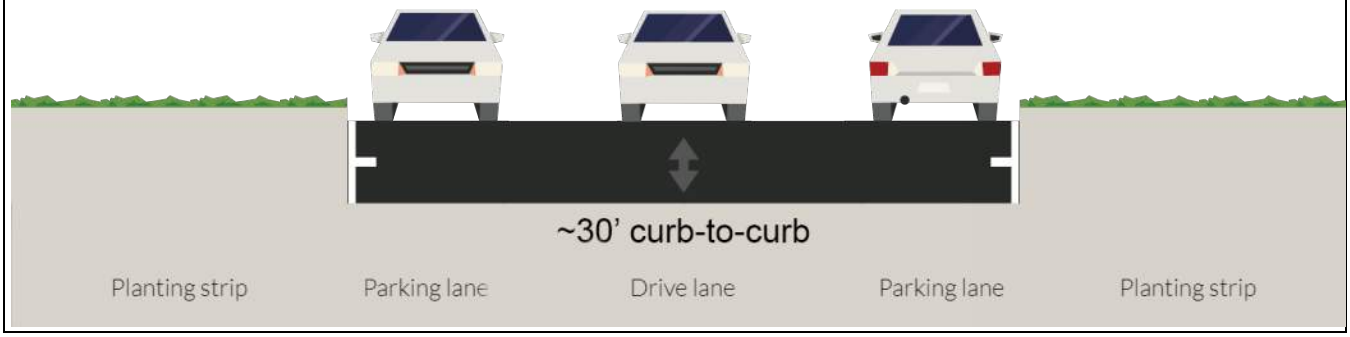
Existing Crossing Treatments
- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

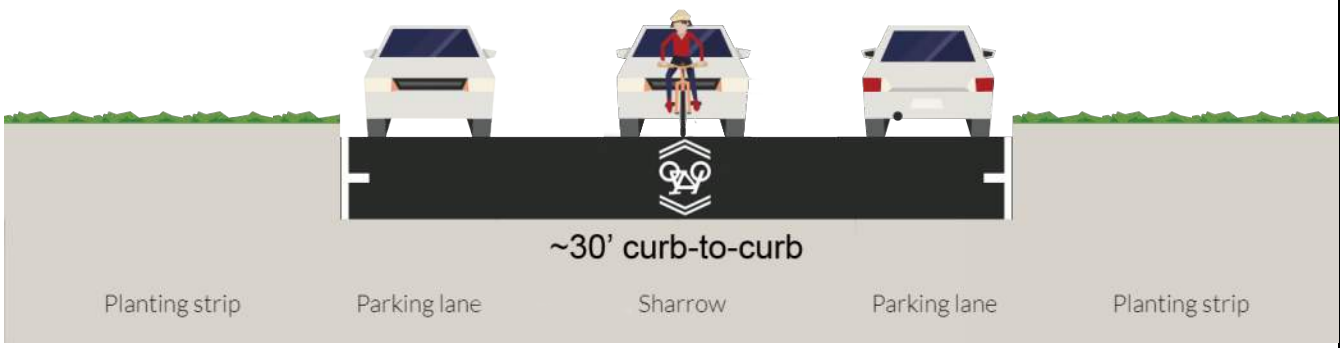

West Glendale Avenue Neighborhood Greenway
Proposed
W HARVEST LN
W CAMERON AVE
W STARK ST
W JEFFREY LN
W HAMPTON AVE
W DERBY AVE
W COURTLAND AVE
W GLENDALE AVE
W RUBY AVE
W SHARON LN
W CONGRESS ST
W MARION ST
W HOPE AVE
W FIEBRANTZ AVE
W GRANTOSA DR
W PALMETTO AVE
W BYRON PL
N LOVERS LANE RD
N 111TH ST
N 110TH ST
N 109TH ST
N 108TH ST
N 107TH ST
N 106TH ST
N 105TH ST
N 104TH ST
N 103RD ST
N 101ST ST
N 100TH ST
N 99TH ST
N 98TH ST
N 97TH ST
N 96TH ST
N 95TH ST
N PARKSIDE DR
N DELCO AVE
N MAYFAIR RD
N MENOMONEE RIVER PKWY
RAYMIR PL
RAYMIR CIR
GLENWAY ST
100
3000
13100
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

W Ruby Avenue / N Delco Avenue / W Glendale Avenue (N Mayfair Road to N 100th Street) – **Existing**

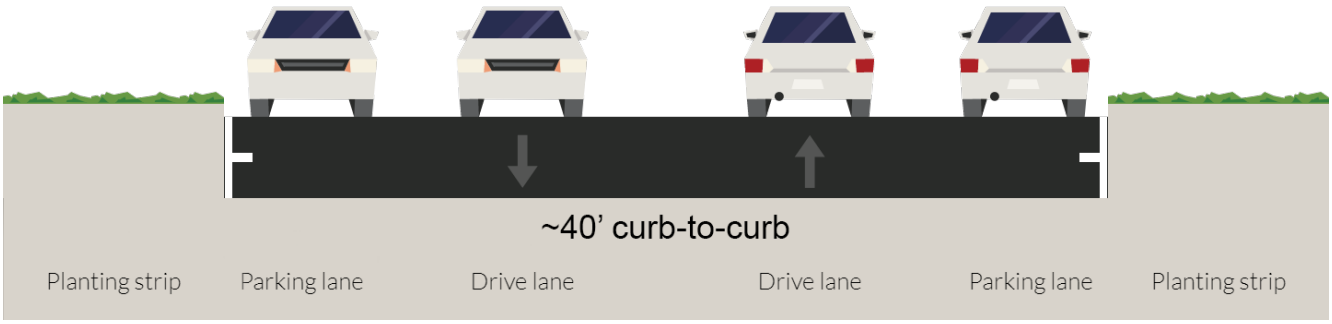


W Ruby Avenue / N Delco Avenue / W Glendale Avenue (N Mayfair Road to N 100th Street) – **Proposed**

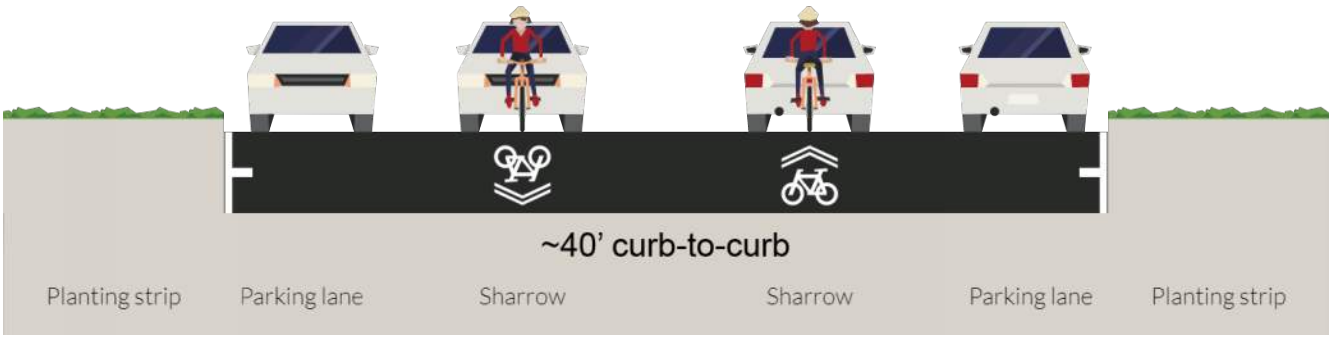


Note: Bidirectional SLMs may require FHWA experimentation.

W Glendale Avenue (N 100th Street to Madison Elementary School) – **Existing**



W Glendale Avenue (N 100th Street to Madison Elementary School) – **Proposed**



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (21)
- Install neighborhood greenway signs (2 per block)
- Wayfinding (future)
  - **N Mayfair Road:** Direct east to park
  - **N 110th Street and West Ruby Avenue:** Direct users through turns
  - **N 110th Street and W Glendale Avenue:** Direct users through turns
  - **N 108th Street:** Connection to greenway
  - **N 100th Street:** Direct to trail

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides numerous connections to parks, trails, and schools

Other Considerations

- Existing high visibility crosswalk and pedestrian refuge at intersection with N Mayfair Road
- Existing high visibility crosswalk at intersection with N 100th Street

Planning-Level Cost Estimates

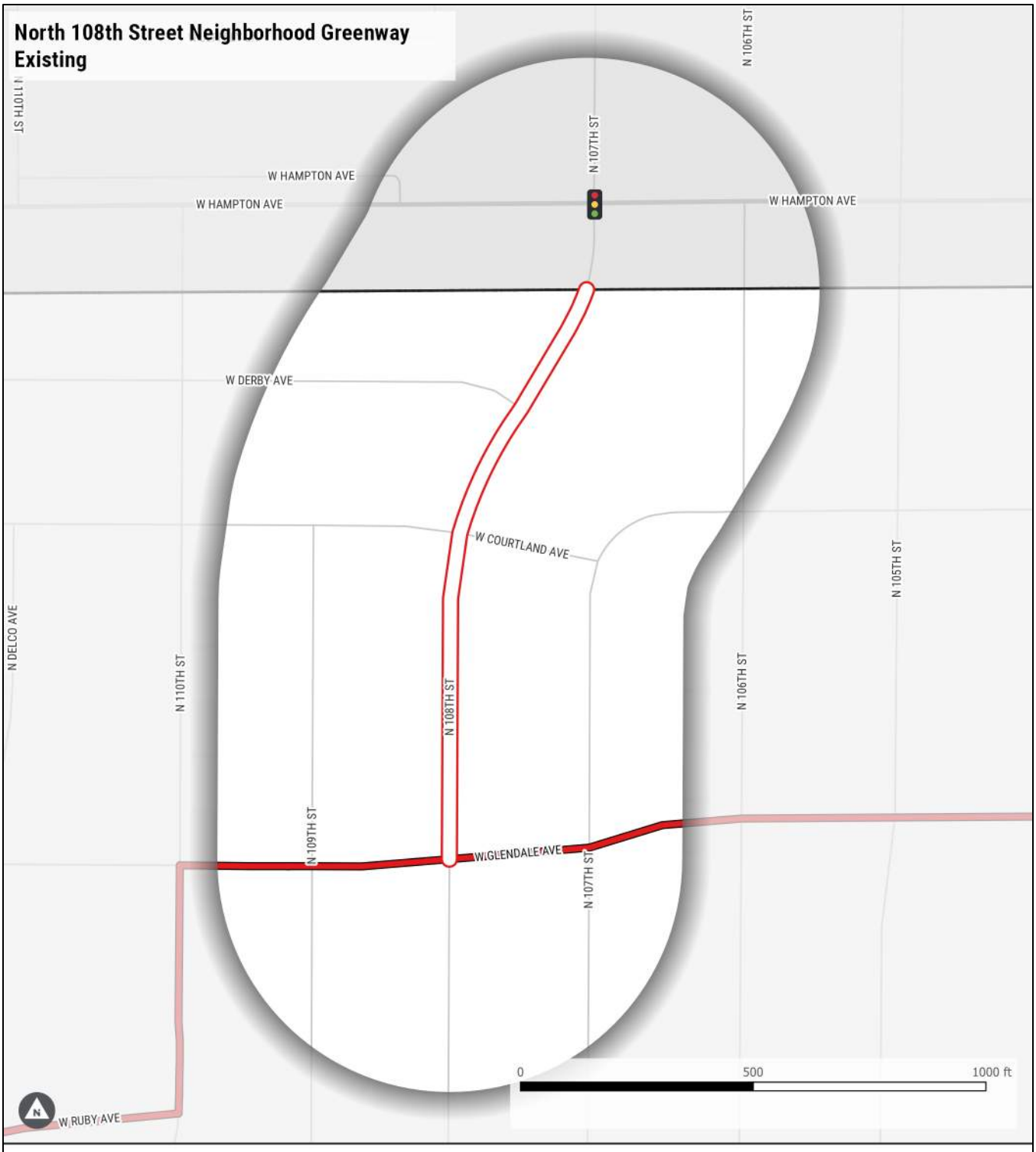
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	8	$2,000
Greenway Sign-Existing Post	$100	Per sign	8	$800
Shared Lane Marking	$250	Per Marking	21	$5,250
			Subtotal	**$8,050**
	20% for incidentals (traffic control, etc.) and contingency			$1,610
			Total	**$9,660**

Potential Risks	Proposed Mitigation
• None	• None

2. NORTH 108TH STREET

Length: 0.25 miles **Posted Speed Limit:** 25 mph

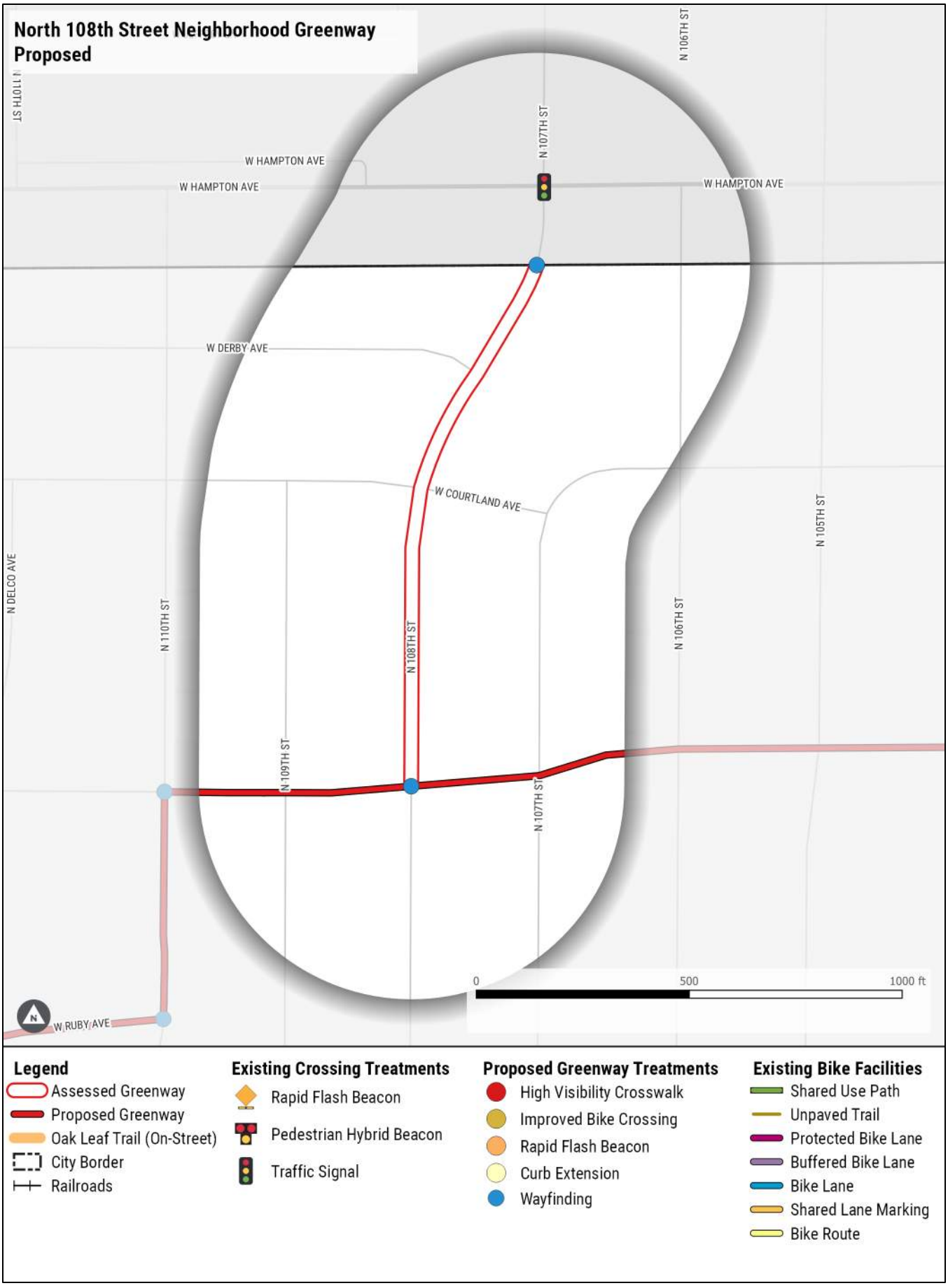
Considerations	Notes
Connectivity to Parks	• None
Connectivity to Schools	• None
Connectivity to Existing Bikeways	• Proposed Neighborhood Greenways on W Glendale Avenue
Connectivity to Transit	• Route ends just south of W Hampton Avenue, which is served by Route 85
Major Barriers	• W Hampton Avenue (high traffic). Technically, the greenway ends about 130 feet south of W Hampton Avenue



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

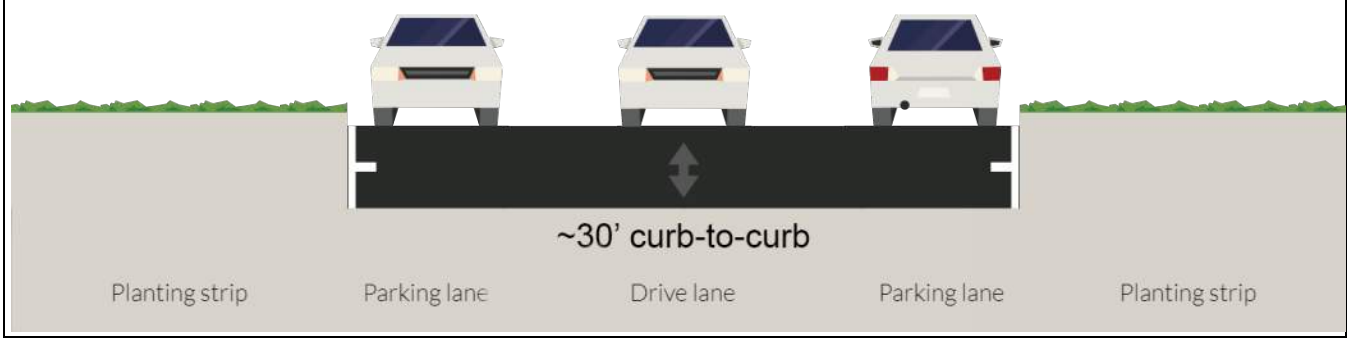
Existing Crossing Treatments
- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

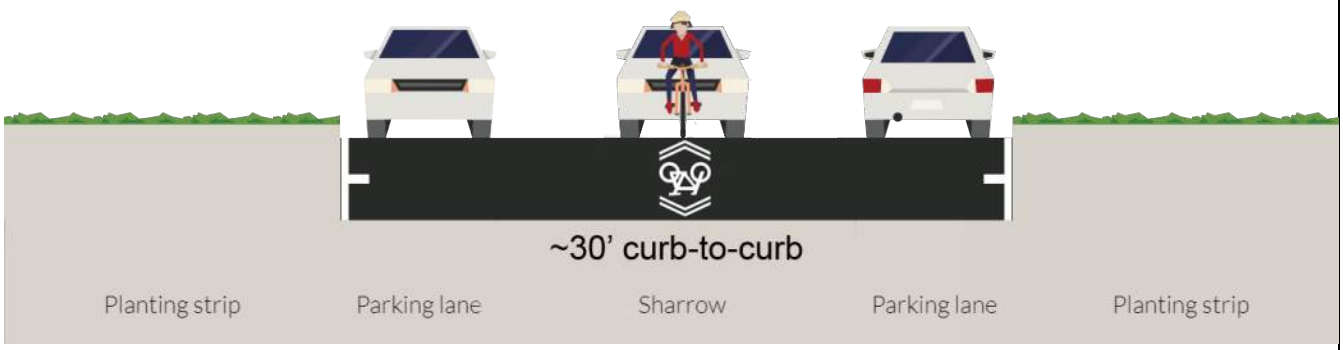

North 108th Street Neighborhood Greenway
Proposed
N 106TH ST
N 107TH ST
W HAMPTON AVE
W HAMPTON AVE
W HAMPTON AVE
W DERBY AVE
W COURTLAND AVE
N 105TH ST
N DELCO AVE
N 110TH ST
N 108TH ST
N 106TH ST
N 109TH ST
N 107TH ST
0
500
1000 ft
W RUBY AVE
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

N 108th Street (W Glendale Avenue to just south of W Hampton Avenue) – **Existing**



N 108th Street (W Glendale Avenue to just south of W Hampton Avenue) – **Proposed**



Note: Bidirectional SLMs may require FHWA experimentation.

Design Recommendations

Recommendations

- Install shared lane markings along the entire corridor (4)
- Install neighborhood greenway signs (2 per block)
- Wayfinding (future)
  - **W Hampton Avenue*:** Direct users north to Milwaukee, south to the W Glendale Avenue greenway
  - **W Glendale Avenue:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides a connection to the proposed W Glendale Avenue Neighborhood Greenway, which will be important east-west route

** Place slightly south of W Hampton Avenue to stay within Wauwatosa's city limits*

Other Considerations

- Short greenway primarily to connect people north to Milwaukee

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	1	$250
Greenway Sign-Existing Post	$100	Per sign	1	$100
Shared Lane Marking	$250	Per Marking	4	$1,000
			Subtotal	**$1,350**
	20% for incidentals (traffic control, etc.) and contingency			$270
			Total	**$1,620**

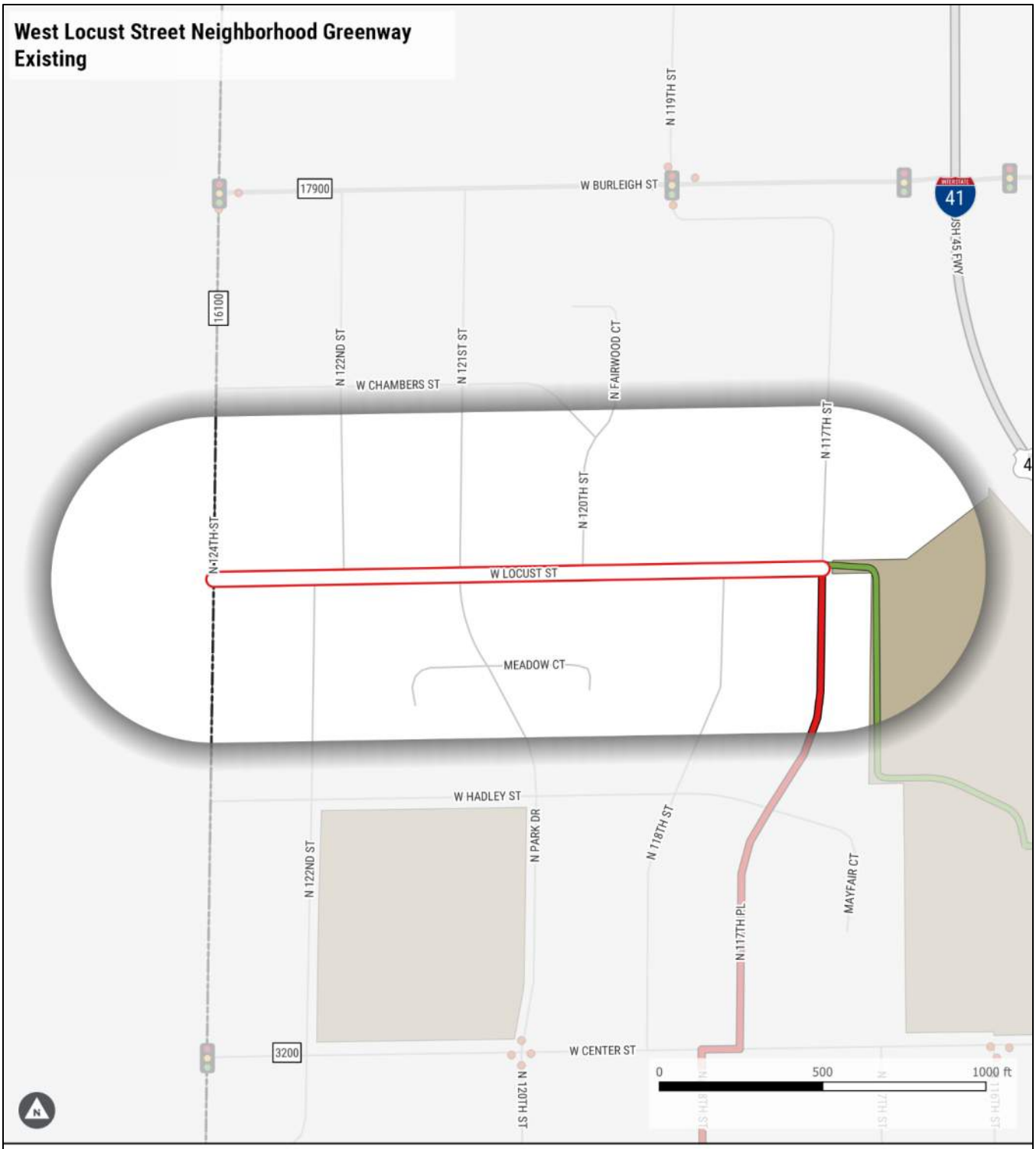
Potential Risks	Proposed Mitigation
• None	• None

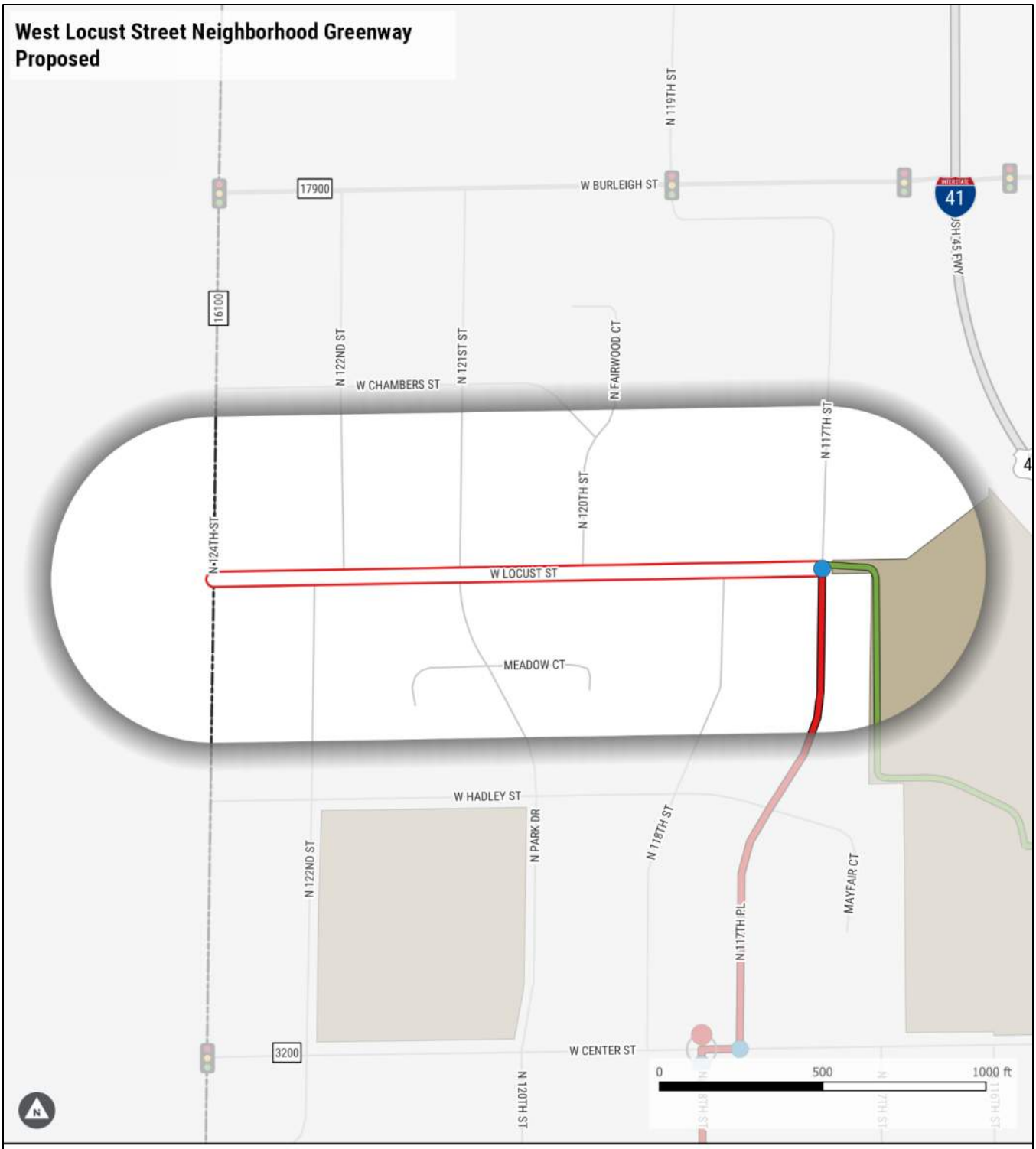
3. WEST LOCUST STREET

Length: 0.35 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Menomonee River Parkway
Connectivity to Schools	• Eisenhower Elementary School, Wauwatosa West High School
Connectivity to Existing Bikeways	• Shared Use Path at N 117th Street • Proposed Neighborhood Greenway at N 117th Street
Connectivity to Transit	• Intersects with Route 85 on N 124th Street
Major Barriers	• N 124th Street (high traffic, and the city boundary)

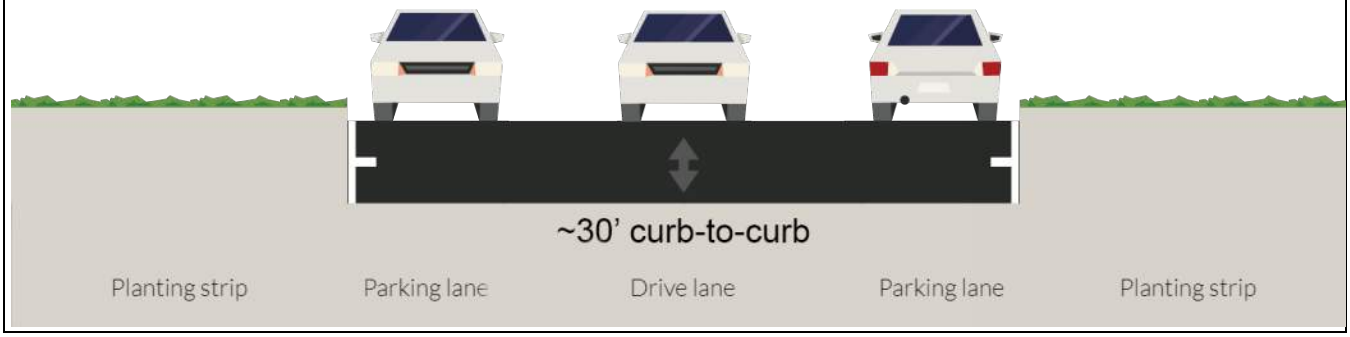
Existing intersection of W Locust Street and N 124th Street. No proposed improvement at this time because there is no sidewalk on the west side of N 124th Street. Crossing improvements should be considered when other improvements are done on this street.


West Locust Street Neighborhood Greenway
Existing
N 119TH ST
17900
W BURLEIGH ST
INTERSTATE
41
USH 45 FWY
16100
N 122ND ST
N 121ST ST
W CHAMBERS ST
N FAIRWOOD CT
N 117TH ST
N 120TH ST
N 124TH ST
W LOCUST ST
MEADOW CT
W HADLEY ST
N 122ND ST
N PARK DR
N 118TH ST
MAYFAIR CT
N 117TH PL
3200
W CENTER ST
N 120TH ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

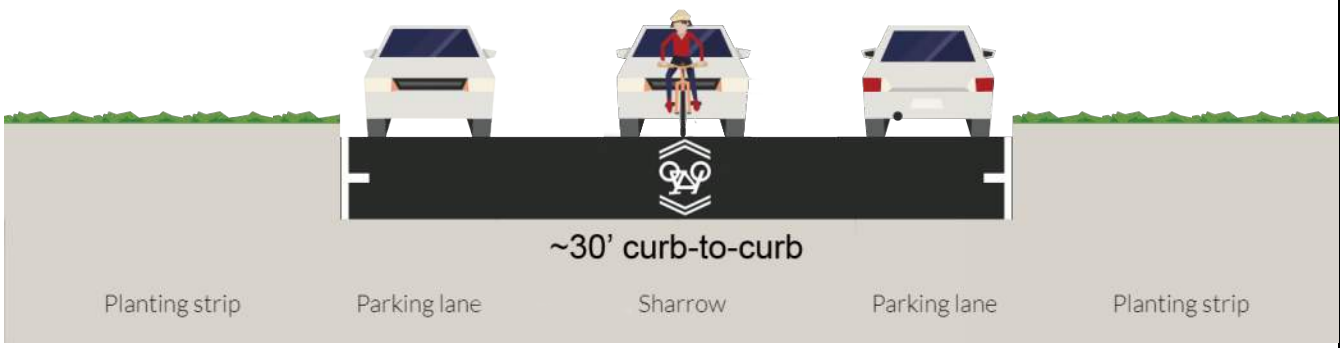

West Locust Street Neighborhood Greenway
Proposed
N 119TH ST
17900
W BURLEIGH ST
41
USH 45 FWY
16100
N 122ND ST
N 121ST ST
W CHAMBERS ST
N FAIRWOOD CT
N 117TH ST
N 120TH ST
N 124TH ST
W LOCUST ST
MEADOW CT
W HADLEY ST
N 122ND ST
N PARK DR
N 118TH ST
MAYFAIR CT
N 117TH PL
3200
W CENTER ST
N 120TH ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

W Locust Street (N 124th Street to N 117th Street) – **Existing**



W Locust Street (N 124th Street to N 117th Street) – **Proposed**



Note: Bidirectional SLMs may require FHWA experimentation.

Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (4)
- Install neighborhood greenway signs (2 per block)
- Wayfinding (future)
  - **N 117th Street:** Connection to the path (straight) and neighborhood greenway (right)

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides a connection to schools and a trail

Other Considerations

- Not promoting crossing of N 124th St on west end: no sidewalk on east side of street and no proposed crosswalk improvement

Planning-Level Cost Estimates

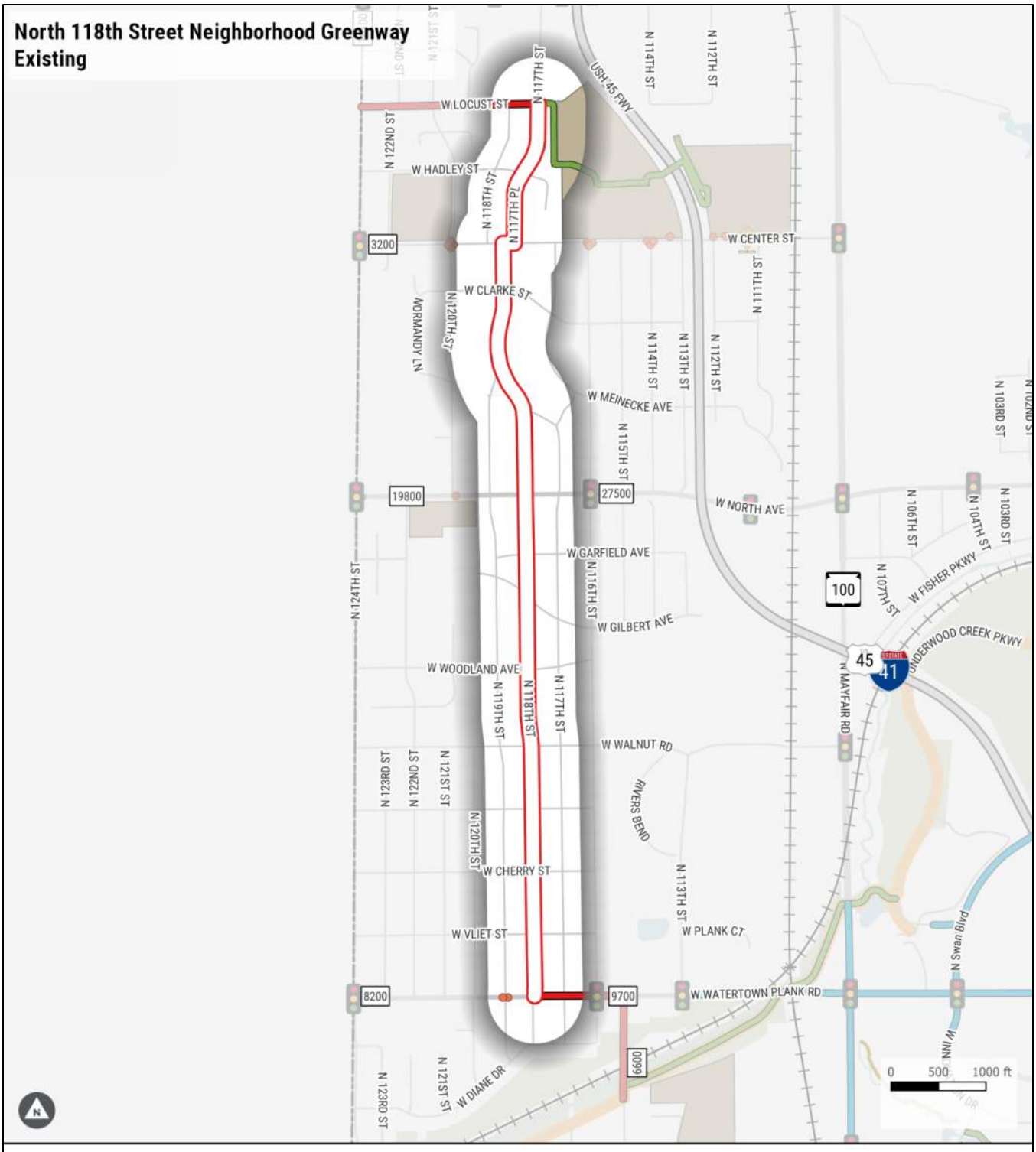
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-Existing Post	$100	Per sign	4	$400
Shared Lane Marking	$250	Per Marking	4	$1,000
			Subtotal	**$1,400**
	20% for incidentals (traffic control, etc.) and contingency			$280
			Total	**$1,680**

Potential Risks	Proposed Mitigation
• None	• None

4. NORTH 118TH STREET

Length: 1.84 miles **Posted Speed Limit:** 25 mph

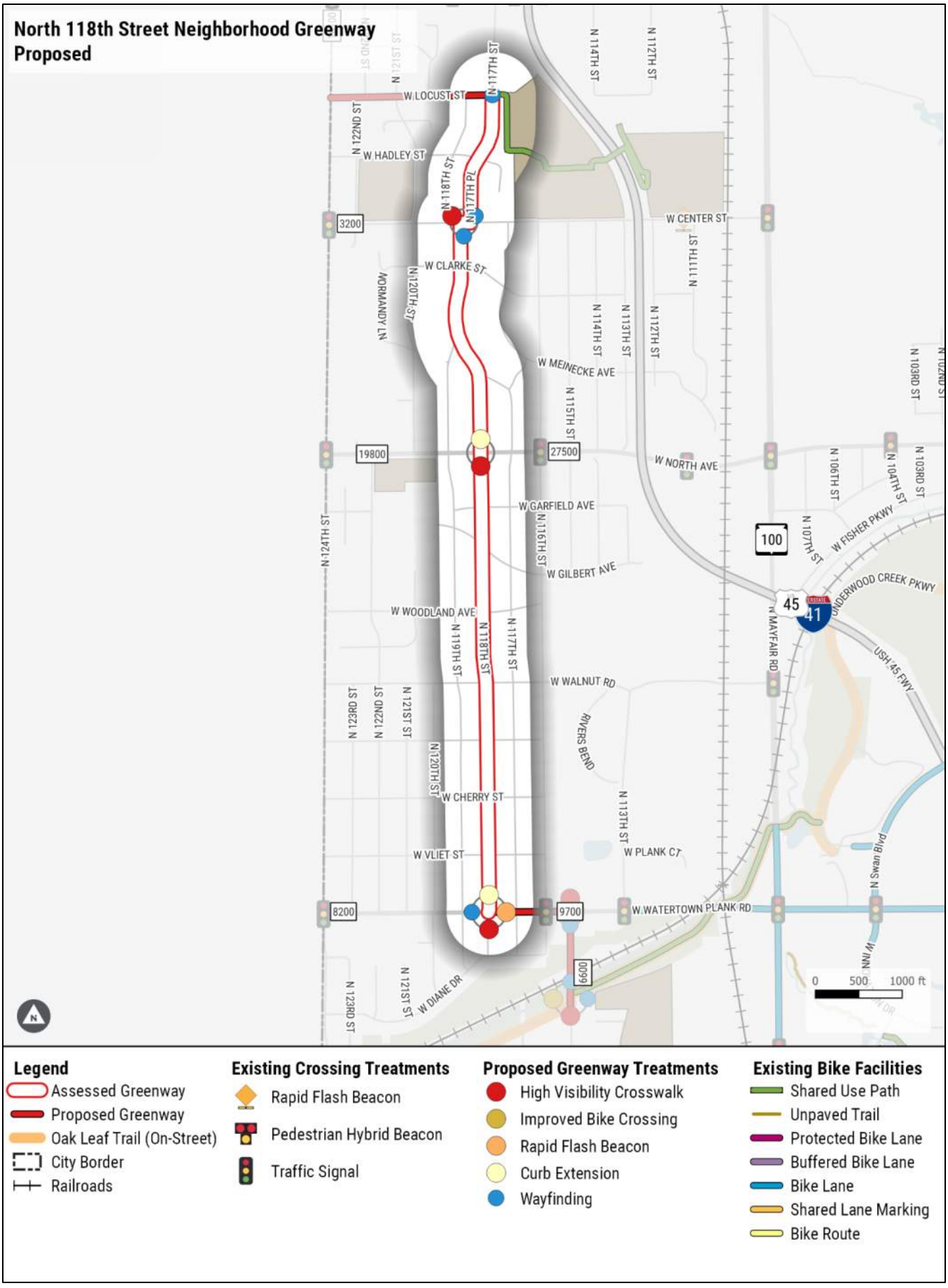
Considerations	Notes
Connectivity to Parks	• Underwood Creek Parkway
Connectivity to Schools	• Eisenhower Elementary School • Wauwatosa West High School
Connectivity to Existing Bikeways	• Proposed Neighborhood Greenways on W Locust Street and W Diane Drive
Connectivity to Transit	• Intersects with Route 85 at W North Avenue and W Watertown Plank Road and with Route 28 at W North Avenue
Major Barriers	• W North Street (high traffic) • W Watertown Plank Road (high traffic) • Misaligned crossing at W Center Street



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments
- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

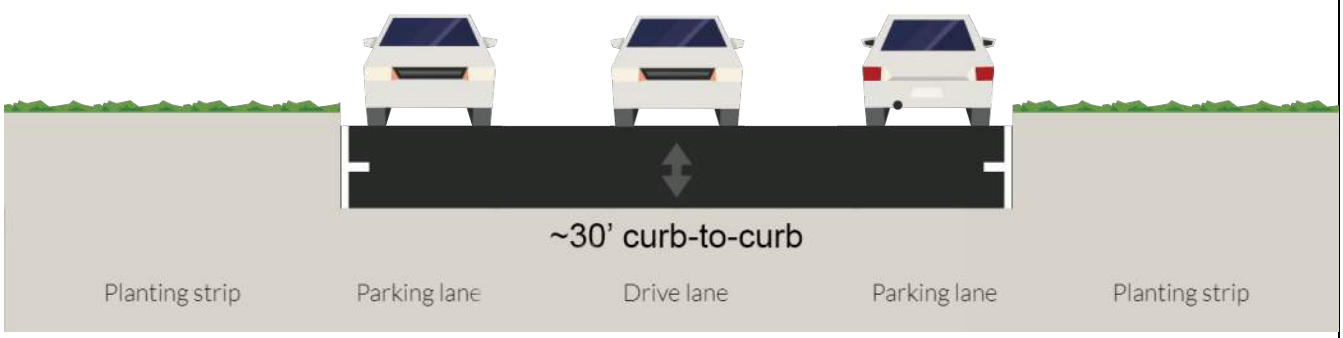
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

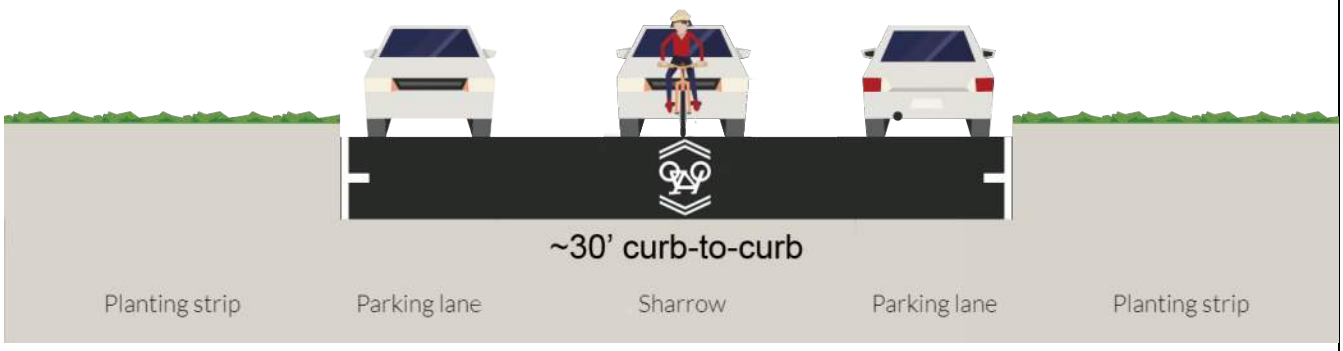
Typical Cross-Sections

W 117th Street / 118th Street (W Locust Street to W Diane Drive) – **Existing**



Note: N 117th Street measures 36' north of W Hadley Street and 27' for very brief sections between W Center Street and N 119th Street

W 117th Street / W 118th Street (W Locust Street to W Diane Drive) – **Proposed**



Note: N 117th Street measures 36' north of W Hadley Street and 27' for very brief sections between W Center Street and N 119th Street; where the street is 32' or wider, standard shared lane markings should be used. Bidirectional SLMs may require FHWA experimentation.

Proposed intersection improvements at Center Street

Proposed crosswalk improvements at W. North Avenue

Proposed intersection improvements at West Watertown Plank Road to be considered as part of future capital improvement project

Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (28)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **W Center Street:** High visibility crosswalks (3); there is a long-term plan to install bike lanes on W Center Street
  - **W North Avenue:** High visibility crosswalks (2); curb extensions (3)
  - **W Watertown Plank Road:** High visibility crosswalks (4); RRFBs (2); Curb extensions (4); W Watertown Plank Road is planned for reconstruction in the Capital Improvement Plan (CIP)
- Wayfinding (future)
  - **W Locust Street:** Connection to greenway
  - **W Center Street:** Signs facing each direction to direct users through a jog in the greenway
  - **W Watertown Plank Road:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to a park, a trail, and several schools

Other Considerations

- No existing high visibility crosswalks at intersections along the corridor
- There is a long-term plan to put a multi-use trail within the road ROW (north side)

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	4	$1,000
Greenway Sign-Existing Post	$100	Per sign	26	$2,600
Shared Lane Marking	$250	Per Marking	28	$7,000
High Visibility Crosswalk	$2,500	Each	9	$22,500
Curb Extension	$7,500	Each	7	$52,500
Rapid Flash Beacon	$15,000	Each	2	$30,000
			Subtotal	**$115,600**
		20% for incidentals (traffic control, etc.) and contingency		$23,120
			Total	**$138,720**

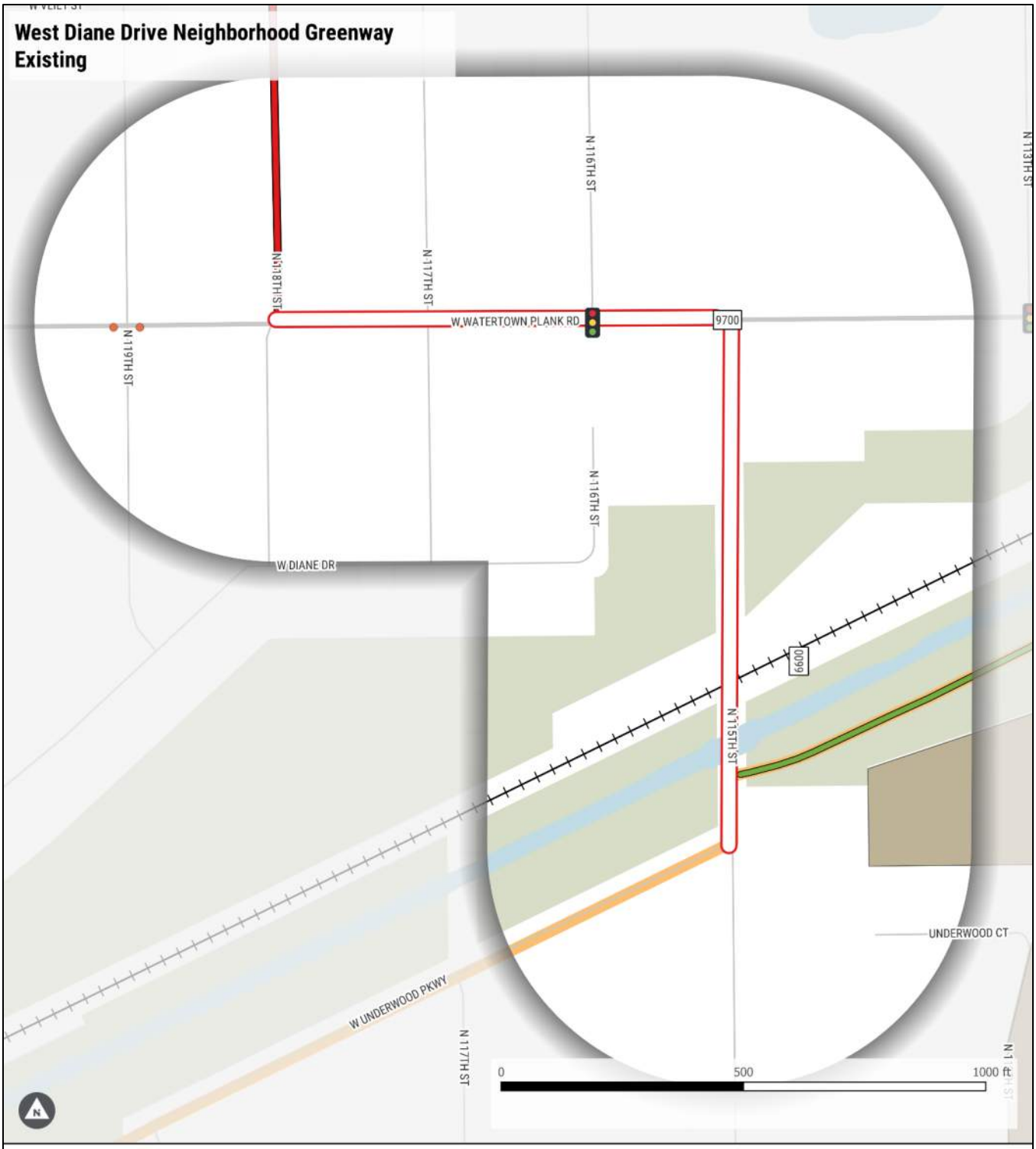
** A pedestrian hybrid beacon could be considered at W North Avenue (instead of the rapid flash beacons). The cost of a pedestrian hybrid beacon is $60,000 (each), for a total cost at W North Avenue of $120,000.*

Potential Risks	Proposed Mitigation
• Bike lanes and turn boxes on W Center Street will require parking removal	• Proactive outreach to the impacted residents and the surrounding community

5. NORTH 115TH STREET

Length: 0.38 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Underwood Creek Parkway
Connectivity to Schools	• Underwood Elementary School
Connectivity to Existing Bikeways	• Oak Leaf Trail on N Menomonee River Parkway (on-street west of N 115th Street with an off-street path east of N 115th Street) • Proposed Neighborhood Greenway on N 118th Street; links to another Neighborhood Greenway (on N 112th Street) via Underwood Elementary School
Connectivity to Transit	• Route 85 runs along the Neighborhood Greenway along N 115th Street
Major Barriers	• Railroad crossing north of Underwood Creek • High-traffic segment along N 115th Street north of W Underwood Parkway • High traffic segment along W Watertown Plank Road



Legend

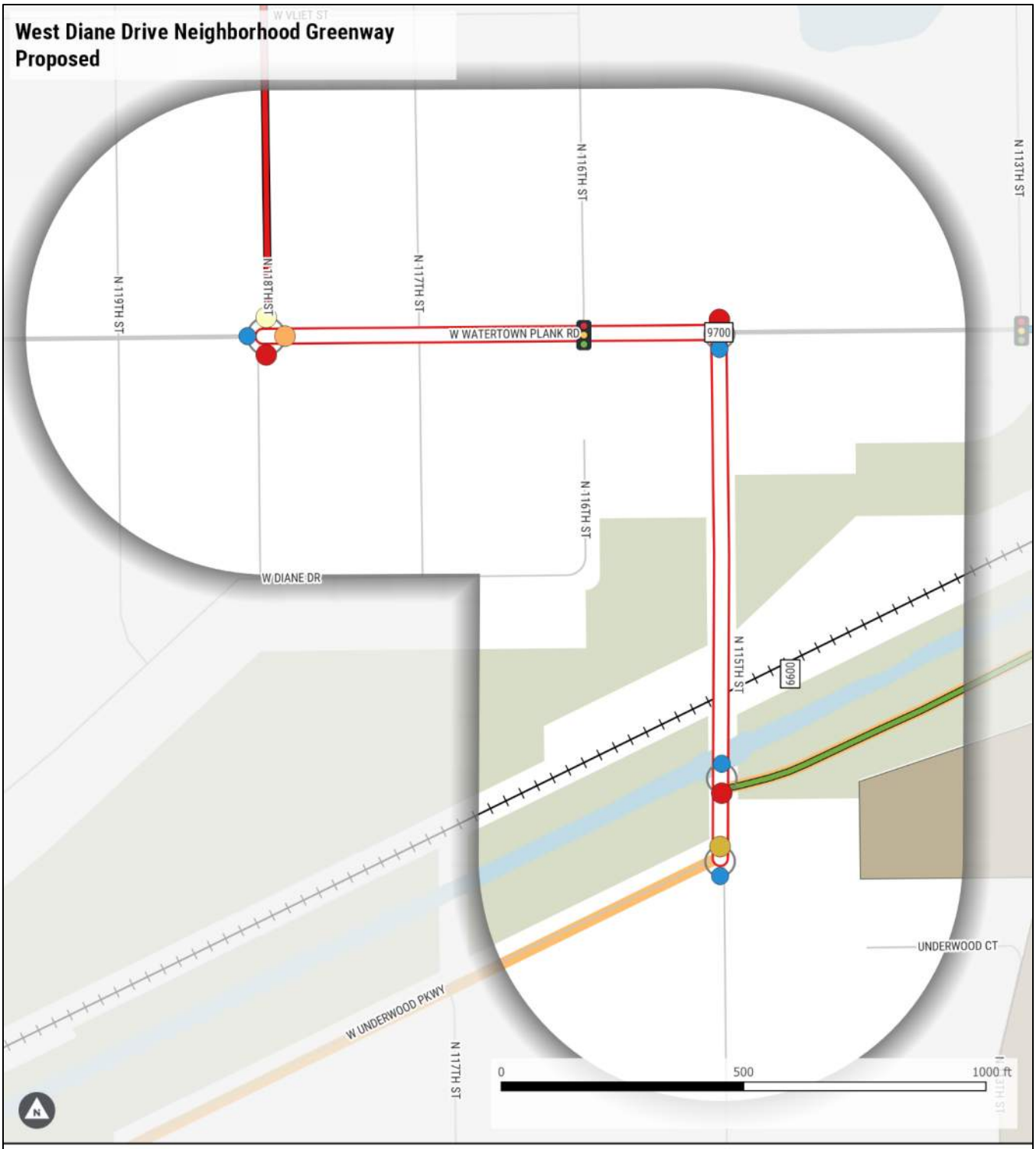
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments

- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

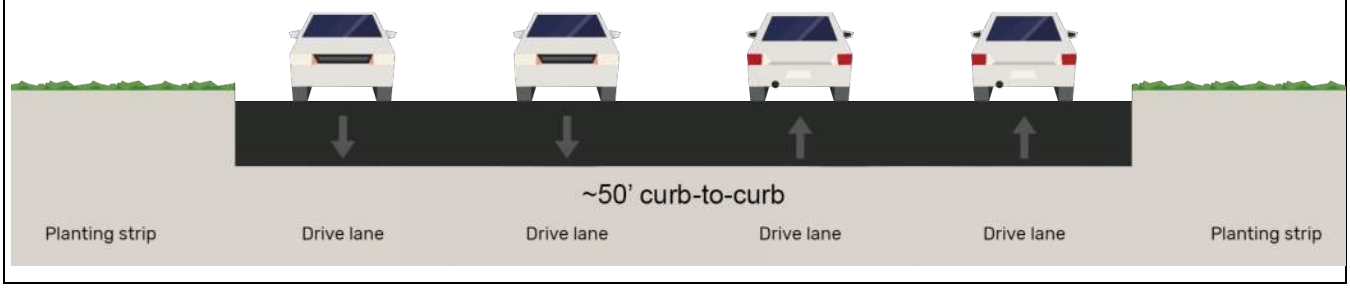
Existing Bike Facilities

- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

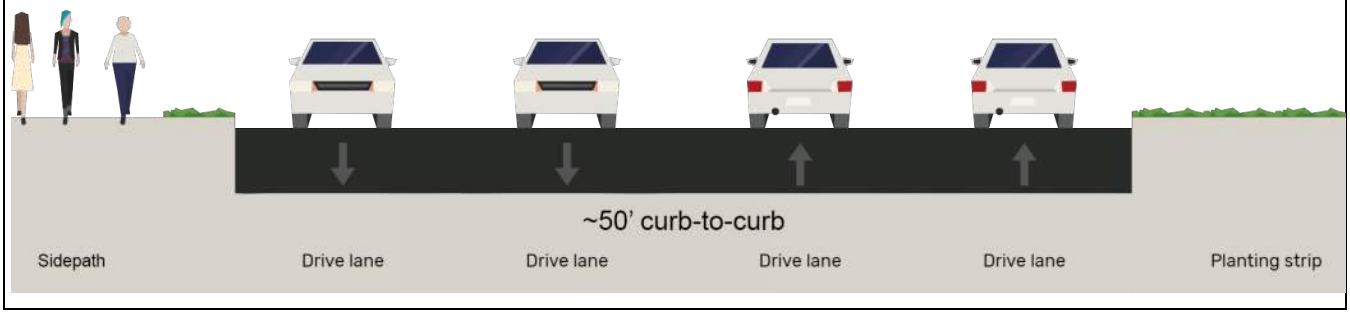

West Diane Drive Neighborhood Greenway
Proposed
W VLIET ST
N 119TH ST
N 118TH ST
N 117TH ST
N 116TH ST
N 113TH ST
W WATERTOWN PLANK RD
9700
W DIANE DR
N 115TH ST
0099
UNDERWOOD CT
W UNDERWOOD PKWY
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

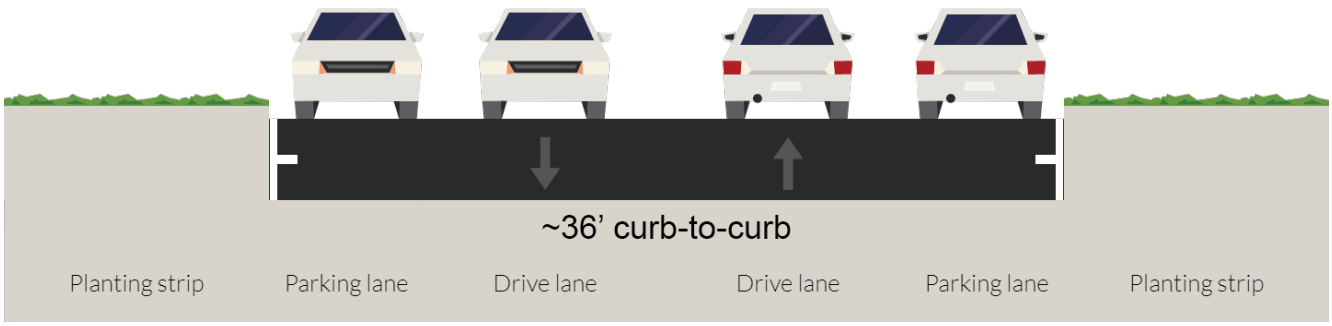
W Watertown Plank Road (N 118th Street to N 115th Street) – **Existing**



W Watertown Plank Road (N 118th Street to N 115th Street) – **Proposed**

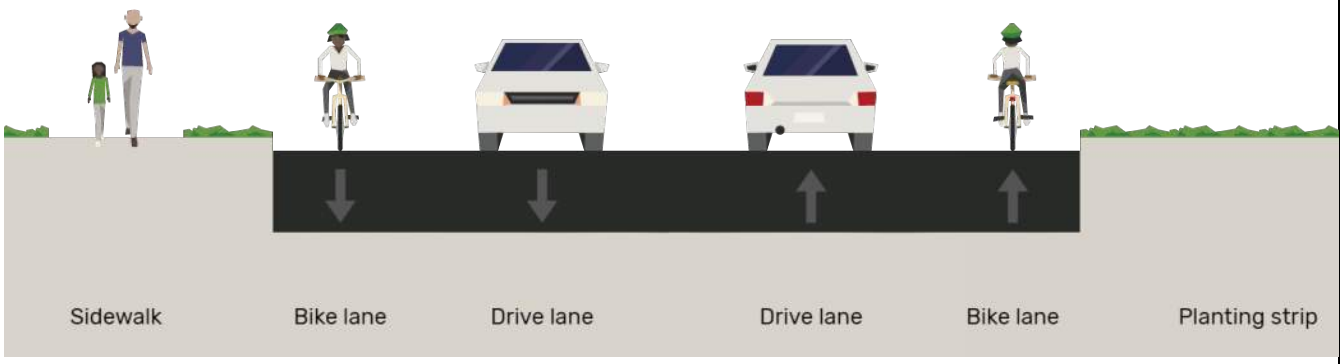


N 115th Street (Existing path to W Underwood Parkway) – **Existing**



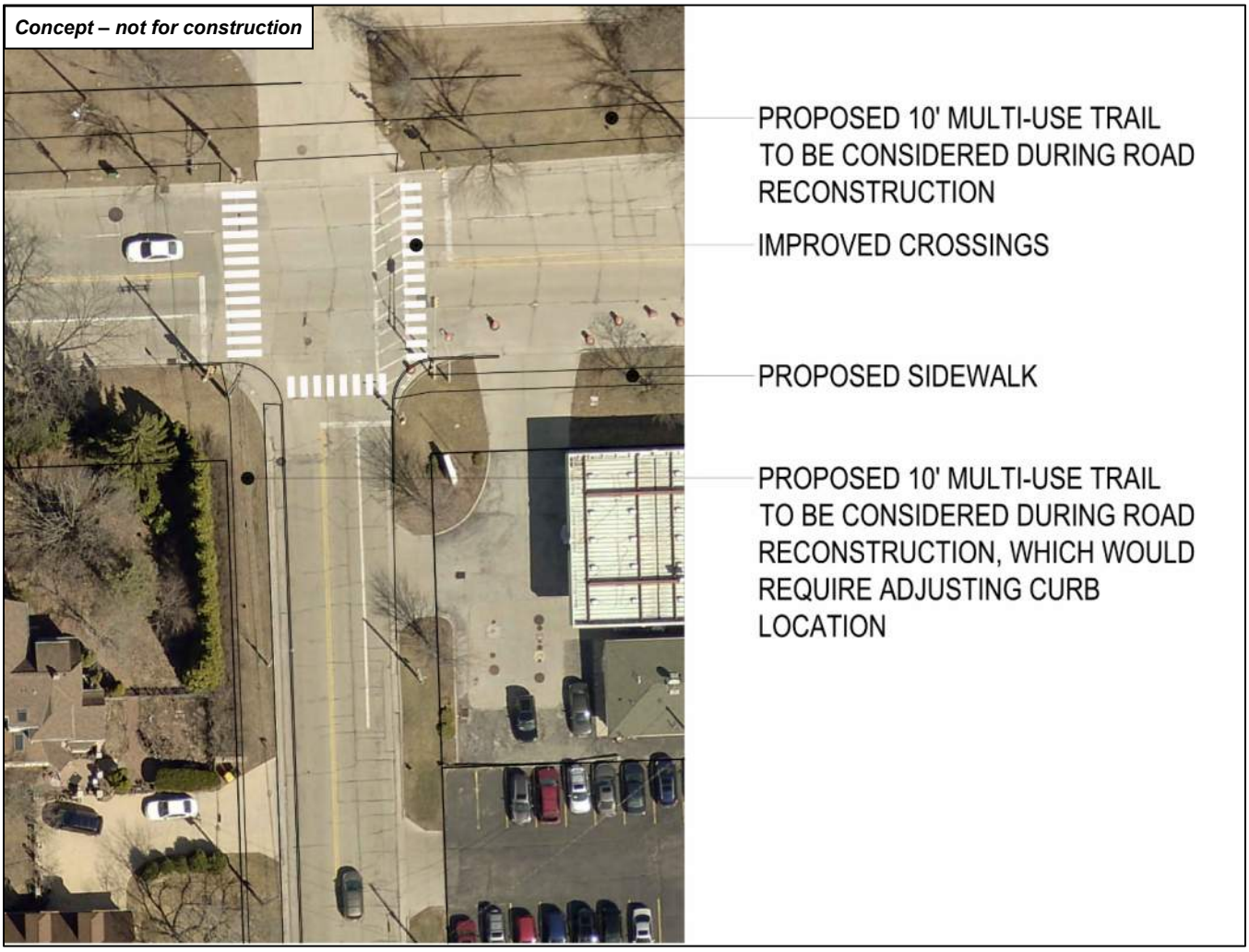
Note: Parking is shown above because it is along most of N 115th Street. Parking is not allowed on the bridge.

N 115th Street (Existing path to W Underwood Parkway) – **Proposed**



Note: Parking is shown above because it is along most of N 115th Street. Parking is not allowed on the bridge.

Proposed improvements on N 115th St



Planned path connection from the Oak Leaf Trail to Underwood Elementary School

Design Recommendations

Recommendations

- Install a shared use path on W Watertown Plank Road when the road is reconstructed
- Install ashared use path along N 115th Street between W Watertown Plank Road and Underwood Parkway
- Install a shared use path to connect the Oak Leaf Trail to a new path to be constructed by the school district
- Intersection Treatments
  - **N 115th Street:** High visibility crosswalks (3)
  - **Oak Leaf Trail:** High visibility crosswalk (1) across N 115th Street (south of the creek)
  - **W Underwood Parkway:** Bike crossing (1) across N 115th Street
- Wayfinding (future)
  - **N 118th Street:** Connection to neighborhood greenway
  - **N 115th Street:** Guiding users through a turn
  - **Intersection with Oak Leaf Trail:** Connection to Oak Leaf Trail and a path connecting to Underwood Elementary School
  - **W Underwood Parkway:** Connection to on-street section of Oak Leaf Trail

Rationale

- This route links two different Neighborhood Greenways (4 and 6) via Underwood Elementary School.

Other Considerations

- This corridor connects the N 118th Street and N 112th Street Neighborhood Greenways, as well as the Oak Leaf Trail and Underwood School.

Planning-Level Cost Estimates

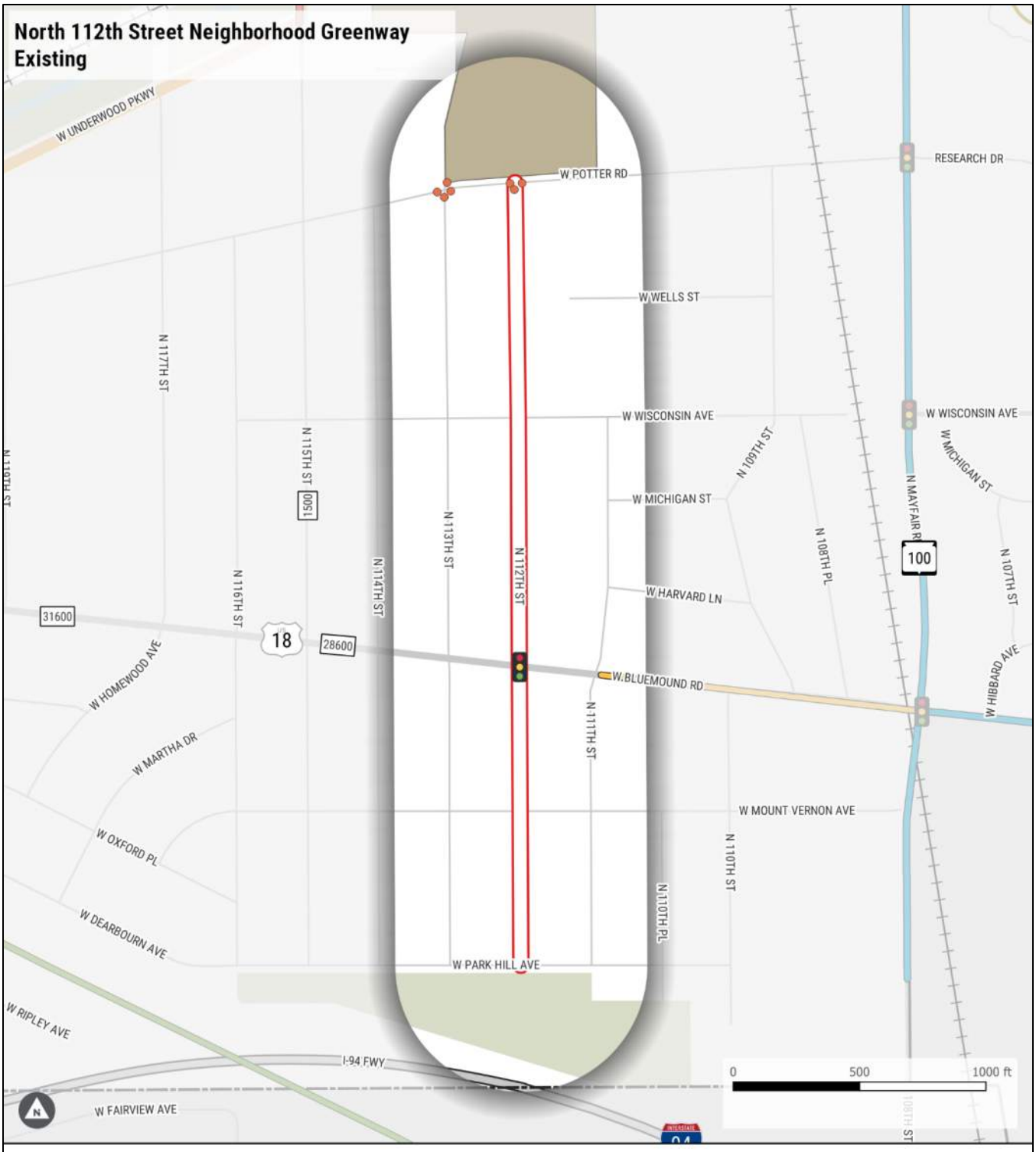
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign	$250	Per sign	4	$1,000
High Visibility Crosswalk	$2,500	Each	4	$10,000
Bike Crossing	$2,500	Each	1	$2,500
Shared Use Path – Oak Leaf Trail to School	$800,000	Per Mile	0.12	$96,000
Shared Use Path – N 115th Street	$800,000	Per Mile	0.20	$160,000
Shared Use Path – Watertown Plank Road	$800,000	Per mile	0.18	$144,000
			Subtotal	**$413,500**
	20% for incidentals (traffic control, etc.) and contingency			$82,700
			Total	**$496,200**

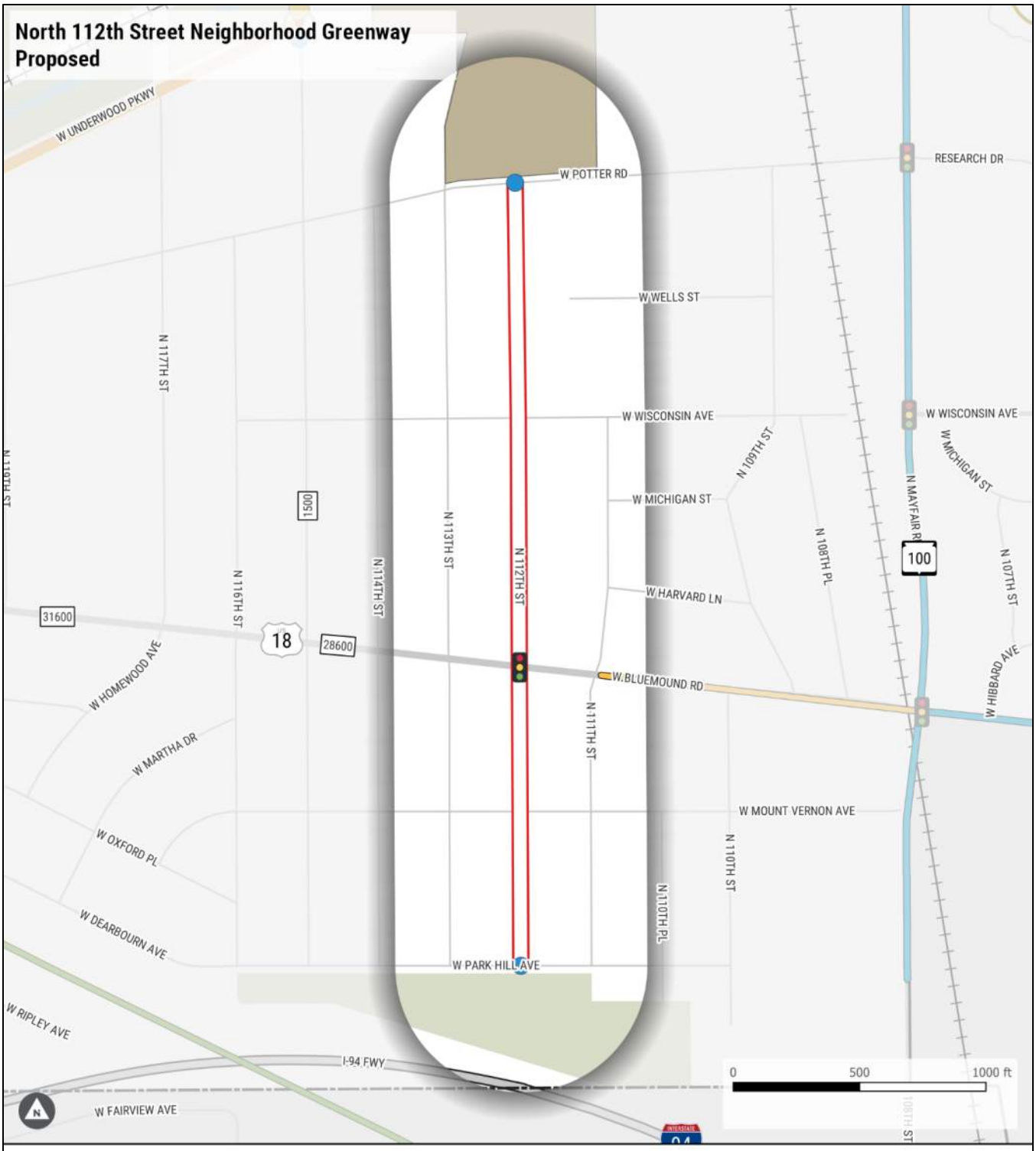
Potential Risks	Proposed Mitigation
• None	• None

6. NORTH 112TH STREET

Length: 0.59 miles **Posted Speed Limit:** 25 mph

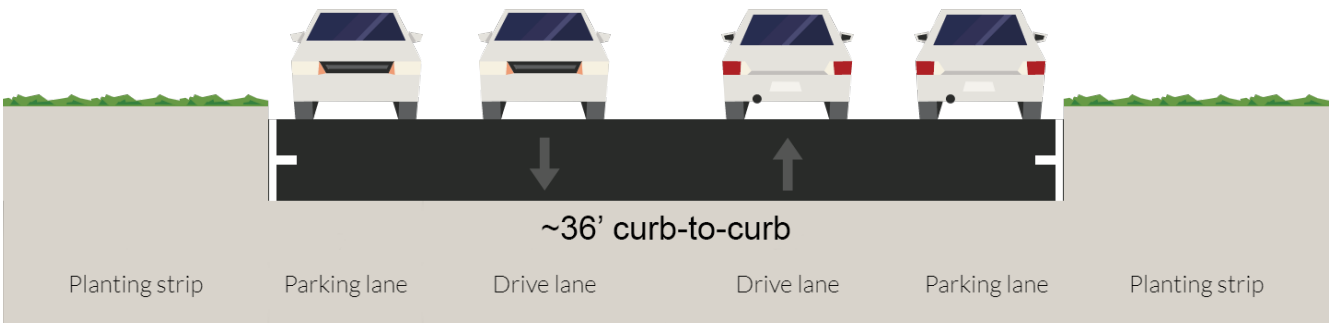
Considerations	Notes
Connectivity to Parks	• Chippewa Park
Connectivity to Schools	• Underwood Elementary School • The entire route is a designated Safe Route to School
Connectivity to Existing Bikeways	• Sharrows on W Bluemound Road / US Highway 18
Connectivity to Transit	• Intersects with Routes 6, 10D, and 85 on NW Bluemound Road / US Highway 18
Major Barriers	• W Bluemound Road / US Highway 18 (high traffic)


North 112th Street Neighborhood Greenway
Existing
W UNDERWOOD PKWY
W POTTER RD
RESEARCH DR
W WELLS ST
N 117TH ST
W WISCONSIN AVE
W WISCONSIN AVE
N 109TH ST
W MICHIGAN ST
W MICHIGAN ST
N MAYFAIR RD
N 115TH ST
1500
N 113TH ST
N 112TH ST
N 108TH PL
100
N 107TH ST
N 114TH ST
W HARVARD LN
31600
18
28600
N 116TH ST
W HOMEWOOD AVE
W BLUEMOUND RD
W HIBBARD AVE
N 111TH ST
W MARTHA DR
W MOUNT VERNON AVE
W OXFORD PL
N 110TH ST
W DEARBOURN AVE
N 110TH PL
W PARK HILL AVE
W RIPLEY AVE
I-94 FWY
0
500
1000 ft
W FAIRVIEW AVE
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

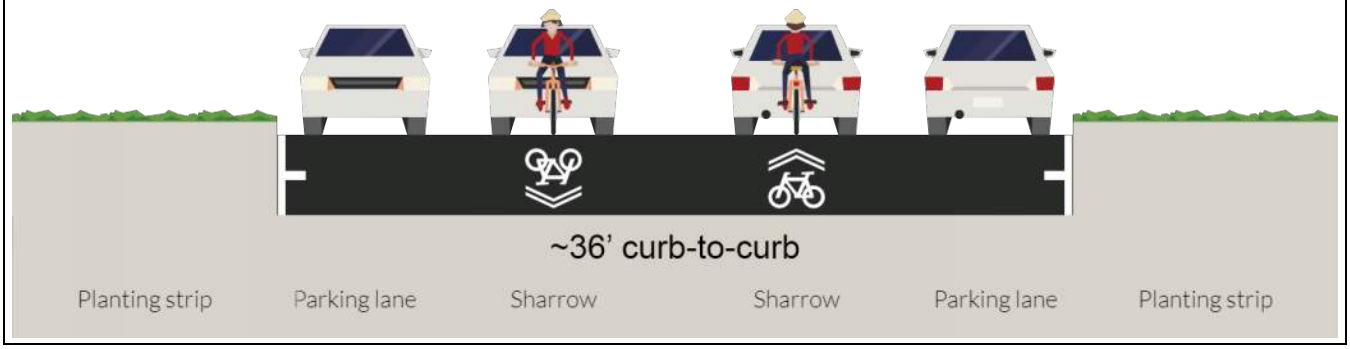

North 112th Street Neighborhood Greenway
Proposed
W UNDERWOOD PKWY
W POTTER RD
RESEARCH DR
W WELLS ST
N 117TH ST
W WISCONSIN AVE
W WISCONSIN AVE
N 109TH ST
W MICHIGAN ST
W MICHIGAN ST
N MAYFAIR RD
N 116TH ST
1500
N 113TH ST
N 112TH ST
N 114TH ST
N 108TH PL
100
N 107TH ST
W HARVARD LN
31600
18
28600
W BLUEMOUND RD
W HIBBARD AVE
W HOMEWOOD AVE
N 111TH ST
W MARTHA DR
W MOUNT VERNON AVE
W OXFORD PL
N 110TH ST
W DEARBOURN AVE
N 110TH PL
W PARK HILL AVE
W RIPLEY AVE
I-94 FWY
0
500
1000 ft
W FAIRVIEW AVE
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

N 112th Street (W Potter Road to W Park Hill Avenue) – **Existing**



N 112th Street (W Potter Road to W Park Hill Avenue) – **Proposed**



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (9)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **W Potter Road:** The City will be installing new pedestrian ramps and crosswalk markings; no other improvements are recommended
  - **W Bluemound Road / US Highway 18:** Ensure that the existing traffic signal cameras are able to detect bicyclists; consider providing Leading Pedestrian Interval for pedestrians crossing W Bluemound Road; consider extending medians through crosswalks to serve as refuge for pedestrians who cannot cross the entire street in one signal cycle
- Wayfinding (future)
  - **W Potter Road:** Direct to the Oak Leaf Trail and to nearby neighborhood greenway to the northwest
  - **W Park Hill Avenue:** Connect to the Hank Aaron Trail

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides a connection to a park and a school

Other Considerations

- Existing high visibility crosswalks at intersection with W Potter Road
- A new path will be installed connecting the Oak Leaf Trail to Underwood Elementary School. The path will serve as a connection from this Neighborhood Greenway to the Oak Leaf Trail

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	8	$2,000
Shared Lane Marking	$250	Per Marking	9	$2,250
			Subtotal	**$4,250**
	20% for incidentals (traffic control, etc.) and contingency			$850
			Total	**$5,100**

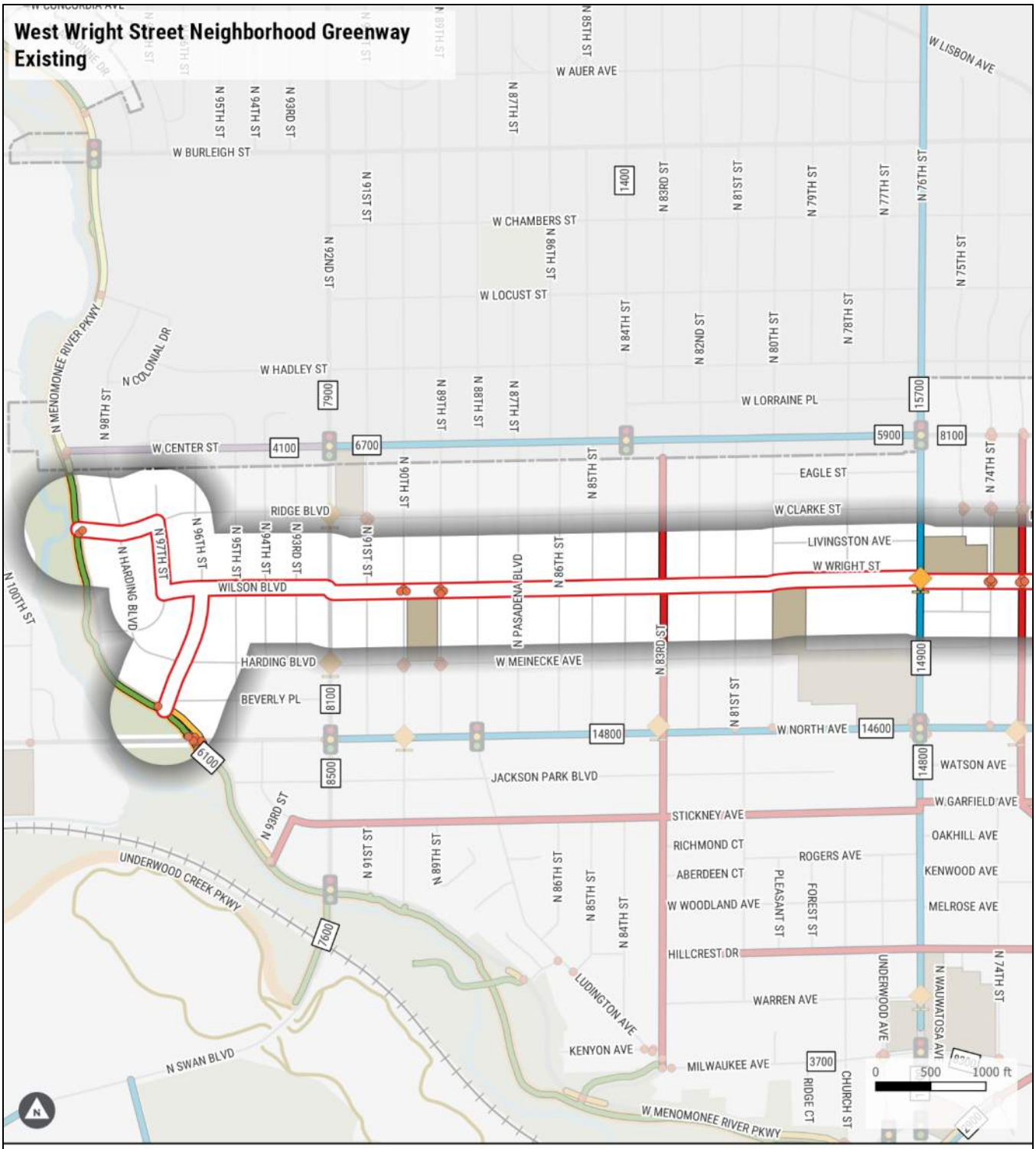
Potential Risks	Proposed Mitigation
• None	• None

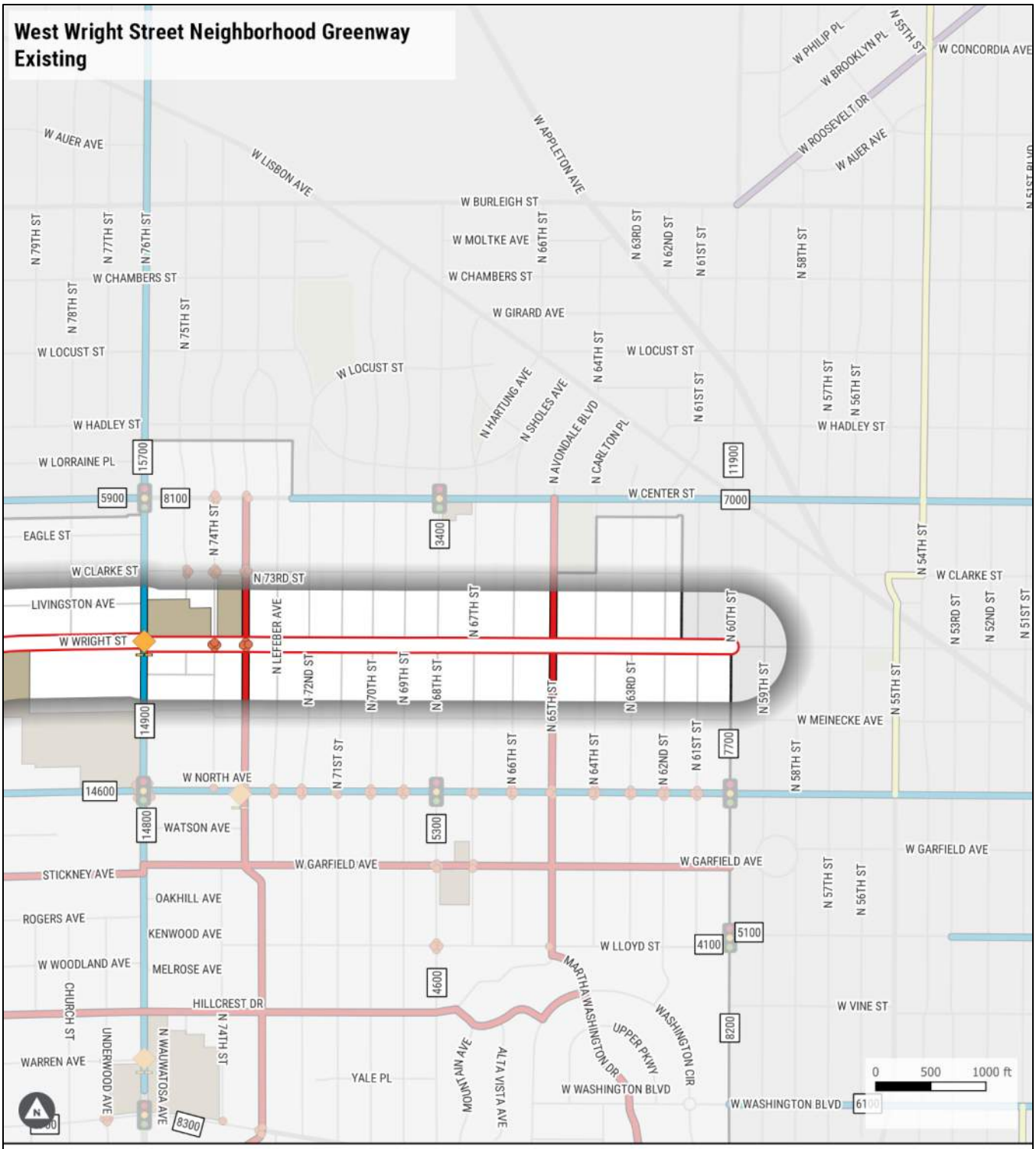
7. WEST WRIGHT STREET

Length: 2.79 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• N Menomonee River Parkway
Connectivity to Schools	• McKinley Elementary School • Longfellow Middle School • Saint Pius X School • Roosevelt Elementary School • Portions of the route are a designated Safe Route to School
Connectivity to Existing Bikeways	• Oak Leaf Trail on N Menomonee River Parkway • Bike Lanes on N Wauwatosa Avenue • Sharrows on N Menomonee River Parkway (near N 96th Street) • Proposed Neighborhood Greenways on N 83rd Street, N 73rd Street, N 65th Street
Connectivity to Transit	• Intersects with Route 67D on N Wauwatosa Ave and connects with Route 76 on N 60th Street
Major Barriers	• N Wauwatosa Ave (high traffic) • Swan Boulevard (misaligned crossing)

The existing intersection of W Wright Street and North Wauwatosa Avenue includes a high visibility crosswalk and a RRFB

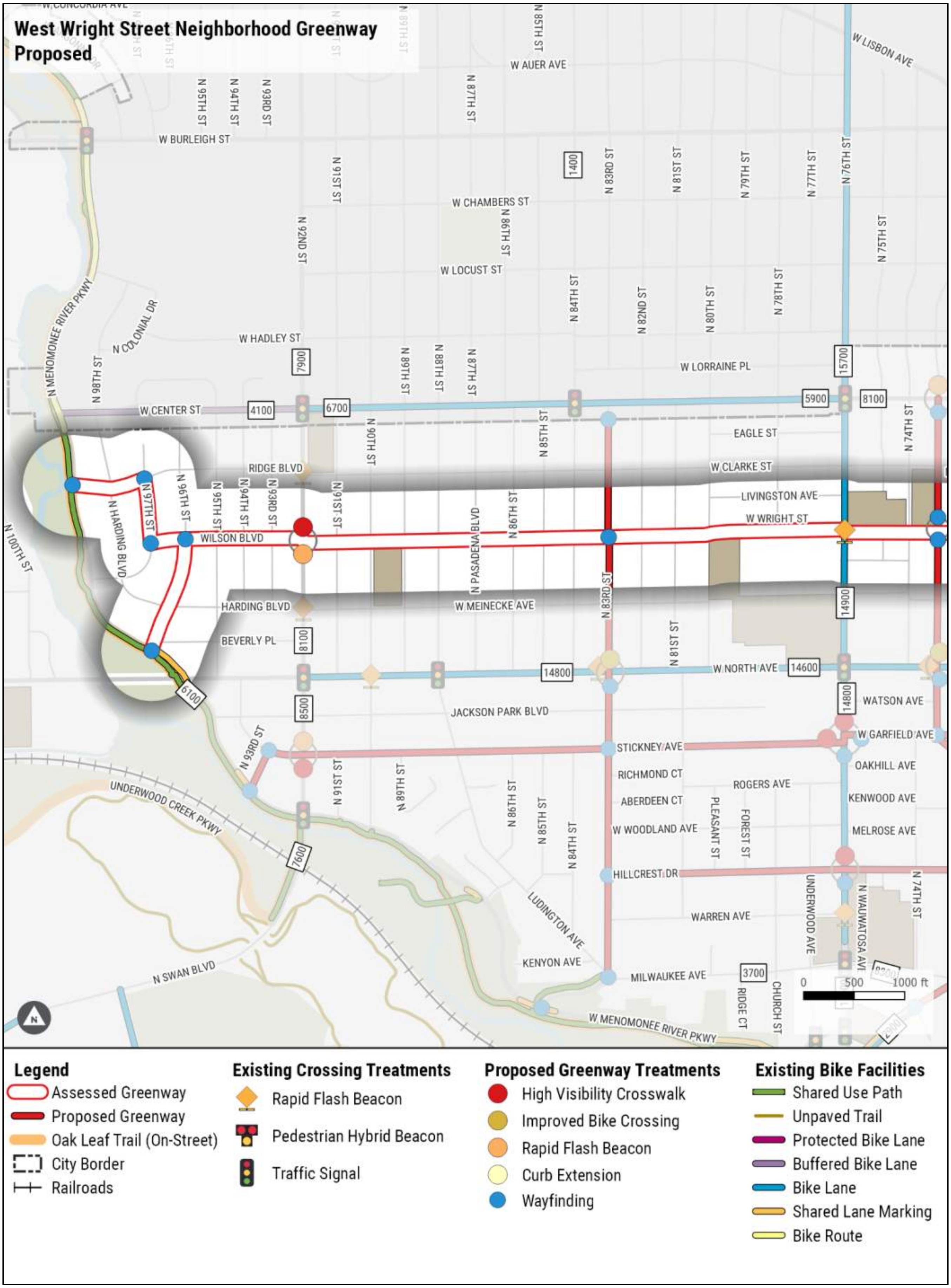

West Wright Street Neighborhood Greenway
Existing
W LISBON AVE
W AUER AVE
W BURLEIGH ST
W CHAMBERS ST
W LOCUST ST
W HADLEY ST
W LORRAINE PL
W CENTER ST
EAGLE ST
W CLARKE ST
LIVINGSTON AVE
W WRIGHT ST
RIDGE BLVD
WILSON BLVD
HARDING BLVD
W MEINECKE AVE
BEVERLY PL
W NORTH AVE
JACKSON PARK BLVD
WATSON AVE
W GARFIELD AVE
STICKNEY AVE
OAKHILL AVE
RICHMOND CT
ROGERS AVE
ABERDEEN CT
KENWOOD AVE
W WOODLAND AVE
MELROSE AVE
HILLCREST DR
WARREN AVE
KENYON AVE
MILWAUKEE AVE
W MENOMONEE RIVER PKWY
N MENOMONEE RIVER PKWY
N COLONIAL DR
N SWAN BLVD
UNDERWOOD CREEK PKWY
LUDINGTON AVE
N WAUWATOSA AVE
UNDERWOOD AVE
PLEASANT ST
FOREST ST
RIDGE CT
CHURCH ST
N 74TH ST
N 75TH ST
N 76TH ST
N 77TH ST
N 78TH ST
N 79TH ST
N 80TH ST
N 81ST ST
N 82ND ST
N 83RD ST
N 84TH ST
N 85TH ST
N 86TH ST
N 87TH ST
N 88TH ST
N 89TH ST
N 90TH ST
N 91ST ST
N 92ND ST
N 93RD ST
N 94TH ST
N 95TH ST
N 96TH ST
N 97TH ST
N 98TH ST
N 100TH ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments
- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route


West Wright Street Neighborhood Greenway
Proposed
W AUER AVE
W LISBON AVE
W BURLEIGH ST
W CHAMBERS ST
W LOCUST ST
W HADLEY ST
W LORRAINE PL
W CENTER ST
EAGLE ST
W CLARKE ST
LIVINGSTON AVE
W WRIGHT ST
RIDGE BLVD
WILSON BLVD
HARDING BLVD
BEVERLY PL
W MEINECKE AVE
W NORTH AVE
WATSON AVE
JACKSON PARK BLVD
W GARFIELD AVE
STICKNEY AVE
OAKHILL AVE
RICHMOND CT
ABERDEEN CT
ROGERS AVE
KENWOOD AVE
W WOODLAND AVE
MELROSE AVE
HILLCREST DR
WARREN AVE
KENYON AVE
MILWAUKEE AVE
N SWAN BLVD
UNDERWOOD CREEK PKWY
W MENOMONEE RIVER PKWY
N MENOMONEE RIVER PKWY
N COLONIAL DR
N HARDING BLVD
N PASADENA BLVD
LUDINGTON AVE
UNDERWOOD AVE
N WAUWATOSA AVE
PLEASANT ST
FOREST ST
RIDGE CT
CHURCH ST
N 100TH ST
N 98TH ST
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14800
14600
14800
8500
6100
7600
3700
0 500 1000 ft
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Proposed Greenway
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Pedestrian Hybrid Beacon
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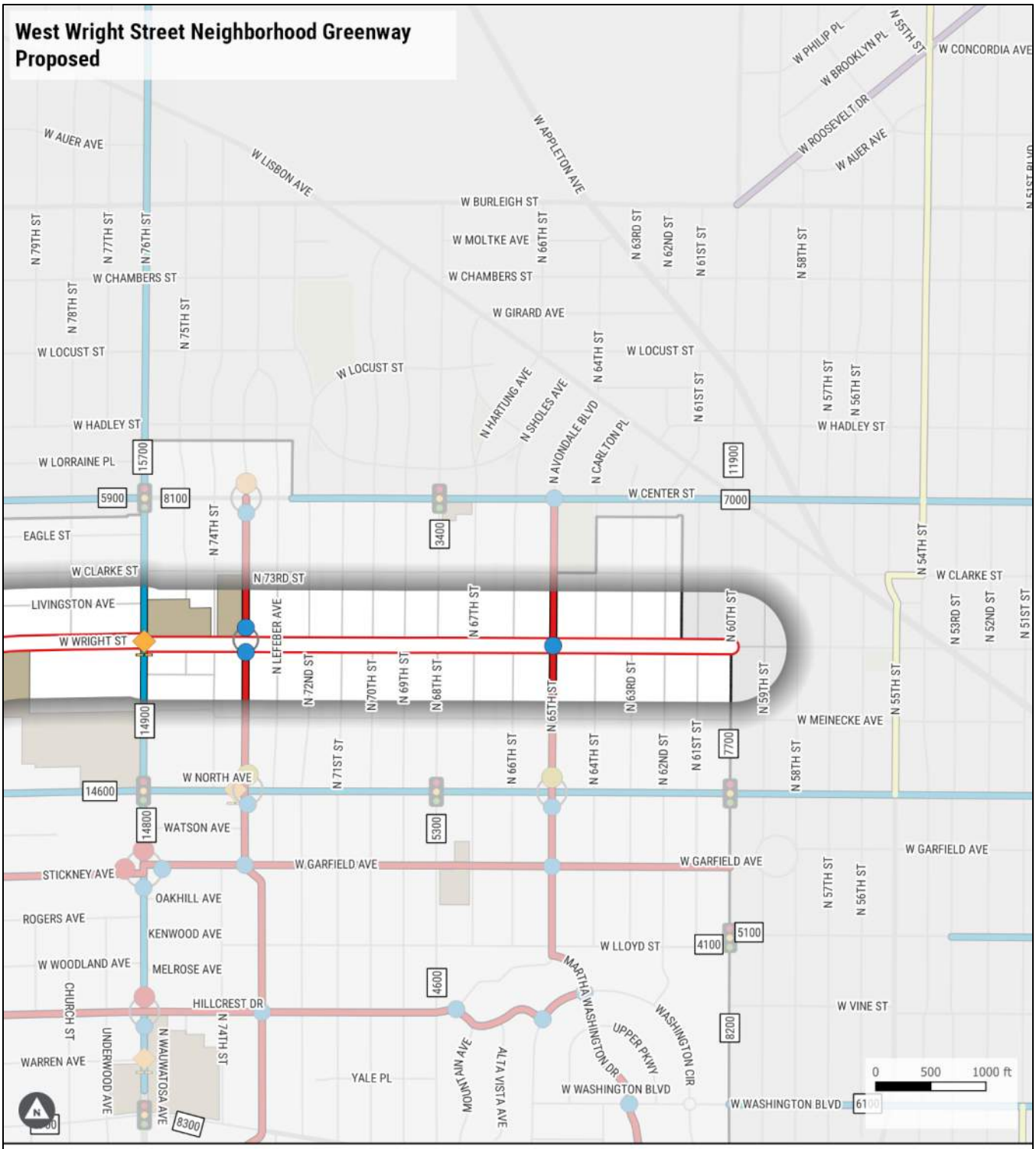
Bike Lane
Shared Lane Marking
Bike Route


West Wright Street Neighborhood Greenway
Proposed
W AUER AVE
W LISBON AVE
W APPLETON AVE
W PHILIP PL
W BROOKLYN PL
N 55TH ST
W CONCORDIA AVE
W ROOSEVELT DR
W AUER AVE
N 51ST BLVD
W BURLEIGH ST
W MOLTKE AVE
W CHAMBERS ST
W GIRARD AVE
W LOCUST ST
W HADLEY ST
W LORRAINE PL
EAGLE ST
W CLARKE ST
LIVINGSTON AVE
W WRIGHT ST
W NORTH AVE
WATSON AVE
W GARFIELD AVE
STICKNEY AVE
OAKHILL AVE
ROGERS AVE
KENWOOD AVE
W WOODLAND AVE
MELROSE AVE
HILLCREST DR
CHURCH ST
WARREN AVE
UNDERWOOD AVE
N WAUWATOSA AVE
N 74TH ST
YALE PL
MOUNTAIN AVE
ALTA VISTA AVE
MARTHA WASHINGTON DR
UPPER PKWY
WASHINGTON CIR
W WASHINGTON BLVD
W LLOYD ST
W VINE ST
W MEINECKE AVE
N 79TH ST
N 77TH ST
N 76TH ST
N 78TH ST
N 75TH ST
N 74TH ST
N 73RD ST
N 72ND ST
N 71ST ST
N 70TH ST
N 69TH ST
N 68TH ST
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N 63RD ST
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N 61ST ST
N 60TH ST
N 59TH ST
N 58TH ST
N 57TH ST
N 56TH ST
N 54TH ST
N 53RD ST
N 52ND ST
N 51ST ST
N HARTUNG AVE
N SHOLES AVE
N AVONDALE BLVD
N CARLTON PL
15700
5900
8100
3400
11900
7000
14900
14600
14800
5300
7700
4100
5100
4600
8200
8300
0 500 1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
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Existing Crossing Treatments
Rapid Flash Beacon
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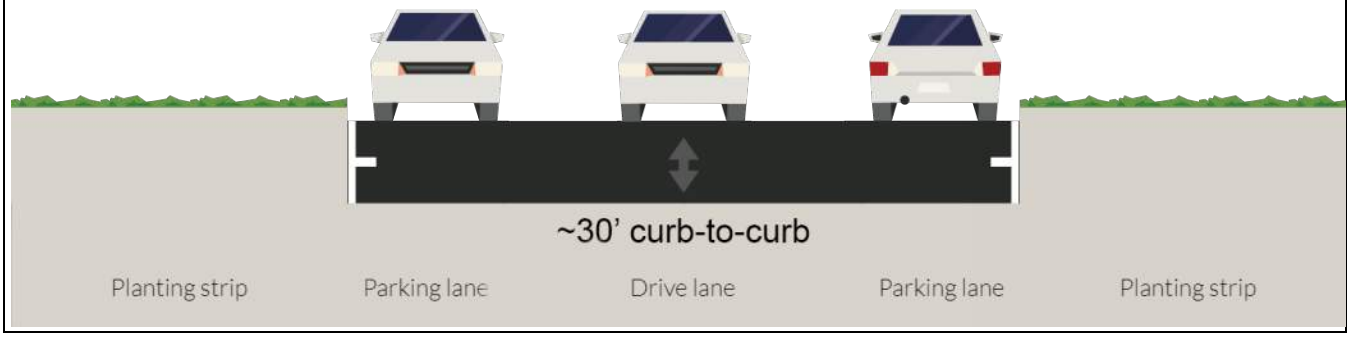
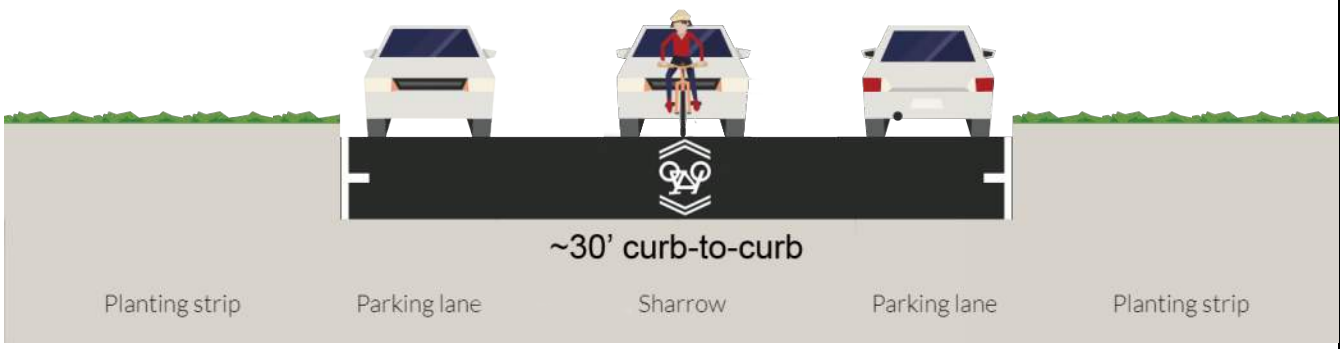
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

N 96th Street / Ridge Boulevard / N 97th Street / Wilson Boulevard / W Wright Street (Menomonee River Parkway to N 60th Street, excepting the segment between N Wauwatosa Avenue and N 74th Street) – **Existing**

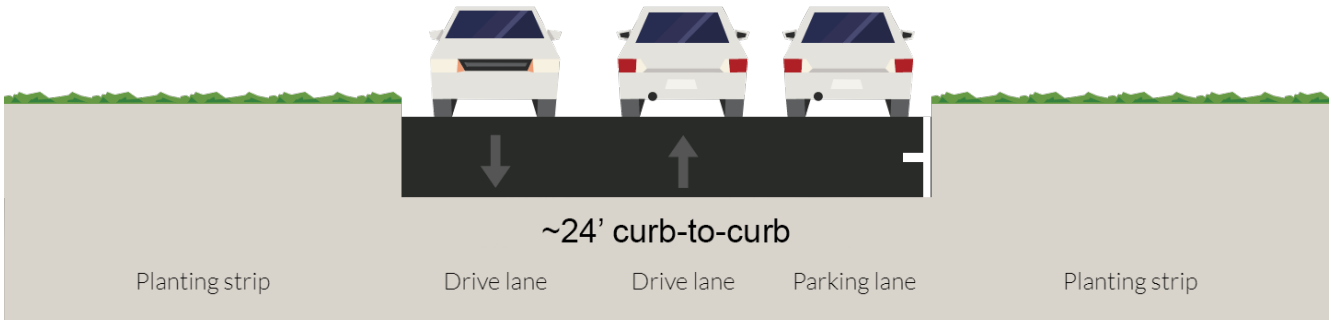


N 96th Street / Ridge Boulevard / N 97th Street / Wilson Boulevard / W Wright Street (Menomonee River Parkway to N 60th Street, excepting the segment between N Wauwatosa Avenue and N 74th Street) – **Proposed**

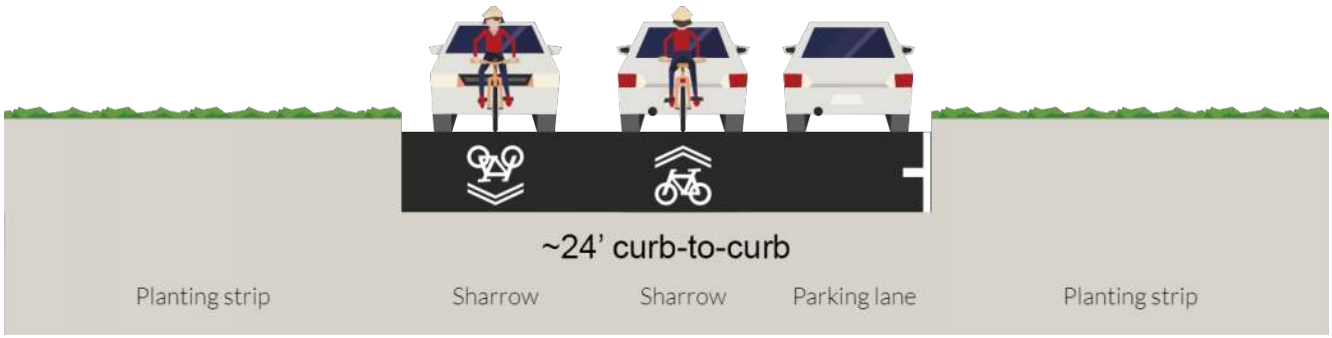


Note: Bidirectional SLMs may require FHWA experimentation.

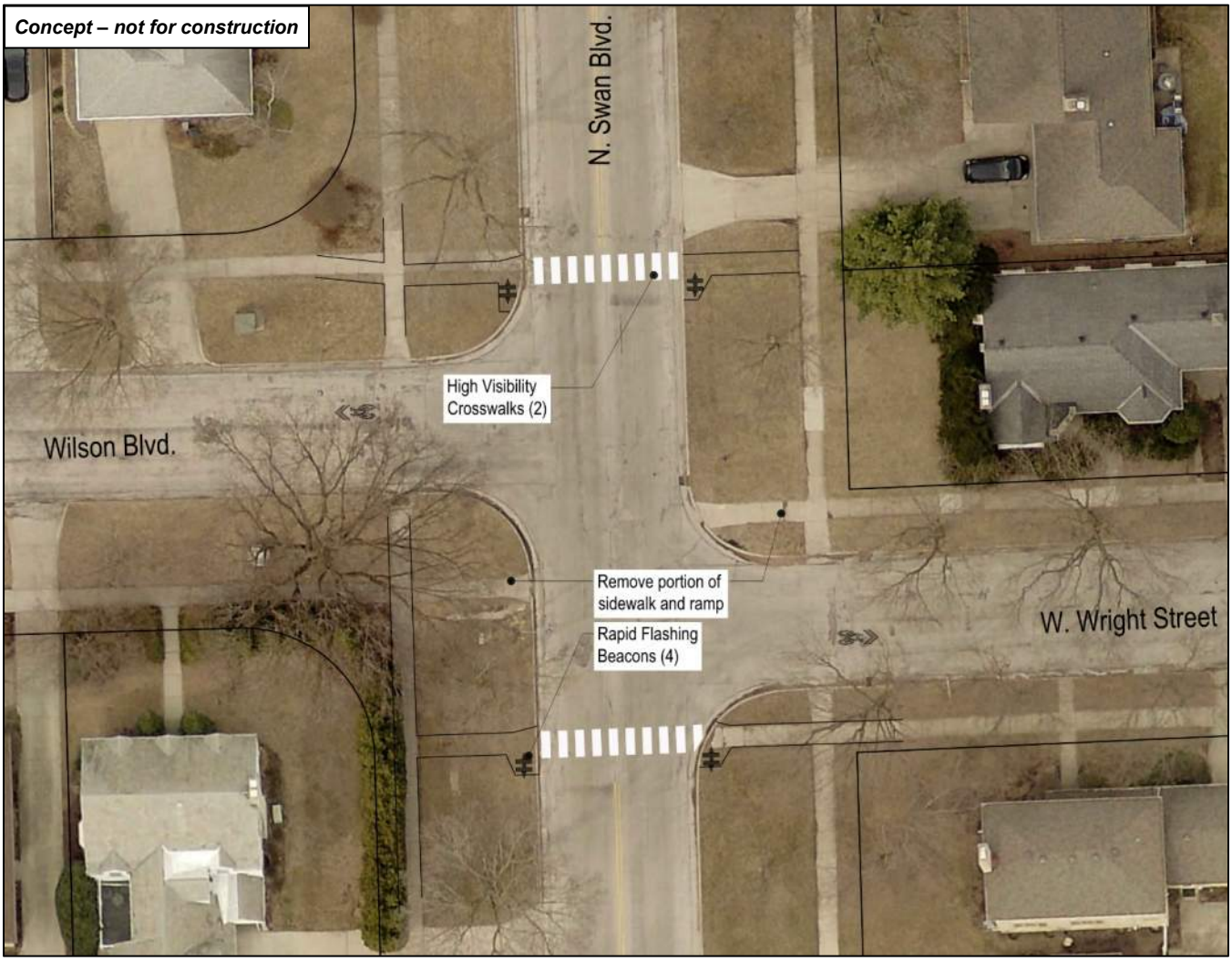
W Wright Street (N Wauwatosa Avenue to N 74th Street) – **Existing**



W Wright Street (N Wauwatosa Avenue to N 74th Street) – **Proposed**



Proposed intersection improvements at N Swan Boulevard



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (47)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **N Swan Blvd / N 92nd Street:** High visibility crosswalks (2) and RRFBs (4)
- Street Treatments
  - **Wright Street:** Many STOP signs face users on the greenway; consider "flipping" some of the signs to face cross traffic (based on engineering judgement)
- Wayfinding (future)
  - **N Menomonee River Parkway (at Ridge Boulevard and N 96th Street):** Connections to walking and biking path
  - **N 97th Street (at Ridge Boulevard and Wilson Boulevard):** Directs users through turns
  - **Wilson Boulevard and N 96th Street:** Directs users through the branching of the greenway
  - **N 83rd Street:** Connection to N 83rd St greenway
  - **N 73rd Street:** Connection to N 73rd St greenway
  - **N 65th Street:** Connection to N 65th St greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides numerous connections to parks, trails, and schools

Other Considerations

- Existing high visibility crosswalks at Menomonee River Parkway (both at Ridge Boulevard and N 96th Street) and at N Wauwatosa Avenue
- Existing RRFB at N Wauwatosa Avenue

Planning-Level Cost Estimates

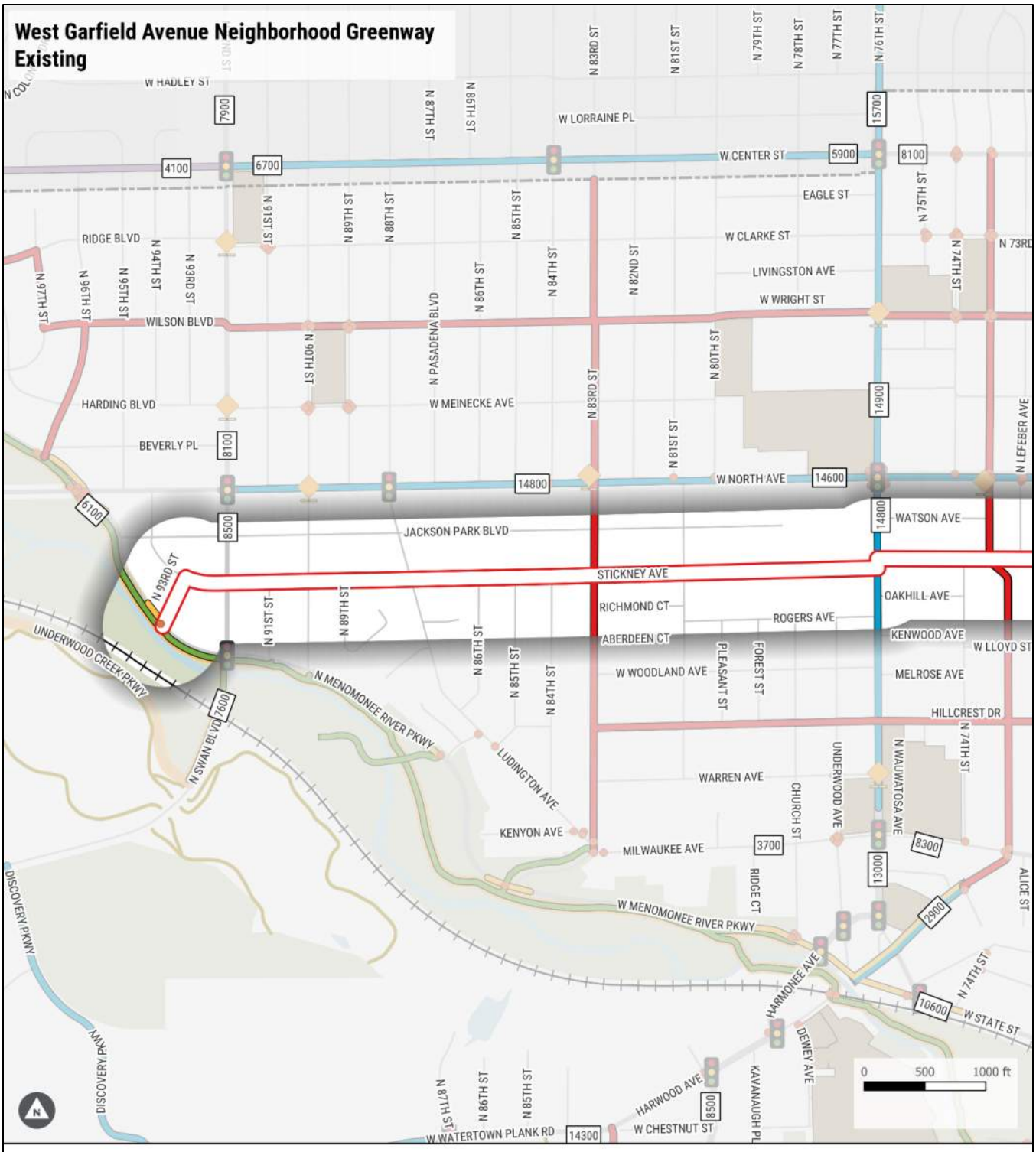
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	13	$3,250
Greenway Sign-Existing Post	$100	Per sign	39	$3,900
Shared Lane Marking	$255	Per Marking	47	$11,750
High Visibility Crosswalk	$2,500	Each	2	$5,000
Rapid Flash Beacon	$15,000	Each	4	$60,000
			Subtotal	**$83,900**
	20% for incidentals (traffic control, etc.) and contingency			$16,780
			Total	**$100,680**

Potential Risks	Proposed Mitigation
• "Flipping" stop signs may result in people using W Wright Street as a "cut-through" route or may result in increased speeds on W Wright Street	• Monitor traffic conditions following changes to any stop controls and install traffic calming if necessary to limit cut-though traffic and/or reduce traffic speeds

8. STICKNEY AVENUE / W GARFIELD AVENUE

Length: 2.1 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• N Menomonee River Parkway, Hansen Park
Connectivity to Schools	• Washington Elementary School • A portion of the route is a designated Safe Route to School
Connectivity to Existing Bikeways	• Oak Leaf Trail on N Menomonee River Parkway • Bike Lanes on N Wauwatosa Avenue • Proposed Neighborhood Greenways on N 83rd Street, N 73rd Street, and N 65th Street
Connectivity to Transit	• Intersects with Route 31 on N Ludington Avenue, with Route 67 D on Wauwatosa Avenue, and with Route 76 on N 60th Street
Major Barriers	• N Wauwatosa Ave (high traffic with a misaligned crossing)



Legend

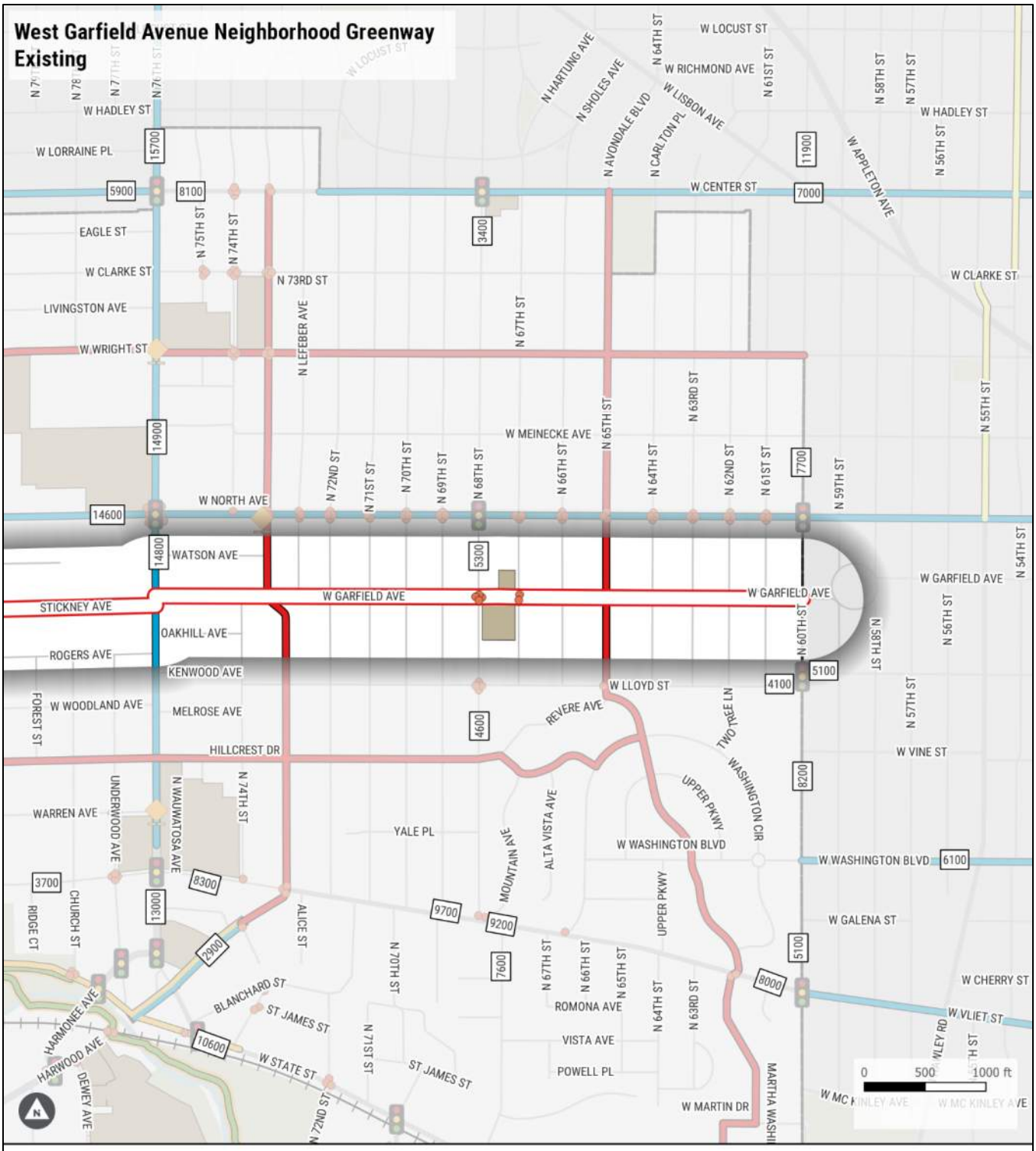
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

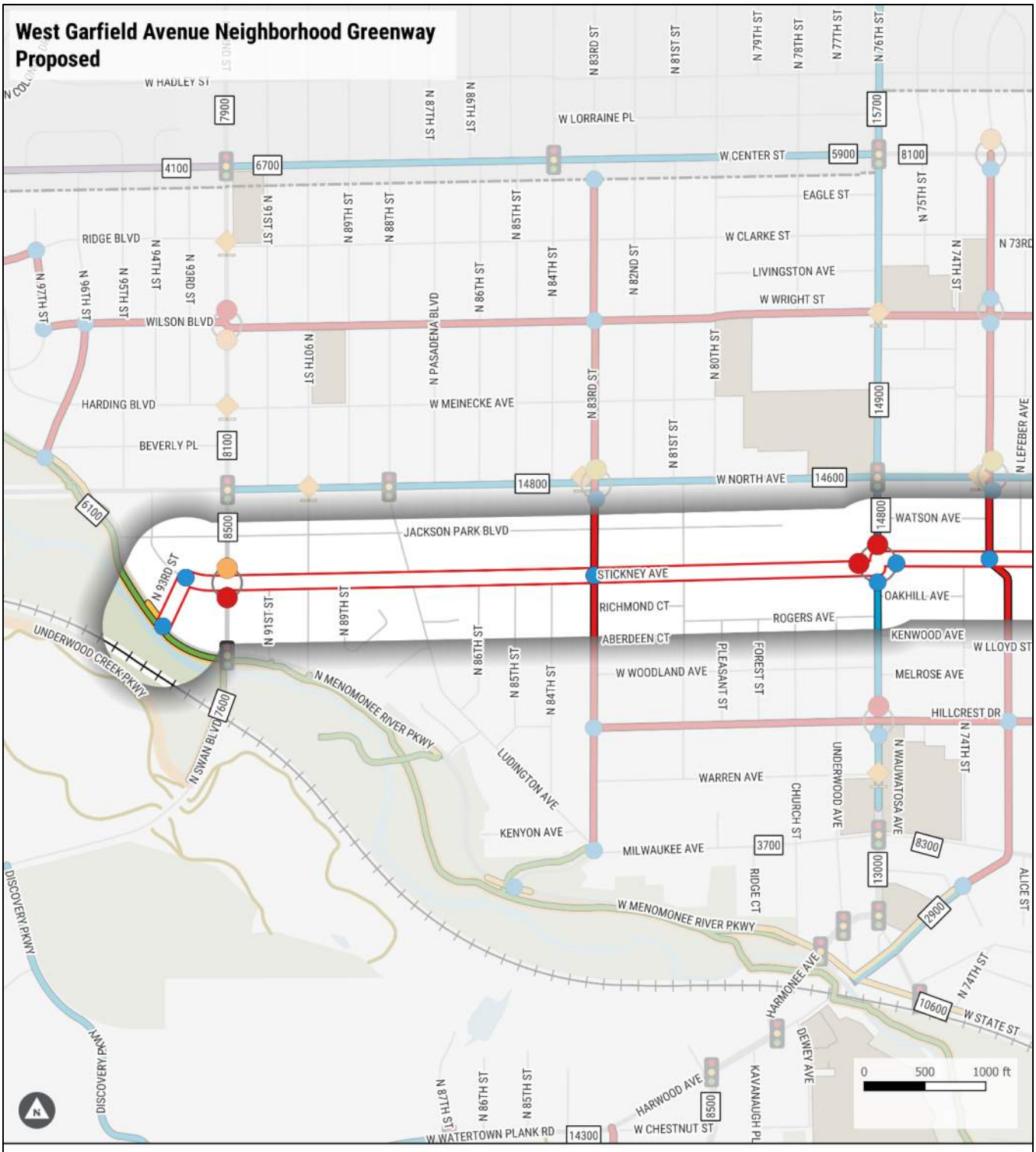
Existing Crossing Treatments

- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities

- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route


West Garfield Avenue Neighborhood Greenway
Existing
W LOCUST ST
N HARTUNG AVE
N SHOLES AVE
N 64TH ST
W RICHMOND AVE
N 61ST ST
W LISBON AVE
N AVONDALE BLVD
N CARLTON PL
N 58TH ST
N 57TH ST
W HADLEY ST
N 56TH ST
W LORRAINE PL
15700
5900
8100
W CENTER ST
7000
11900
W APPLETON AVE
EAGLE ST
N 75TH ST
N 74TH ST
3400
W CLARKE ST
N 73RD ST
LIVINGSTON AVE
N LEFEBER AVE
N 67TH ST
W WRIGHT ST
N 55TH ST
14900
W MEINECKE AVE
N 65TH ST
N 63RD ST
N 72ND ST
N 71ST ST
N 70TH ST
N 69TH ST
N 68TH ST
N 66TH ST
N 64TH ST
N 62ND ST
N 61ST ST
7700
N 59TH ST
14600
W NORTH AVE
14800
WATSON AVE
5300
N 54TH ST
W GARFIELD AVE
STICKNEY AVE
OAKHILL AVE
ROGERS AVE
KENWOOD AVE
N 60TH ST
N 56TH ST
N 58TH ST
5100
4100
W LLOYD ST
FOREST ST
W WOODLAND AVE
MELROSE AVE
4600
REVERE AVE
TWO TREE LN
N 57TH ST
HILLCREST DR
W VINE ST
8200
UNDERWOOD AVE
N WAUWATOSA AVE
N 74TH ST
WARREN AVE
YALE PL
MOUNTAIN AVE
ALTA VISTA AVE
UPPER PKWY
WASHINGTON CIR
W WASHINGTON BLVD
6100
3700
8300
13000
CHURCH ST
RIDGE CT
9700
9200
W GALENA ST
ALICE ST
2900
7600
N 67TH ST
N 66TH ST
N 65TH ST
N 70TH ST
8000
W CHERRY ST
BLANCHARD ST
ST JAMES ST
ROMONA AVE
N 64TH ST
N 63RD ST
W VLIET ST
HARMONEE AVE
HARWOOD AVE
10600
W STATE ST
N 71ST ST
VISTA AVE
POWELL PL
DEWEY AVE
N 72ND ST
W MARTIN DR
MARTHA WASHI
0
500
1000 ft
W MC KINLEY AVE
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

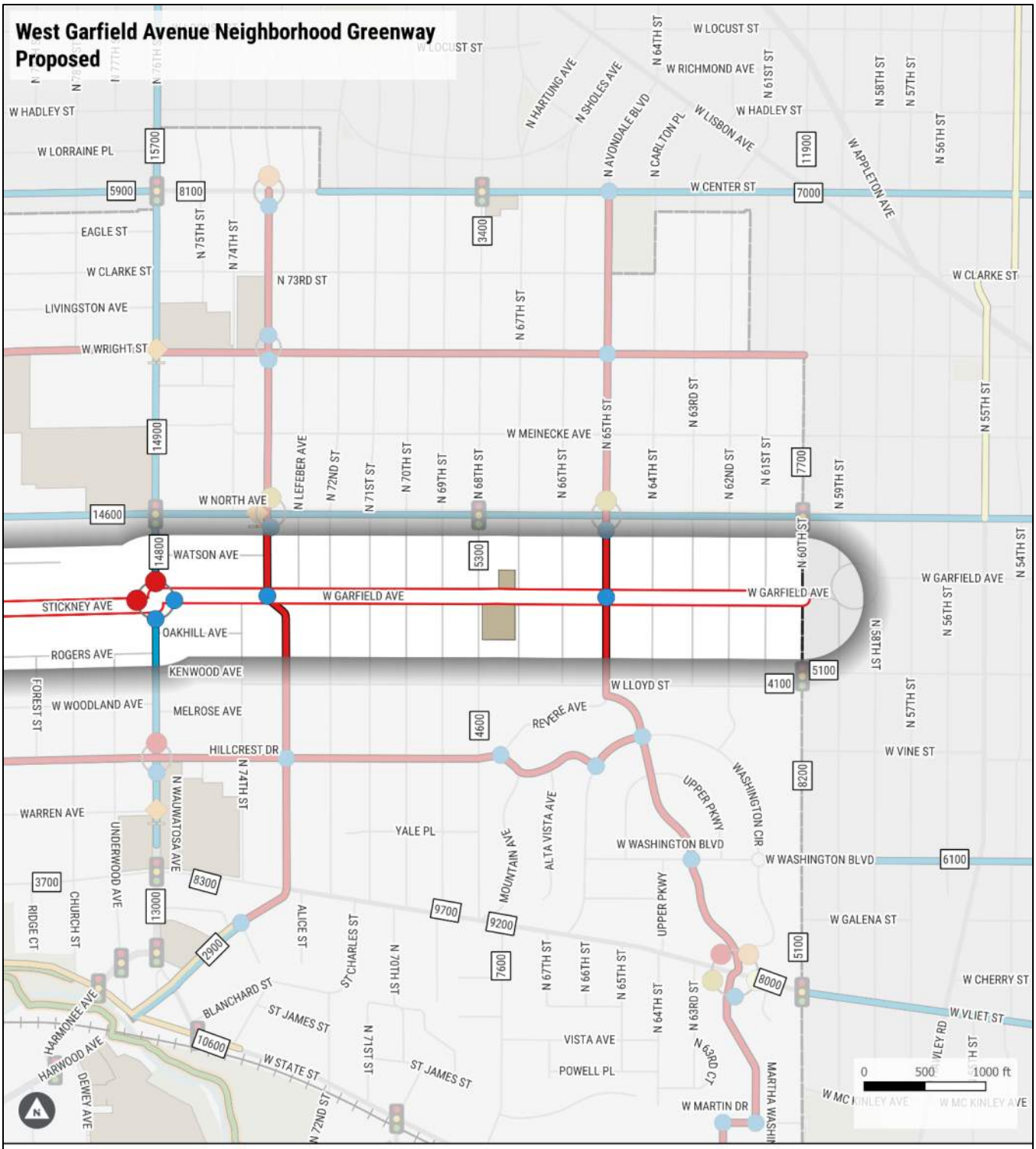


Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

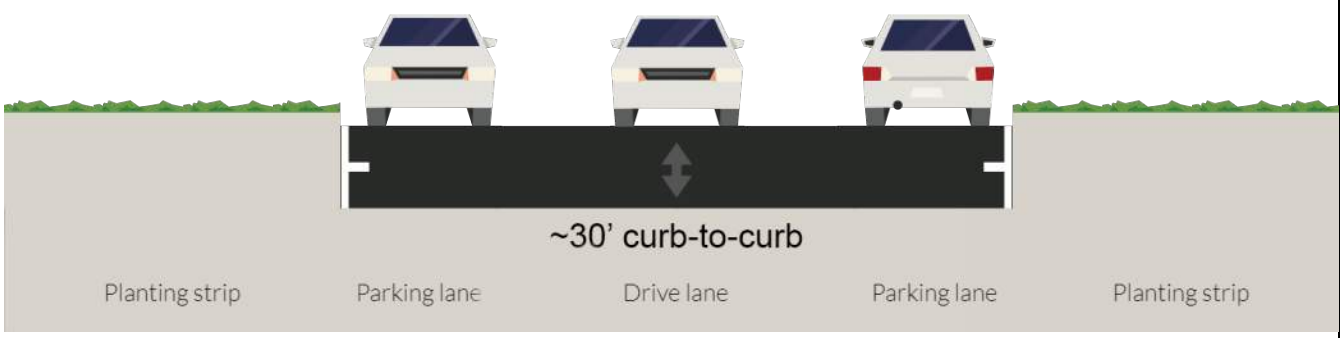
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

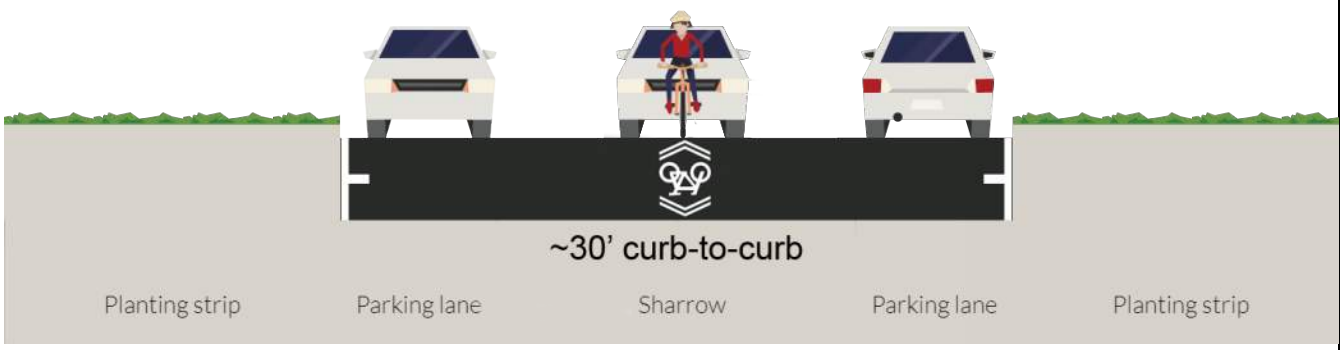
Typical Cross-Sections

N 93rd Street / Stickney Avenue (Menomonee River Parkway to Ludington Avenue) – **Existing**



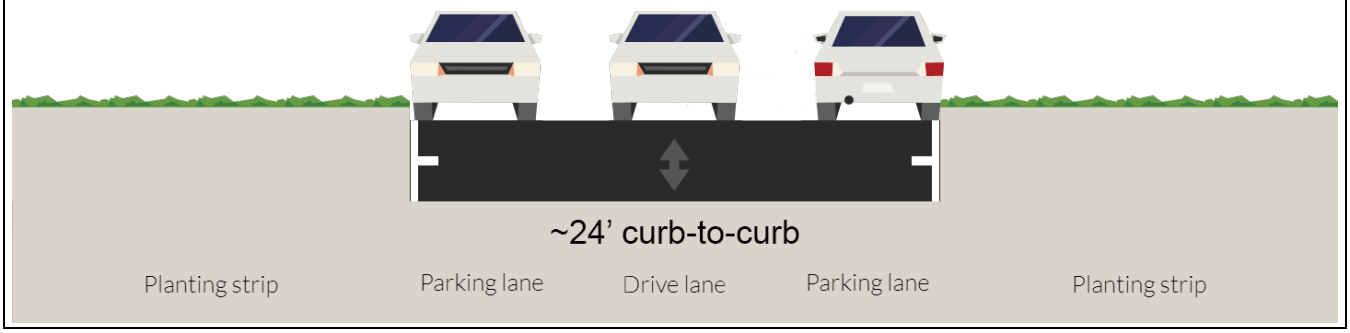
Note: This segment has alternating NO PARKING ANY TIME signs on one side.

N 93rd Street / Stickney Avenue (Menomonee River Parkway to Ludington Avenue) – **Proposed**

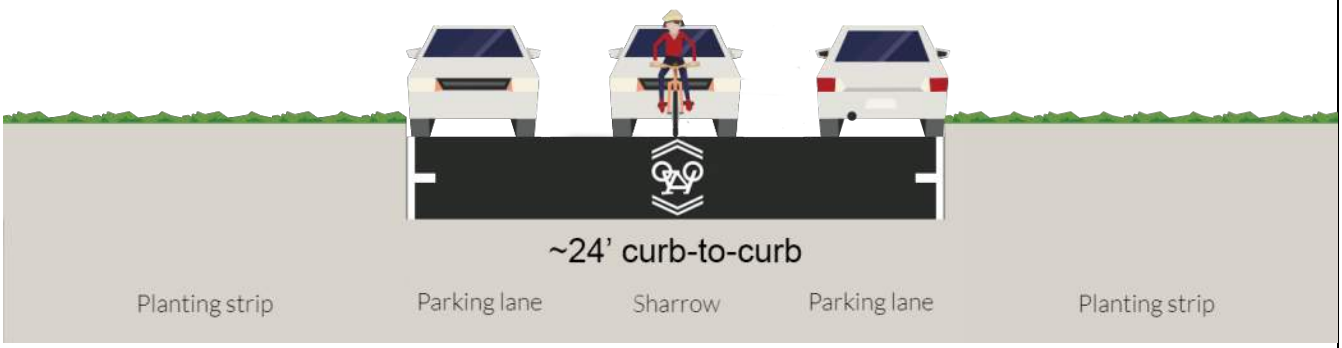


Note: Bidirectional SLMs may require FHWA experimentation.

Stickney Avenue / West Garfield Avenue (Ludington Avenue to N 60th Street) – **Existing**



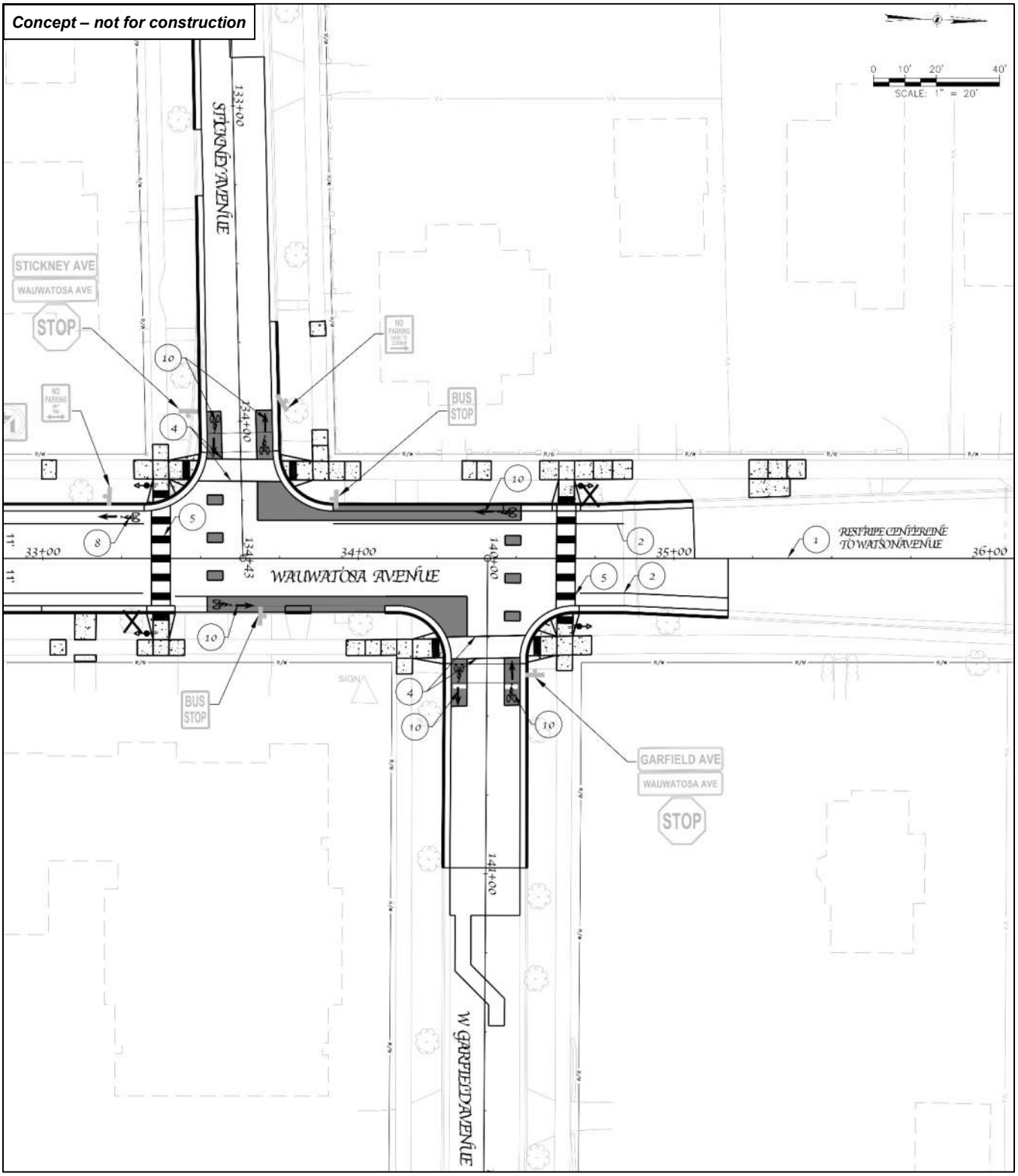
Stickney Avenue / West Garfield Avenue (Ludington Avenue to N 60th Street) – **Proposed**



Note: This segment has alternating NO PARKING ANY TIME signs on one side. Bidirectional SLMs may require FHWA experimentation.

Proposed crossing improvements at N. Swan Boulevard

Proposed intersection improvements at Wauwatosa Avenue to be constructed as part of a capital project that is under construction



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (36)
- Install neighborhood greenway signs (2 per block)
- On West Garfield Avenue east of N Wauwatosa Avenue, consider removing parking from one side of the street (parking is underutilized and street is 24' wide)
- Intersection Treatments
  - **N Swan Boulevard / N 92nd Street:** High visibility crosswalk (2); RRFB (4)
  - **Wauwatosa Avenue:** High visibility crosswalks (2) to be added with the reconstruction of N Wauwatosa Avenue in 2020
- Wayfinding (future)
  - **N Menomonee River Parkway:** Connection to path
  - **N 93rd Street and W Stickney Avenue:** Directs users through a turn
  - **N 83rd Street:** Connection to N 83rd Street greenway
  - **N Wauwatosa Avenue:** Two signs to direct users through jog in greenway
  - **N 73rd Street:** Connection to N 73rd Street greenway
  - **N 65th Street:** Connection to N 65th Street greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to parks, a trail, and a school

Other Considerations

- No high visibility crosswalks, except those being added with the reconstruction of N Wauwatosa Avenue in 2020
- Misaligned crossing at N Wauwatosa Avenue

Planning-Level Cost Estimates

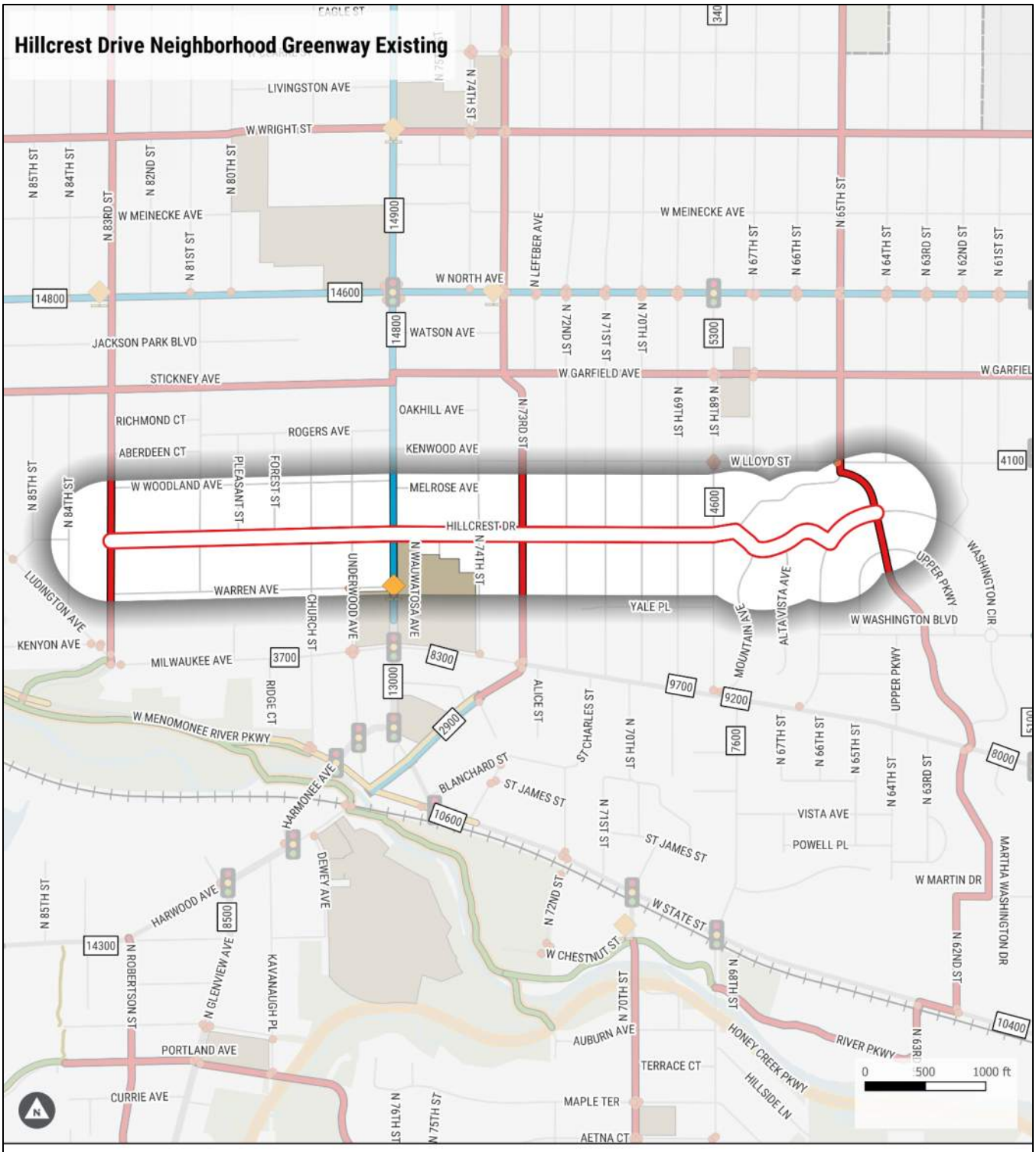
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	23	$5,750
Greenway Sign-Existing Post	$100	Per sign	13	$1,300
Shared Lane Marking	$250	Per Marking	36	$9,000
High Visibility Crosswalk	$2,500	Each	2	$5,000
Rapid Flash Beacon	$15,000	Each	4	$60,000
			Subtotal	**$81,050**
	20% for incidentals (traffic control, etc.) and contingency			$16,210
			Total	**$97,260**

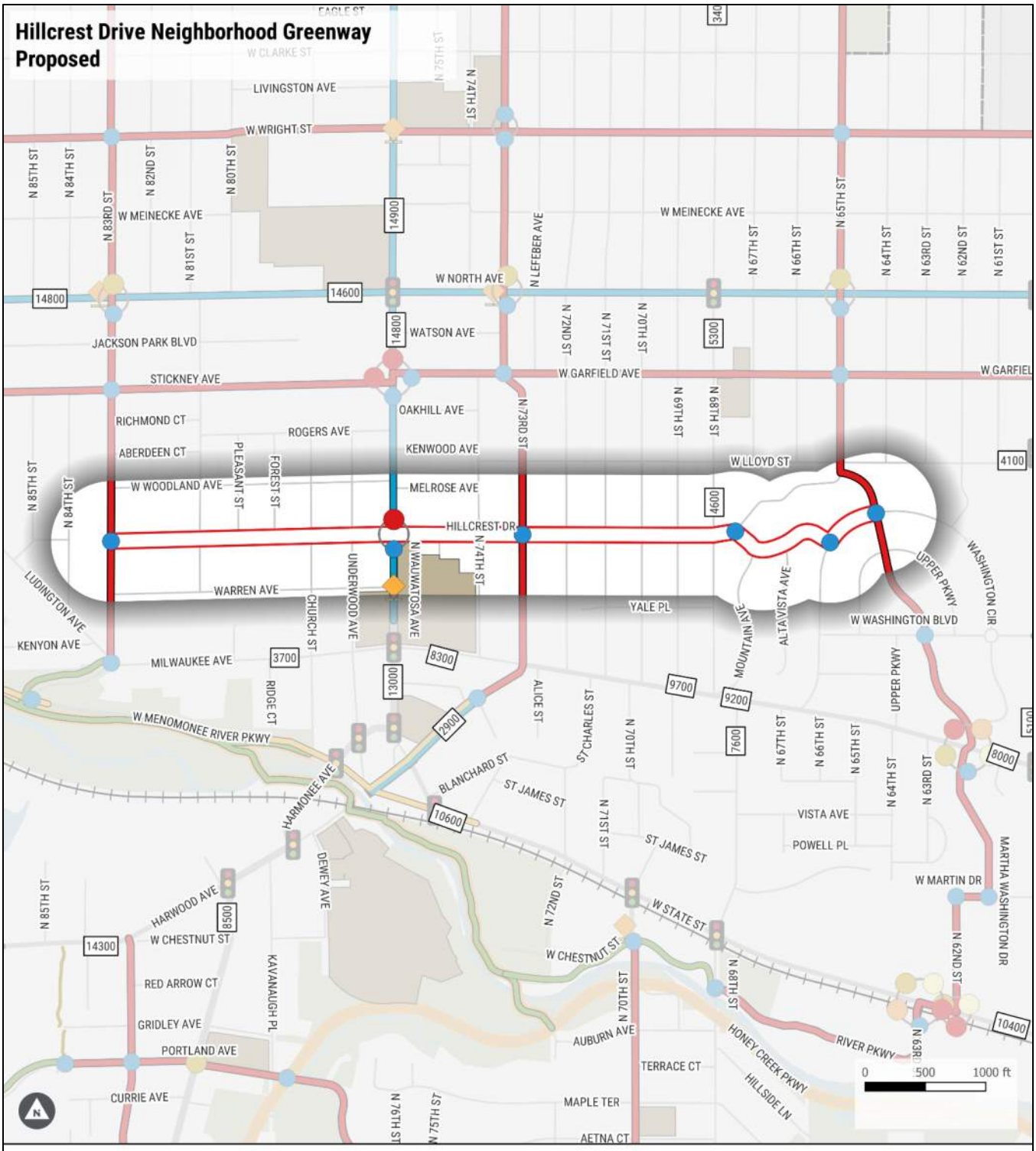
Potential Risks	Proposed Mitigation
• Parking removal east of N Wauwatosa Avenue could be controversial, even is parking is underutilized	• Proactive outreach to the impacted residents and the surrounding community

9. HILLCREST DRIVE

Length: 1.67 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Privately-owned open space along the creek paralleling Martha Washington Drive
Connectivity to Schools	• Wauwatosa East High School • Portion of the route is a designated Safe Route to School
Connectivity to Existing Bikeways	• Bike Lanes on N Wauwatosa Avenue (direct connection) W Washington Boulevard (nearby connection) • Proposed Neighborhood Greenways on N 83rd Street, N 73rd Street, and N 65th Street / Martha Washington Drive; shares a short segment with the N 65th Street Neighborhood Greenway on Martha Washington Drive
Connectivity to Transit	• Intersects with Route 67D on N Wauwatosa Avenue
Major Barriers	• N Wauwatosa Ave (high traffic)


Hillcrest Drive Neighborhood Greenway Existing
LIVINGSTON AVE
W WRIGHT ST
N 74TH ST
N 85TH ST
N 84TH ST
N 82ND ST
N 80TH ST
N 83RD ST
W MEINECKE AVE
N 81ST ST
N LEFEBER AVE
N 67TH ST
N 66TH ST
N 65TH ST
N 64TH ST
N 63RD ST
N 62ND ST
N 61ST ST
W NORTH AVE
JACKSON PARK BLVD
WATSON AVE
N 72ND ST
N 71ST ST
N 70TH ST
STICKNEY AVE
W GARFIELD AVE
RICHMOND CT
OAKHILL AVE
N 73RD ST
N 69TH ST
N 68TH ST
ABERDEEN CT
ROGERS AVE
KENWOOD AVE
W LLOYD ST
W WOODLAND AVE
PLEASANT ST
FOREST ST
MELROSE AVE
HILLCREST DR
WARREN AVE
CHURCH ST
UNDERWOOD AVE
N WAUWATOSA AVE
YALE PL
MOUNTAIN AVE
ALTA VISTA AVE
UPPER PKWY
WASHINGTON CIR
W WASHINGTON BLVD
LUDINGTON AVE
KENYON AVE
MILWAUKEE AVE
RIDGE CT
W MENOMONEE RIVER PKWY
ALICE ST
ST CHARLES ST
BLANCHARD ST
ST JAMES ST
HARMONEE AVE
VISTA AVE
POWELL PL
W MARTIN DR
MARTHA WASHINGTON DR
DEWEY AVE
HARWOOD AVE
W STATE ST
W CHESTNUT ST
N ROBERTSON ST
N GLENVIEW AVE
KAVANAUGH PL
AUBURN AVE
HONEY CREEK PKWY
RIVER PKWY
PORTLAND AVE
TERRACE CT
HILLSIDE LN
CURRIE AVE
MAPLE TER
AETNA CT
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route


Hillcrest Drive Neighborhood Greenway
Proposed
LIVINGSTON AVE
W WRIGHT ST
W MEINECKE AVE
W NORTH AVE
WATSON AVE
JACKSON PARK BLVD
STICKNEY AVE
W GARFIELD AVE
OAKHILL AVE
RICHMOND CT
ROGERS AVE
ABERDEEN CT
KENWOOD AVE
W WOODLAND AVE
MELROSE AVE
HILLCREST DR
W LLOYD ST
WARREN AVE
YALE PL
W WASHINGTON BLVD
MILWAUKEE AVE
KENYON AVE
W MENOMONEE RIVER PKWY
BLANCHARD ST
ST JAMES ST
VISTA AVE
POWELL PL
W MARTIN DR
W CHESTNUT ST
W STATE ST
RED ARROW CT
GRIDLEY AVE
PORTLAND AVE
CURRIE AVE
AUBURN AVE
TERRACE CT
MAPLE TER
AETNA CT
HONEY CREEK PKWY
RIVER PKWY
HILLSIDE LN
N 85TH ST
N 84TH ST
N 82ND ST
N 80TH ST
N 83RD ST
N 81ST ST
N 74TH ST
N 75TH ST
N 73RD ST
N 72ND ST
N 71ST ST
N 70TH ST
N 69TH ST
N 68TH ST
N 67TH ST
N 66TH ST
N 65TH ST
N 64TH ST
N 63RD ST
N 62ND ST
N 61ST ST
N LEFEBER AVE
PLEASANT ST
FOREST ST
UNDERWOOD AVE
N WAUWATOSA AVE
CHURCH ST
RIDGE CT
ALICE ST
ST CHARLES ST
MOUNTAIN AVE
ALTA VISTA AVE
UPPER PKWY
WASHINGTON CIR
MARTHA WASHINGTON DR
HARMONEE AVE
DEWEY AVE
HARWOOD AVE
KAVANAUGH PL
LUDINGTON AVE
14900
14800
14600
5300
4100
4600
3700
8300
13000
9700
9200
7600
8000
2900
10600
8500
14300
10400
0 500 1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
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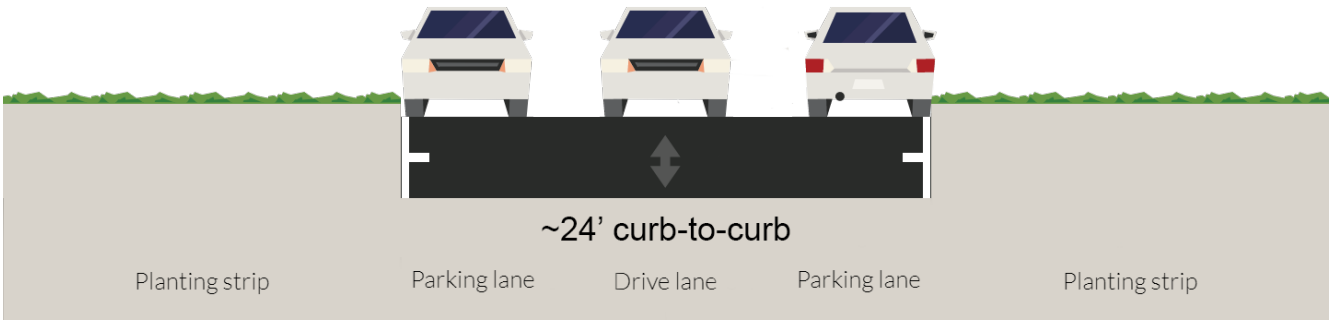
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

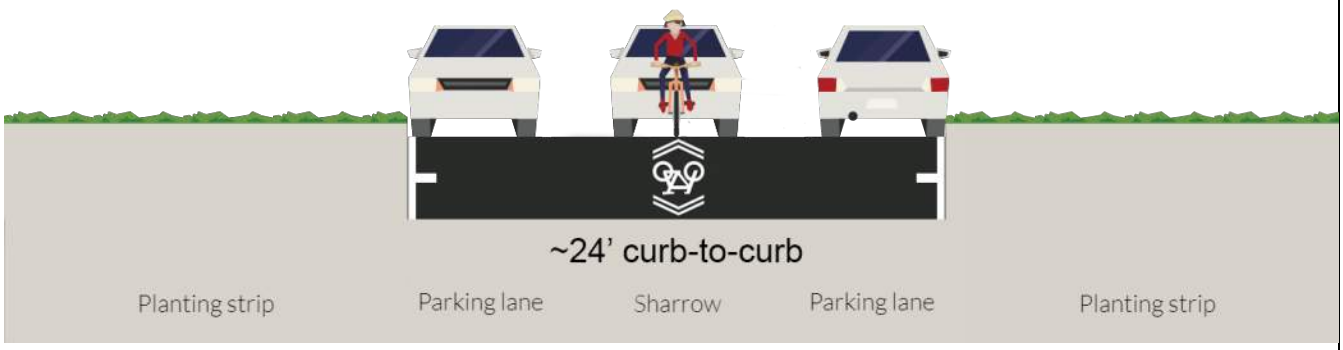
Typical Cross-Sections

Hillcrest Drive / Martha Washington Drive (from N 83rd Street to N Wauwatosa Avenue and east of N 68th Street) – **Existing**



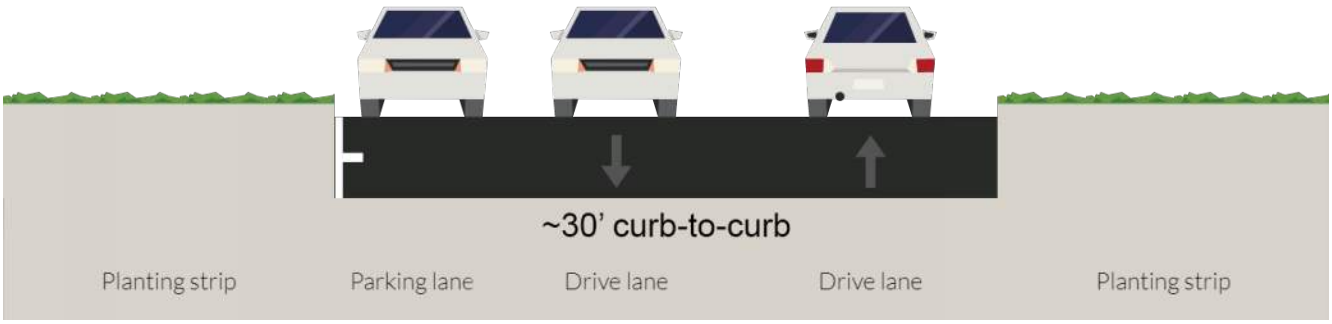
Note: Washington Circle is a boulevard with a median in the middle but is not shown because that segment is very short. Additionally, Martha Washington Drive measures 26-27 feet wide, slightly more than is shown above.

Hillcrest Drive / Martha Washington Drive (from N 83rd Street to N Wauwatosa Avenue and east of N 68th Street) – **Proposed**



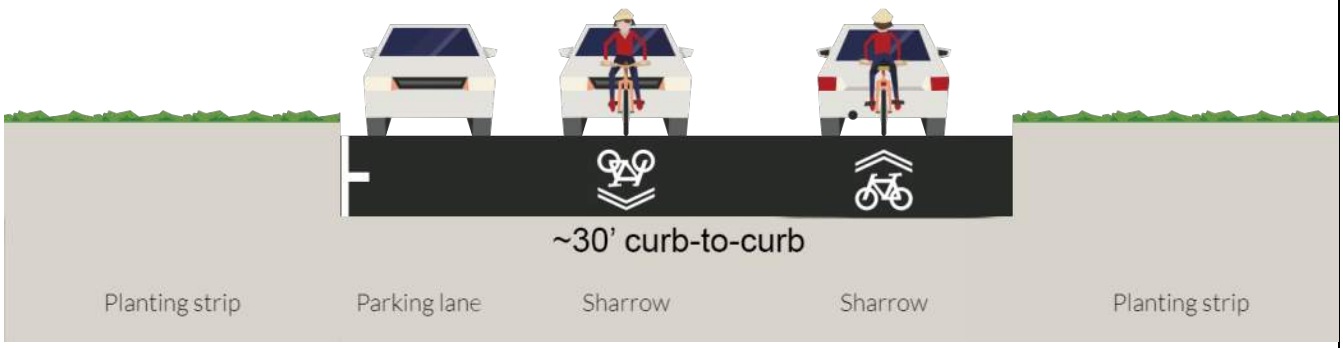
Note: Washington Circle is a boulevard with a median in the middle but is not shown because that segment is very short. Additionally, Martha Washington Drive measures 26-27 feet wide, slightly more than is shown above. Bidirectional SLMs may require FHWA experimentation.

Hillcrest Drive (N Wauwatosa Avenue to N 68th Street) – **Existing**



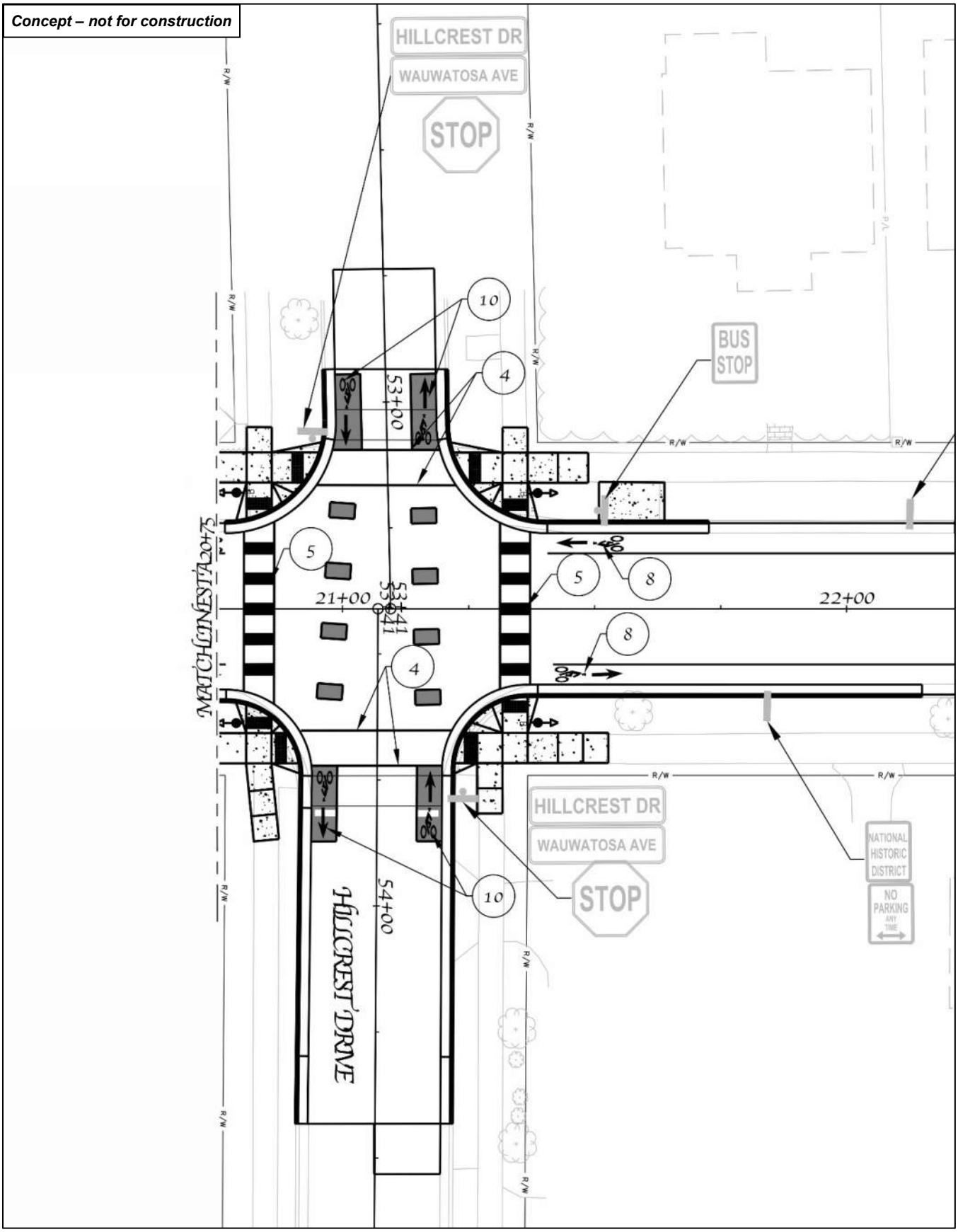
Note: The western section of this segment, from N Wauwatosa Avenue to North 73rd Street, does not allow parking on one side. East of that point, parking is allowed on both sides. This image shows the section without parking.

Hillcrest Drive (N Wauwatosa Avenue to N 68th Street) – **Proposed**



Note: The western section of this segment, from N Wauwatosa Avenue to North 73rd Street, does not allow parking on one side. East of that point, parking is allowed on both sides. This image shows the section without parking.

Proposed intersection improvements at Wauwatosa Avenue



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (23)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **N Wauwatosa Avenue:** High visibility crosswalks (2) to be added with the reconstruction of N Wauwatosa Avenue in 2020
- Wayfinding (future)
  - **N 83rd Street:** Connection to N 83rd Street greenway
  - **N Wauwatosa Avenue:** Connection to bike lanes
  - **N 73rd Street:** Connection to N 73rd Street greenway
  - **Revere Avenue:** Guide users through a turn
  - **Washington Circle:** Guide users through a turn
  - **Martha Washington Drive:** Guide users through a turn; connection to greenway
  - **W Washington Boulevard:** Direct users to nearby bike lanes to the east
  - **N 60th Street:** Connection to bike lanes (City of Milwaukee)

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to bike lanes and a school

Other Considerations

- No high visibility crosswalks along the route

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	21	$5,250
Greenway Sign-Existing Post	$100	Per sign	7	$700
Shared Lane Marking	$250	Per Marking	23	$5,750
			Subtotal	**$11,700**
	20% for incidentals (traffic control, etc.) and contingency			$2,340
			Total	**$14,040**

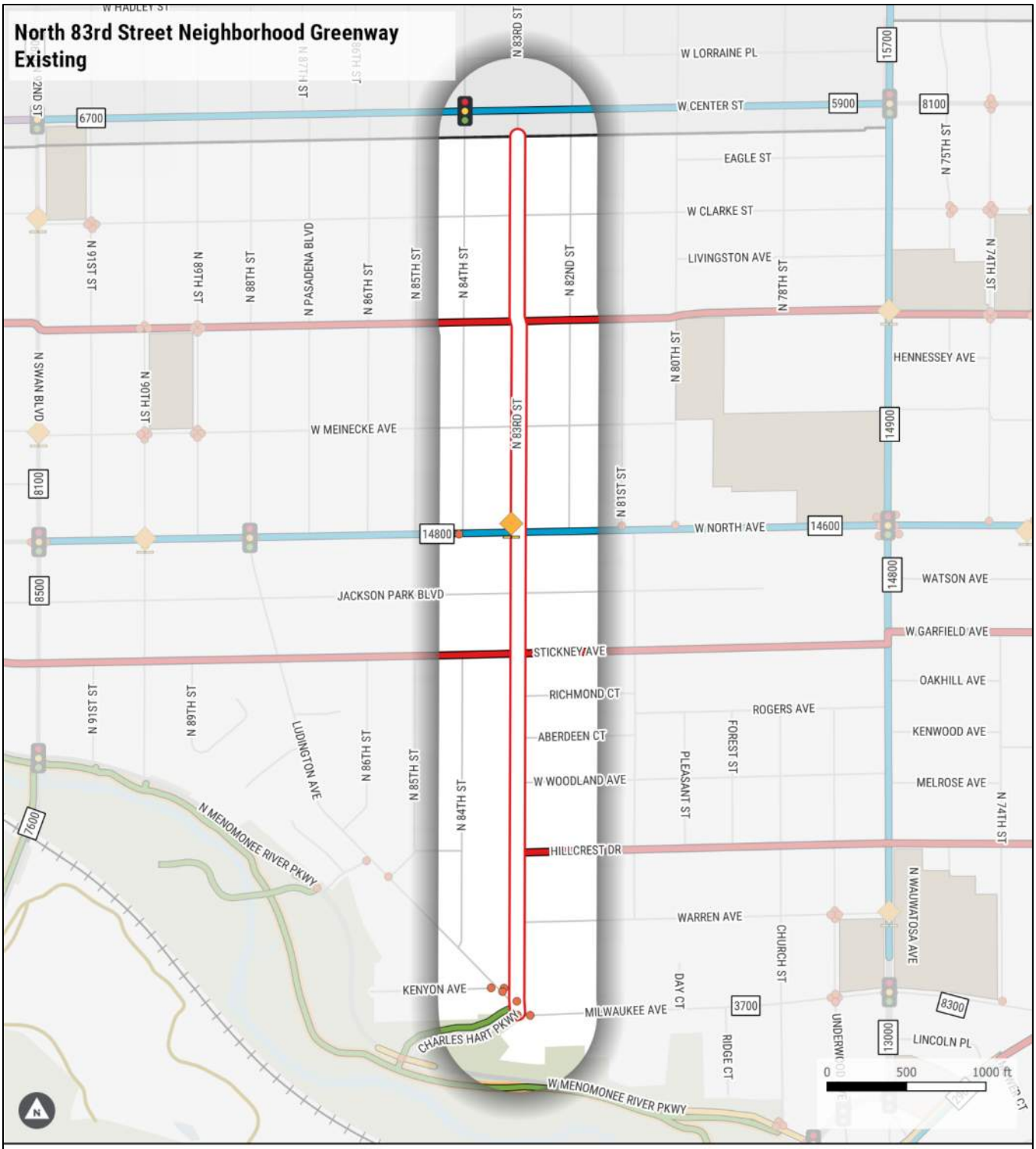
Potential Risks	Proposed Mitigation
None	

10. NORTH 83RD STREET

Length: 1.19 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Menomonee River Parkway
Connectivity to Schools	• None
Connectivity to Existing Bikeways	• Oak Leaf Trail on W Menomonee River Parkway • Bike Lanes on W Center Street, W North Avenue • Sharrows on W Menomonee River Parkway • Proposed Neighborhood Greenways on W Wright St, Stickney Avenue, and Hillcrest Drive
Connectivity to Transit	• Connects with Route 57D on N Wauwatosa Avenue • Intersects with Route 21 on W North Avenue, and with Route 31 on Milwaukee Avenue
Major Barriers	• W North Ave (high traffic)

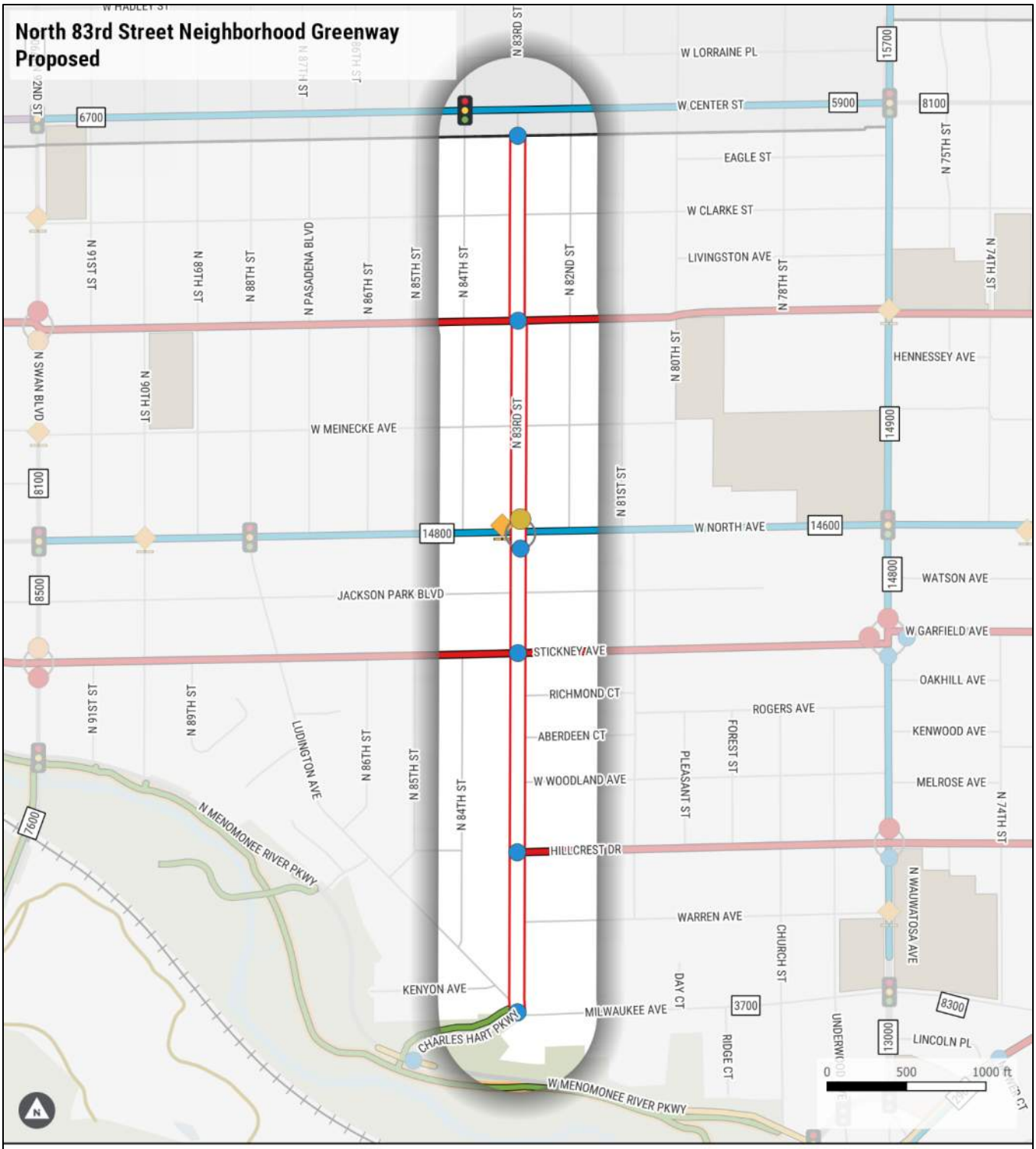
Existing conditions at the intersection of Ludington Avenue, N. 83rd Street, and Charles Hart Parkway



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments
- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

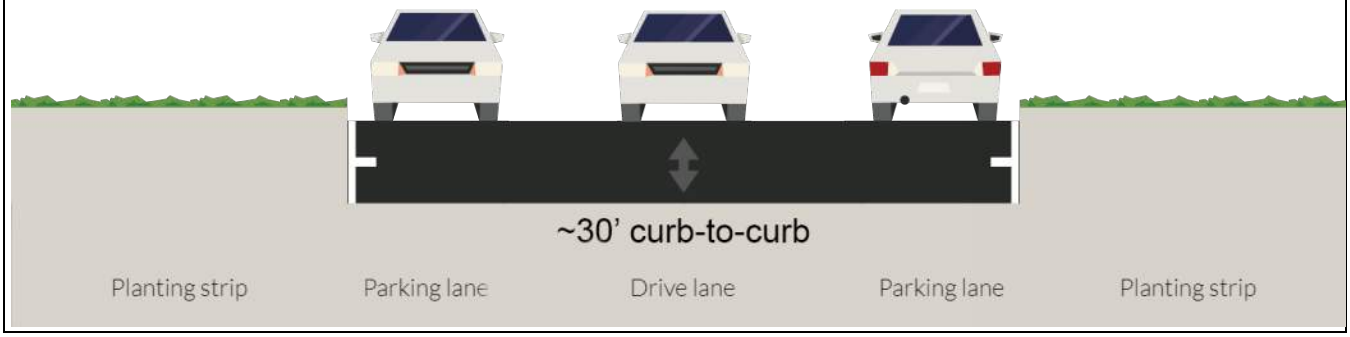
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

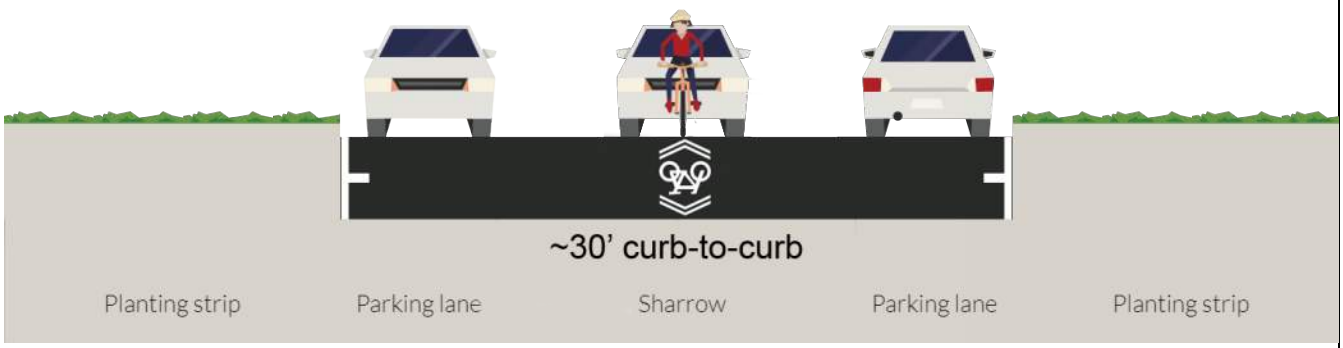
Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

Typical Cross-Sections

N 83rd St (W North Avenue to Milwaukee Avenue) – **Existing**

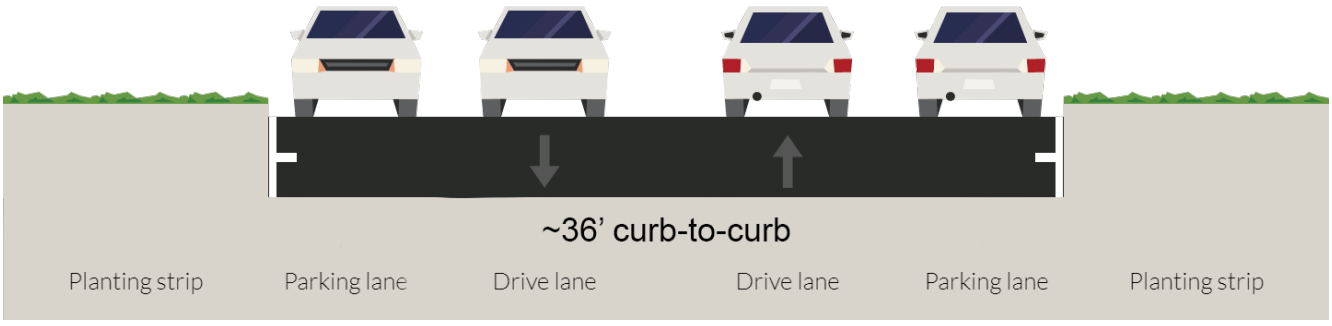


N 83rd St (W North Avenue to Milwaukee Avenue) – **Proposed**

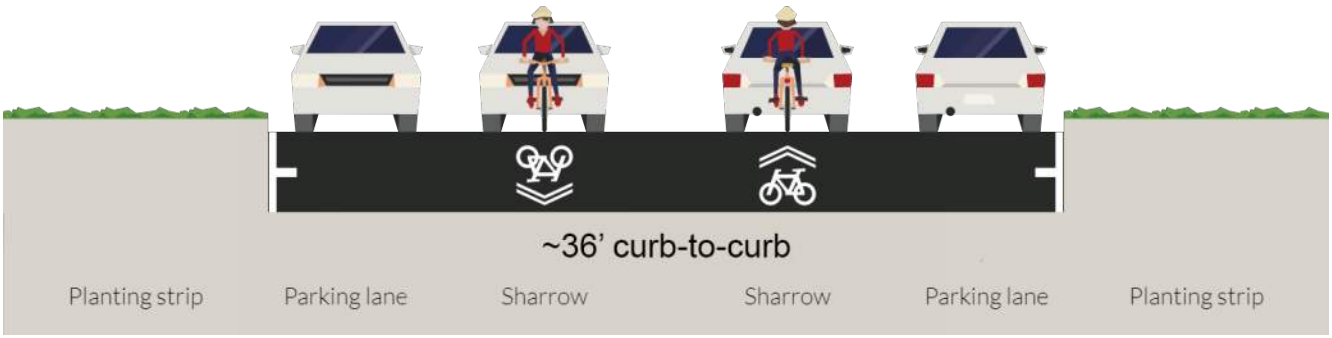


Note: Bidirectional SLMs may require FHWA experimentation.

Charles Hart Parkway (Milwaukee Avenue to Menomonee River Parkway) – **Existing**



Charles Hart Parkway (Milwaukee Avenue to Menomonee River Parkway) – **Proposed**



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **W North Avenue:** Existing RRFB and curb extensions; provide high visibility bike crossings
- Wayfinding (future)
  - **W Center Street:*** Connection to bike lanes
  - **W Wright Street:** Connection to greenway
  - **W North Avenue:** Connection to bike lanes
  - **W Stickney Avenue:** Connection to greenway
  - **Hillcrest Drive:** Connection to greenway
  - **Charles Hart Parkway / Milwaukee Avenue:** Connection to the existing path
  - **W Menomonee River Parkway:** Connection to Oak Leaf Trail

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to bike infrastructure and a park at the southern edge

** Place wayfinding sign slightly south of W Center Street as the City of Wauwatosa ends north of that location.*

Other Considerations

- Existing high visibility crosswalks at Milwaukee Avenue
- Existing RRFB at W North Avenue

Planning-Level Cost Estimates

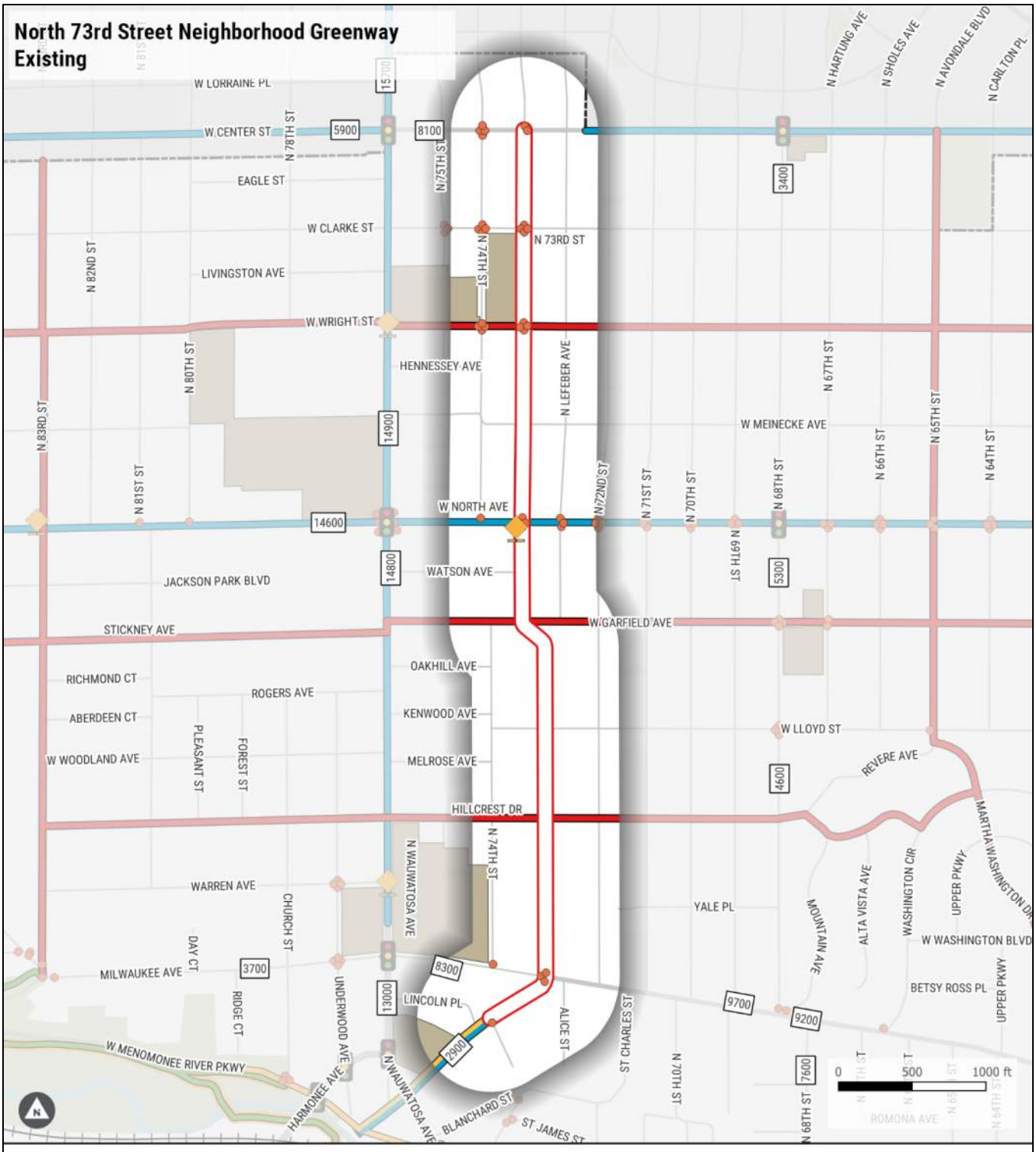
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	9	$2,250
Greenway Sign-Existing Post	$100	Per sign	5	$500
Shared Lane Marking	$255	Per Marking	22	$5,500
High Visibility Bike Crossing	$2,500	Each	2	$5,000
			Subtotal	**$13,250**
	20% for incidentals (traffic control, etc.) and contingency			$2,650
			Total	**$15,900**

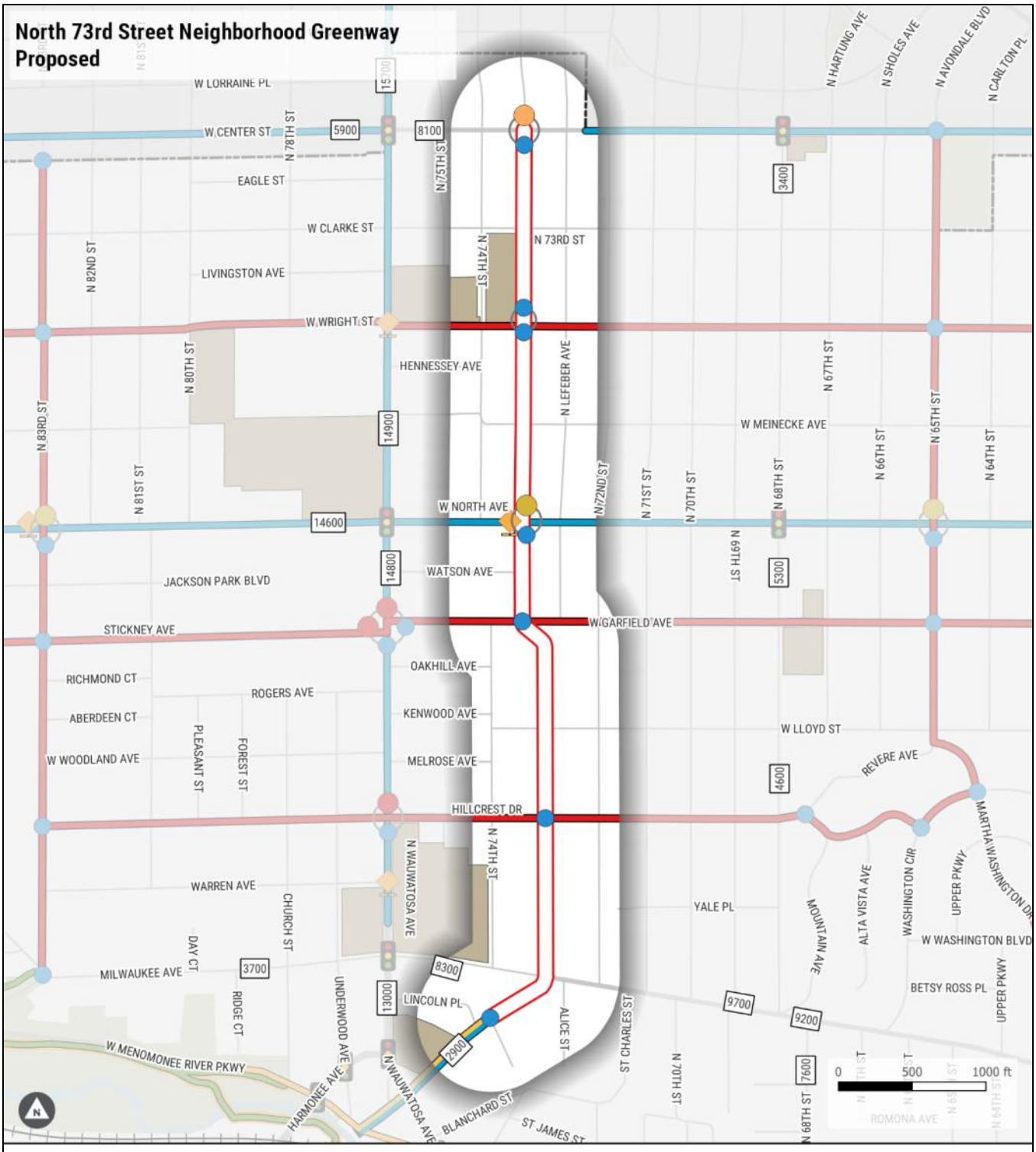
Potential Risks	Proposed Mitigation
None	

11. NORTH 73RD STREET

Length: 1.19 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• None
Connectivity to Schools	• Roosevelt Elementary School • Wauwatosa Catholic School • Portions of route are part of a designated Safe Route to School
Connectivity to Existing Bikeways	• Bike Lanes on W North Avenue, and W Center Street (starting one block east of N 73rd Street) • Combined Bike Lane/Climbing Lane on Harwood Avenue south of Mower Court • Proposed Neighborhood Greenways on Hillcrest Drive, W Garfield Avenue, and W Wright Street
Connectivity to Transit	• Route 31 runs along the Neighborhood Greenway on Harwood Avenue and intersects it at Milwaukee Avenue • Intersects with Route 21 at W North Avenue • Connects with Route 57D at W Center Street
Major Barriers	• Milwaukee Avenue (high traffic) • W North Avenue (high traffic)


North 73rd Street Neighborhood Greenway
Existing
W LORRAINE PL
W CENTER ST
EAGLE ST
W CLARKE ST
LIVINGSTON AVE
W WRIGHT ST
HENNESSEY AVE
W MEINECKE AVE
W NORTH AVE
WATSON AVE
JACKSON PARK BLVD
STICKNEY AVE
W GARFIELD AVE
OAKHILL AVE
KENWOOD AVE
MELROSE AVE
HILLCREST DR
RICHMOND CT
ROGERS AVE
ABERDEEN CT
W WOODLAND AVE
PLEASANT ST
FOREST ST
W LLOYD ST
REVERE AVE
WARREN AVE
CHURCH ST
DAY CT
MILWAUKEE AVE
RIDGE CT
UNDERWOOD AVE
LINCOLN PL
YALE PL
MOUNTAIN AVE
ALTA VISTA AVE
WASHINGTON CIR
UPPER PKWY
MARTHA WASHINGTON DR
W WASHINGTON BLVD
BETSY ROSS PL
ALICE ST
ST CHARLES ST
W MENOMONEE RIVER PKWY
HARMONEE AVE
BLANCHARD ST
ST JAMES ST
ROMONA AVE
N 73RD ST
N 74TH ST
N 75TH ST
N 78TH ST
N 82ND ST
N 80TH ST
N 83RD ST
N 81ST ST
N LEFEBER AVE
N 72ND ST
N 71ST ST
N 70TH ST
N 69TH ST
N 68TH ST
N 67TH ST
N 66TH ST
N 65TH ST
N 64TH ST
N WAUWATOSA AVE
N HARTUNG AVE
N SHOLES AVE
N AVONDALE BLVD
N CARLTON PL
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

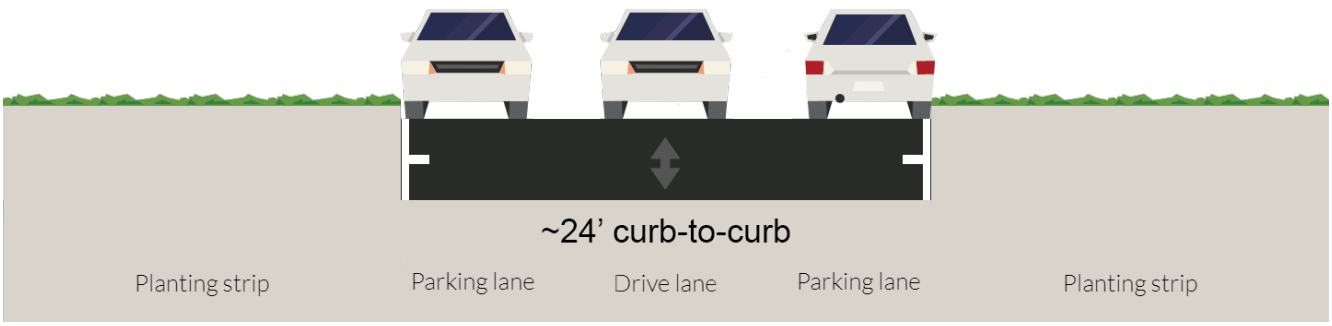
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

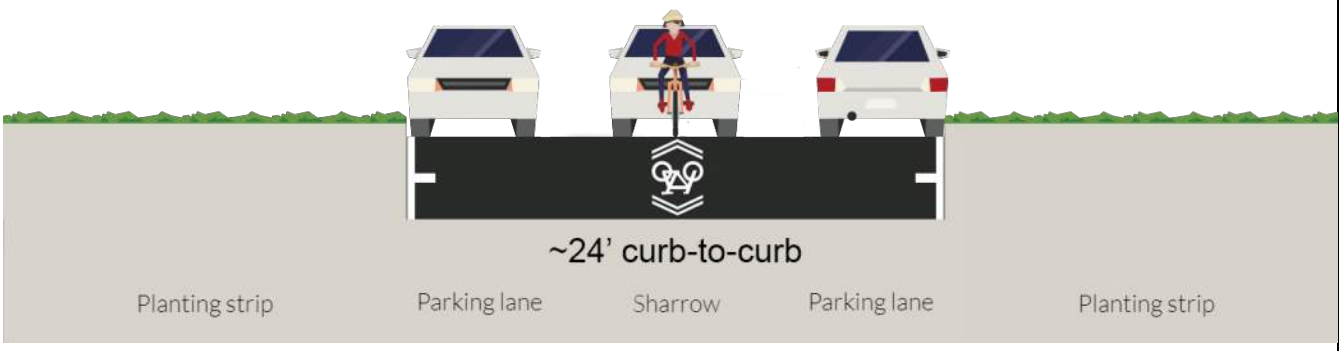
Typical Cross-Sections

N 73rd Street (W Center Street to W Garfield Avenue) – **Existing**



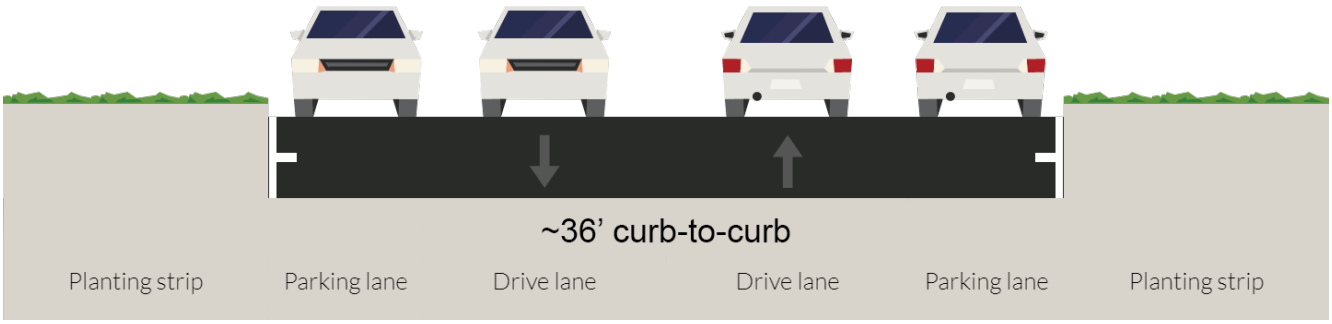
Note: There are NO PARKING signs on brief sections near the school (mostly limited to school hours). The image above is shown with parking.

N 73rd Street (W Center Street to W Garfield Avenue) – **Proposed**



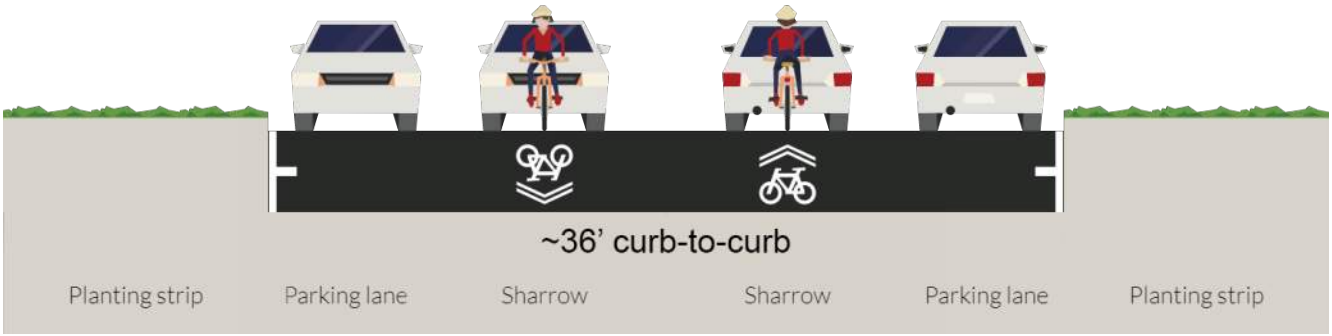
Note: There are NO PARKING signs on brief sections near the school (mostly limited to school hours). The image above is shown with parking. Bidirectional SLMs may require FHWA experimentation.

N 73rd Street (W Garfield Avenue to Mower Court) – **Existing**



Note: Street measures ~28-30 feet in the block immediately south of W Garfield Avenue. Street widens slightly from ~36 feet to ~40 feet at the brief segment south of Milwaukee Avenue

N 73rd Street (W Garfield Avenue to Mower Court) – **Proposed**



Note: Street measures ~28-30 feet in the block immediately south of W Garfield Avenue. Street widens slightly from ~36 feet to ~40 feet at the brief segment south of Milwaukee Avenue

Proposed conditions at Center Street and 73rd Street (crosswalks and ramps were previously upgraded, but rapid flash beacons would increase visibility here)

Concept for intersection of N 73rd Street and Milwaukee Avenue (high visibility crosswalks already exist)

Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (14)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments
  - **W Center Street:** Install RRFBs (4)
  - **W North Avenue:** Provide high visibility bike crossings
  - **Milwaukee Avenue:** Install bike lanes on Milwaukee Avenue to connect the jog in N 73rd Street
  - Immediately north of **W Wright Street on N 73rd Street**, there is a DO NOT ENTER sign in front of the school for during drop-off and pick-up; add "Except Bikes" to sign
- Wayfinding (future)
  - **W Center Street:** Direct users to the bike lanes to the east and west
  - **W Wright Street;** Connection to greenway
  - **W North Avenue:** Connection to bike lanes
  - **W Garfield Avenue:** Connection to greenway
  - **Hillcrest Drive:** Connection to greenway
  - **Mower Court:** Connection to bike lanes and guide users into and out of Tosa Village

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to bike infrastructure and a school

Other Considerations

- Existing high visibility crosswalks at W Center Street, W North Avenue, and Milwaukee Avenue
- Existing RRFB at W North Avenue

Planning-Level Cost Estimates

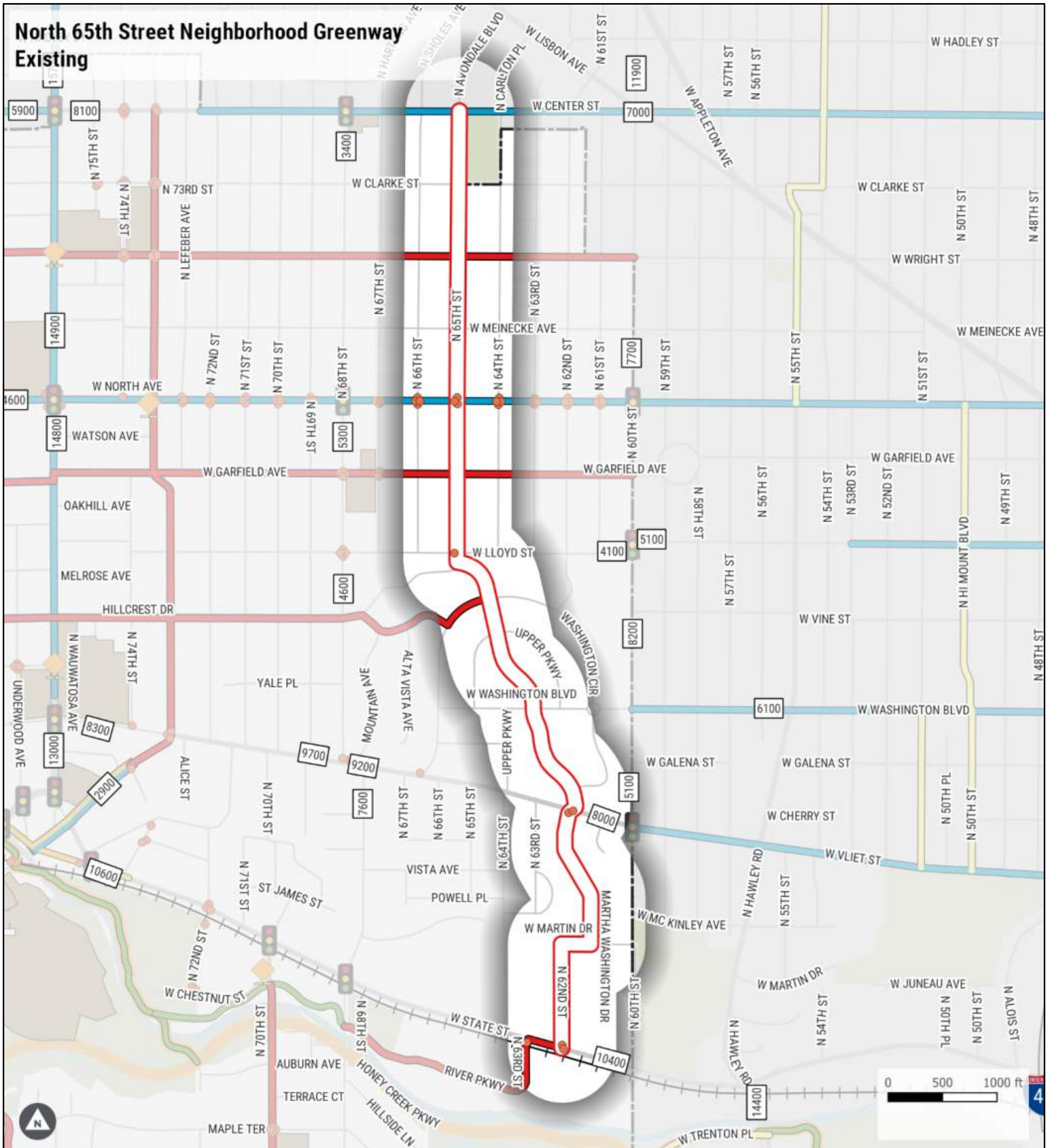
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	6	$1,500
Greenway Sign-Existing Post	$100	Per sign	10	$1,000
Shared Lane Marking	$250	Per Marking	14	$3,500
High Visibility Bike Crossing	$2,500	Each	2	$5,000
Rapid Flash Beacon	$15,000	Each	4	$60,000
			Subtotal	**$71,000**
	20% for incidentals (traffic control, etc.) and contingency			$14,200
			Total	**$85,200**

Potential Risks	Proposed Mitigation
None	

12. NORTH 65TH ST / MARTHA WASHINGTON AVE

Length: 1.77 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Center Street Park • Privately-owned open space along the creek paralleling Martha Washington Drive • Hawthorn Glen Nature Preserve
Connectivity to Schools	• None
Connectivity to Existing Bikeways	• Oak Leaf Trail on W Wright Street • Bike Lanes on W Center Street and W North Avenue • Proposed Neighborhood Greenways on W Wright Street, W Garfield Avenue, and Hillcrest Drive / Washington Circle; shares a short segment with the Hillcrest Drive Neighborhood Greenway on Martha Washington Drive
Connectivity to Transit	• Intersects with Route 21 on W North Avenue, and with Route 31 and 76 on Milwaukee Avenue • Connects with Route 57D on W Center Street and with Route 31 on W State Street
Major Barriers	• W State Street (high traffic)



Legend

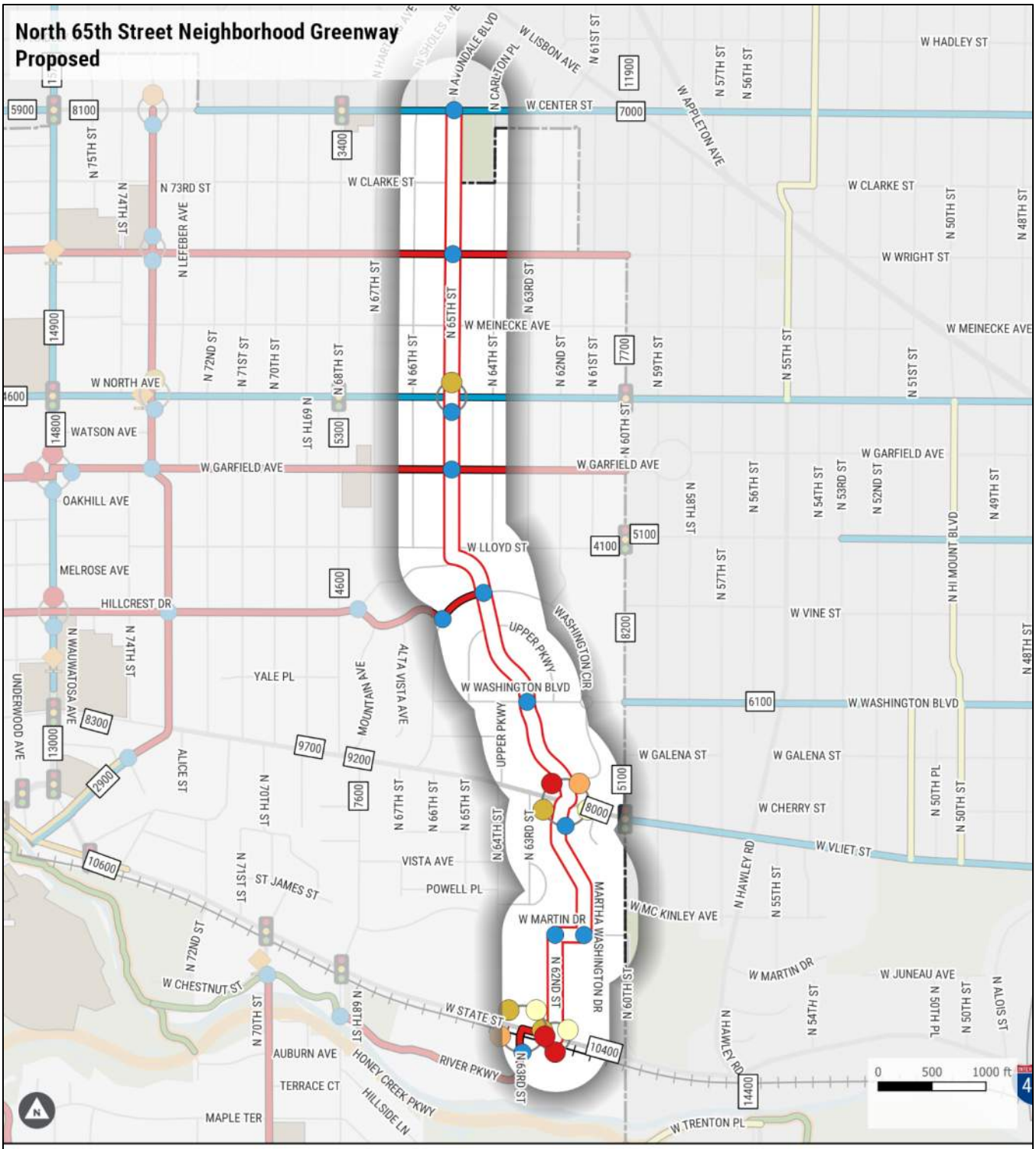
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments

- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

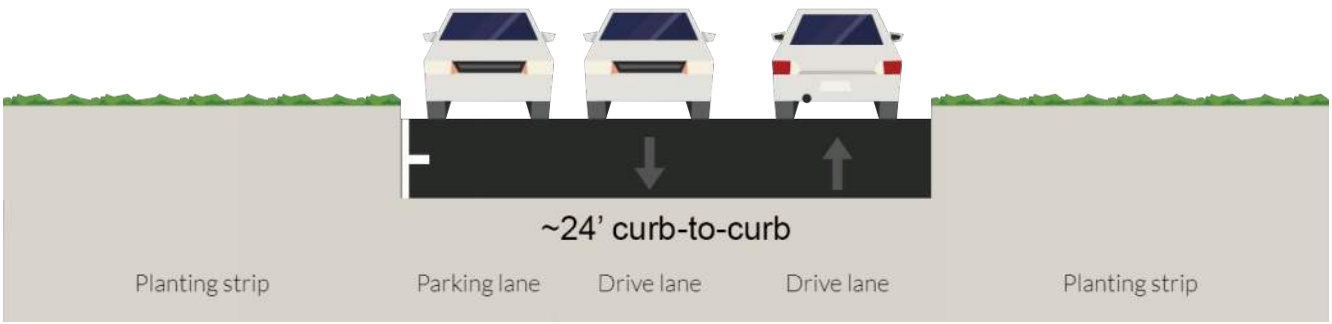
Existing Bike Facilities

- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route


North 65th Street Neighborhood Greenway
Proposed
W CENTER ST
W CLARKE ST
W WRIGHT ST
W MEINECKE AVE
W NORTH AVE
WATSON AVE
W GARFIELD AVE
OAKHILL AVE
MELROSE AVE
HILLCREST DR
W LLOYD ST
W WASHINGTON BLVD
W GALENA ST
W CHERRY ST
W VLIET ST
W MC KINLEY AVE
W MARTIN DR
W STATE ST
W CHESTNUT ST
ST JAMES ST
VISTA AVE
POWELL PL
YALE PL
AUBURN AVE
TERRACE CT
MAPLE TER
HILLSIDE LN
HONEY CREEK PKWY
RIVER PKWY
W TRENTON PL
W JUNEAU AVE
W VINE ST
W HADLEY ST
W APPLETON AVE
N LEFEBER AVE
N MOUNTAIN AVE
ALTA VISTA AVE
UPPER PKWY
WASHINGTON CIR
MARTHA WASHINGTON DR
N HAWLEY RD
N HI MOUNT BLVD
N AVONDALE BLVD
N CARLTON PL
W LISBON AVE
UNDERWOOD AVE
N WAUWATOSA AVE
ALICE ST
0 500 1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

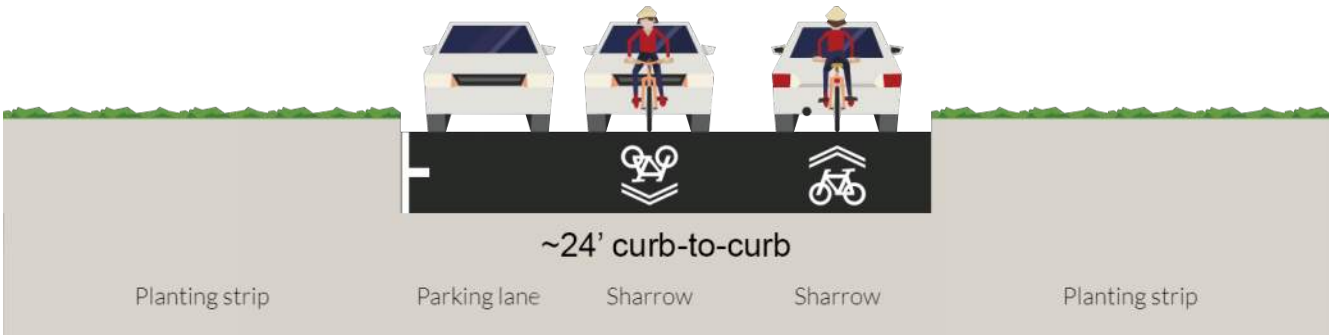
Typical Cross-Sections

N 65th Street (W Center Street to W Lloyd Street) – **Existing**



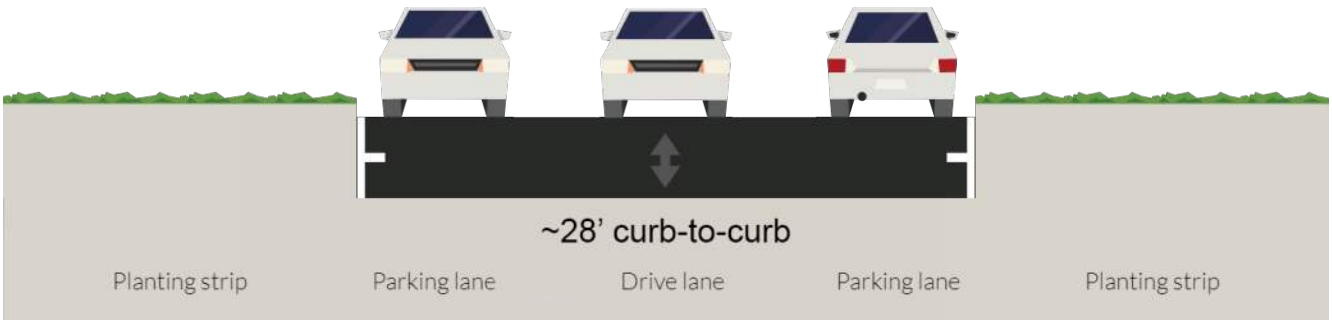
Note: Street measures 30' in the block immediately south of W Center Street

N 65th Street (W Center Street to W Lloyd Street) – **Proposed**

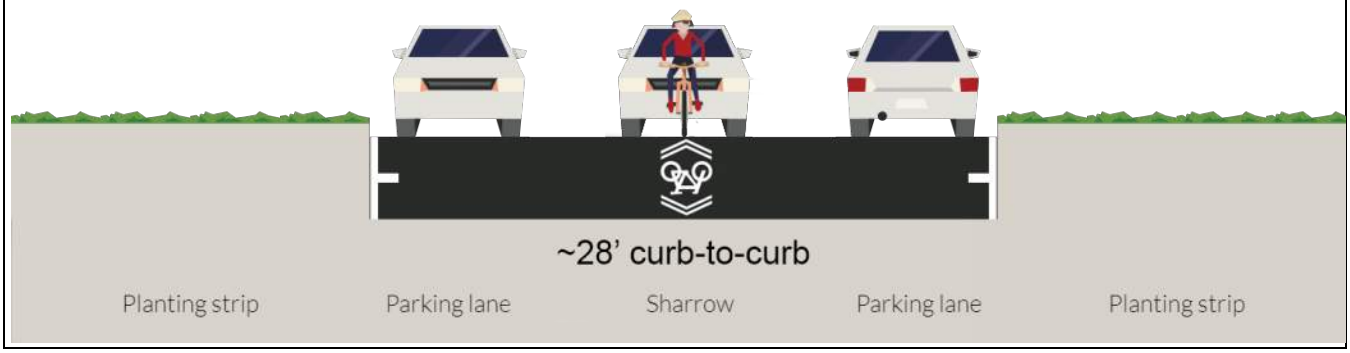


Note: Street measures 30' in the block immediately south of W Center Street

Martha Washington Drive (W Lloyd Street to Milwaukee Avenue / W Vliet Street) – **Existing**



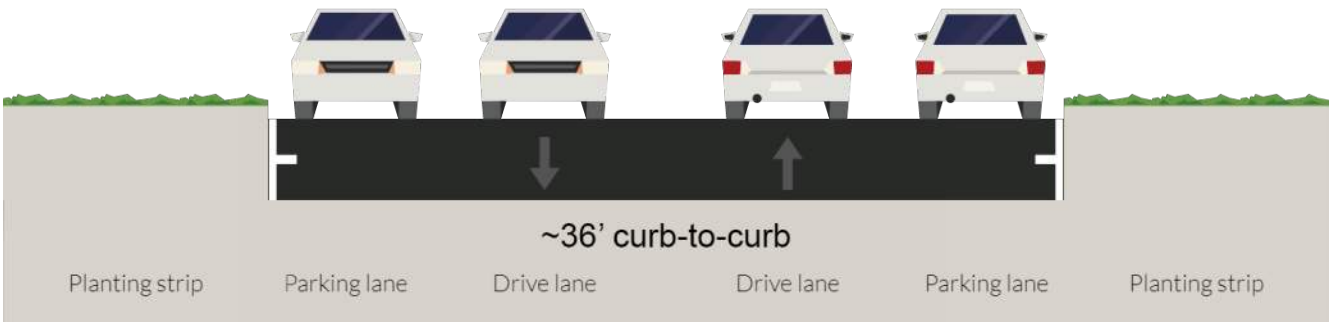
Martha Washington Drive (W Lloyd Street to Milwaukee Avenue / W Vliet Street) – **Existing**



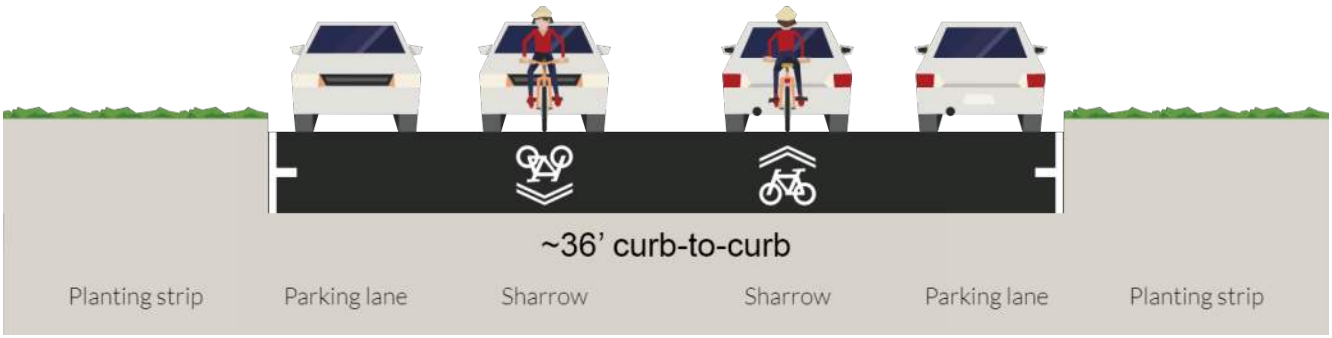
Martha Washington Drive (Milwaukee Avenue / W Vliet Street to W Martin Drive) – **Existing**

Martha Washington Drive (Milwaukee Avenue / W Vliet Street to W Martin Drive) – **Proposed**

N 62nd Street (W Martin Drive to W State Street) – **Existing**



N 62nd Street (W Martin Drive to W State Street) – **Proposed**



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (18)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments:
  - **W North Avenue:** High visibility bike crossings (2); Improved signage
  - **Milwaukee Avenue:** RRFBs (4); high visibility crosswalks (4), bike crossings (2), and curb extension (1)
  - **W State Street:** Treatments and cost estimates are included in the North 63rd Street / River Parkway Neighborhood Greenway
- Wayfinding (future)
  - **W Center Street:** Connection to bike lanes
  - **W Wright Street:** Connection to greenway
  - **W North Avenue:** Connection to bike lanes
  - **W Garfield Avenue:** Connection to greenway
  - **Washington Circle:** Connection to greenway
  - **W Washington Boulevard:** Milwaukee bike lanes to the east
  - **Milwaukee Avenue:** Guidance through the intersection
  - **W Martin Drive (at Martha Washington Circle and N 62nd Street):** Direct users through multiple turns
  - **W State Street:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to parks and trails

Other Considerations

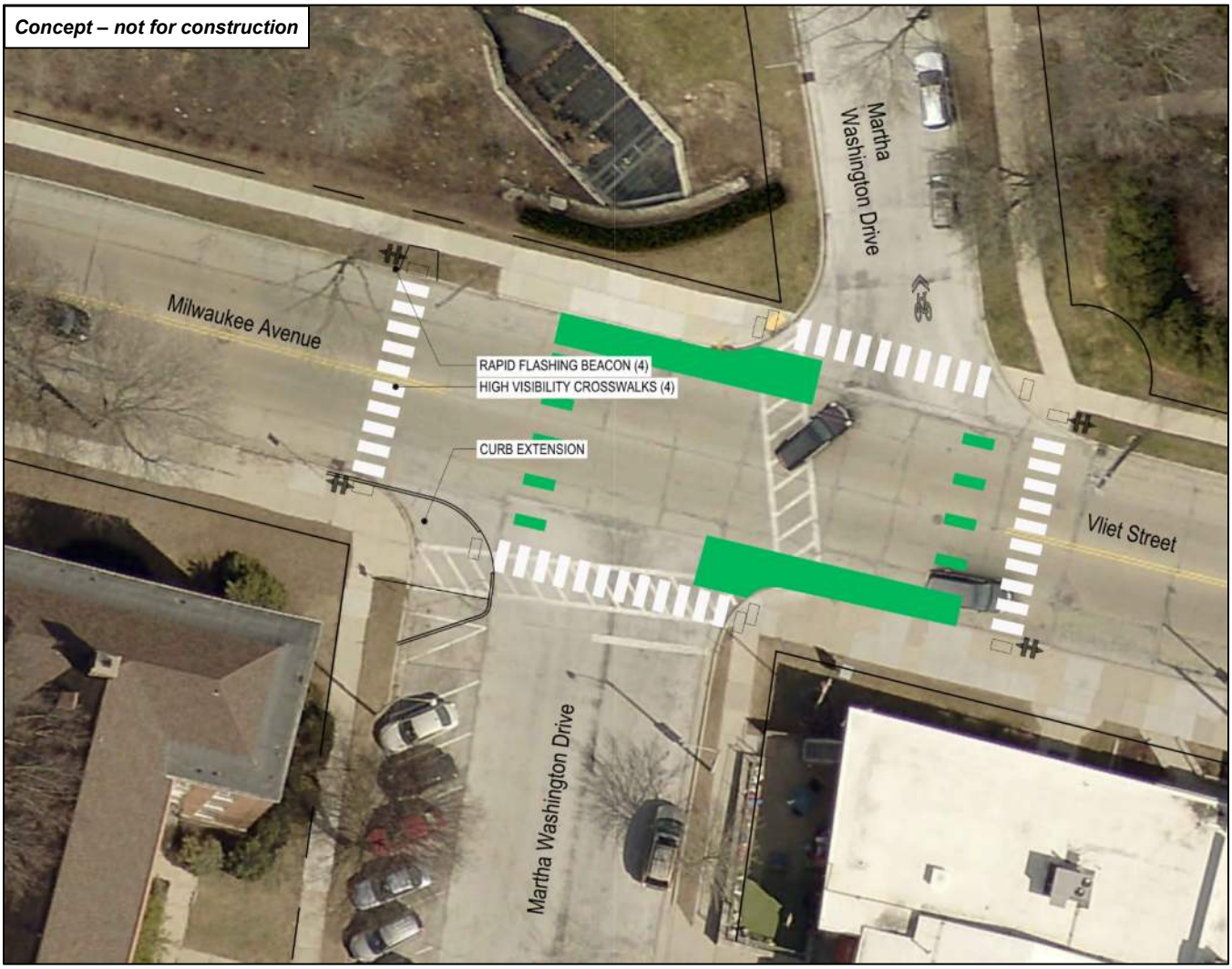
- Existing high visibility crosswalks at W North Avenue, Milwaukee Avenue, and W State Street

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	7	$1,750
Greenway Sign-Existing Post	$100	Per sign	20	$2,000
Shared Lane Marking	$255	Per Marking	18	$4,500
High Visibility Crosswalk	$2,500	Each	4	$10,000
High Visibility Bike Crossing	$2,500	Each	4	$10,000
Curb Extension	$7,500	Each	1	$7,500
Rapid Flash Beacon	$15,000	Each	4	$60,000
			Subtotal	**$95,750**
	20% for incidentals (traffic control, etc.) and contingency			$19,150
			Total	**$114,900**

Potential Risks	Proposed Mitigation
None	

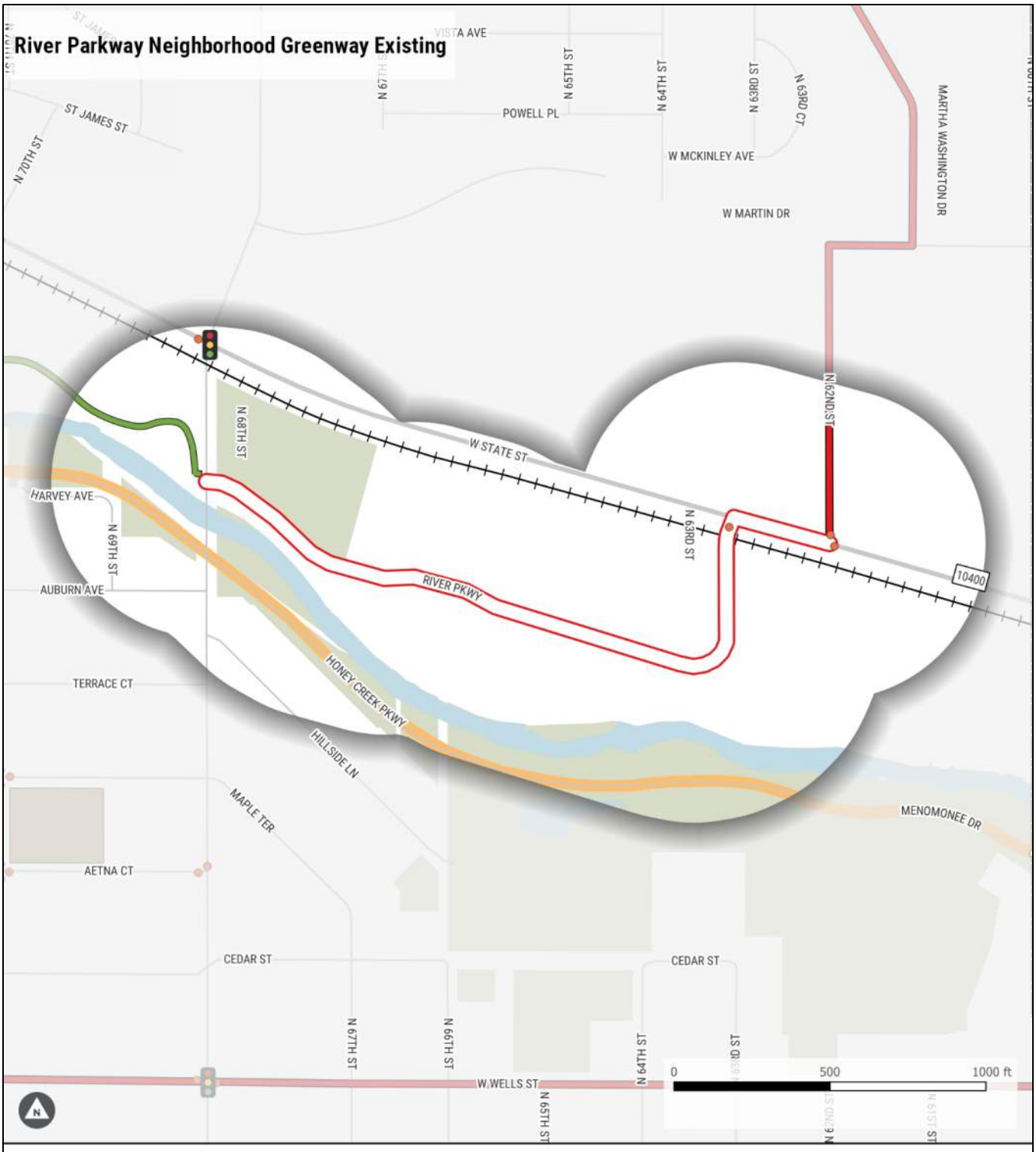
Concept for intersection of Martha Washington Drive and Milwaukee Avenue

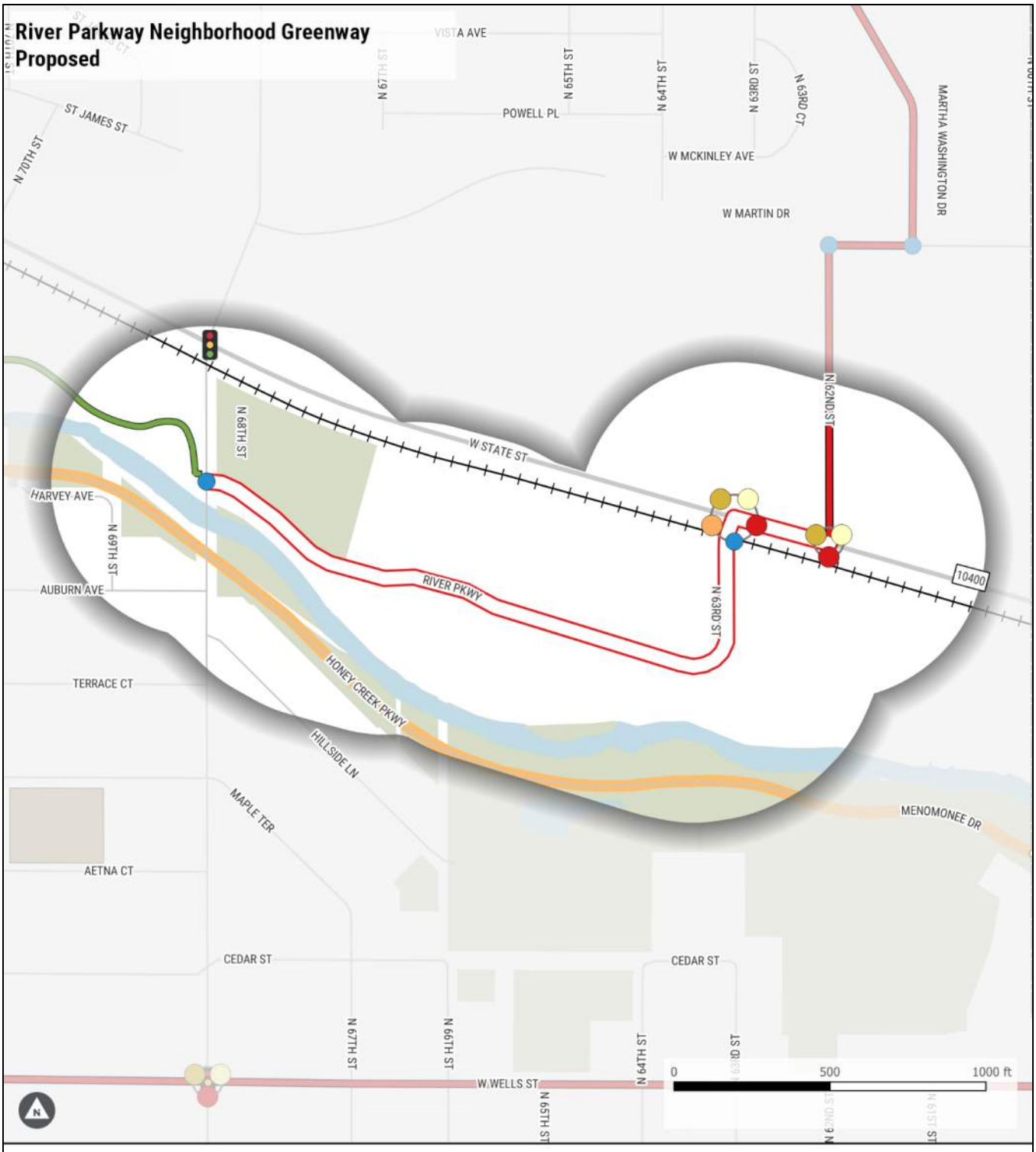


13. NORTH 63RD STREET / RIVER PARKWAY

Length: 0.49 miles **Posted Speed Limit:** 30 mph (State St); 25 mph (other streets)

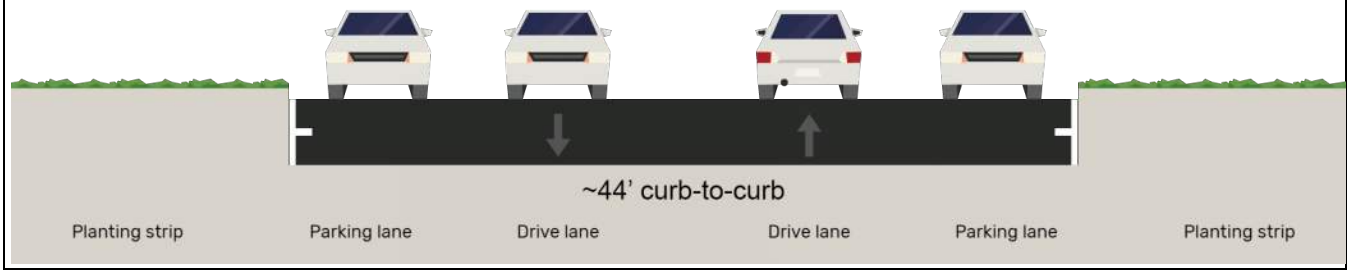
Considerations	Notes
Connectivity to Parks	• Menomonee River Parkway • Hart Park
Connectivity to Schools	• None
Connectivity to Existing Bikeways	• On-street segment of Oak Leaf Trail south of the river on Honey Creek Parkway • Off-street segment of the Oak Leaf Trail at N 68th Street
Connectivity to Transit	• Intersects with Route 31 on W State Street (and also shares a short segment with the bus line) • Connects with Route 76 on N 68th Street
Major Barriers	• W State Street (high traffic) • Rail line south of W State Street


River Parkway Neighborhood Greenway Existing
VISTA AVE
ST JAMES ST
N 70TH ST
N 67TH ST
N 65TH ST
N 64TH ST
N 63RD ST
N 63RD CT
POWELL PL
W MCKINLEY AVE
W MARTIN DR
MARTHA WASHINGTON DR
N 62ND ST
W STATE ST
N 68TH ST
HARVEY AVE
N 69TH ST
N 63RD ST
AUBURN AVE
RIVER PKWY
10400
HONEY CREEK PKWY
TERRACE CT
HILLSIDE LN
MAPLE TER
MENOMONEE DR
AETNA CT
CEDAR ST
CEDAR ST
N 67TH ST
N 66TH ST
N 64TH ST
W WELLS ST
N 65TH ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

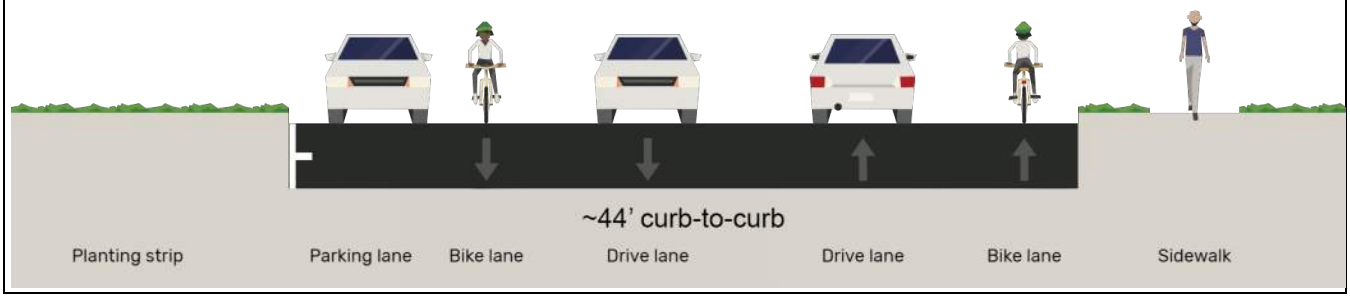

River Parkway Neighborhood Greenway
Proposed
VISTA AVE
ST JAMES ST
N 70TH ST
N 67TH ST
N 65TH ST
N 64TH ST
N 63RD ST
N 63RD CT
POWELL PL
W MCKINLEY AVE
W MARTIN DR
MARTHA WASHINGTON DR
N 62ND ST
W STATE ST
N 68TH ST
HARVEY AVE
N 69TH ST
AUBURN AVE
RIVER PKWY
10400
TERRACE CT
HONEY CREEK PKWY
HILLSIDE LN
MAPLE TER
MENOMONEE DR
AETNA CT
CEDAR ST
CEDAR ST
N 67TH ST
N 66TH ST
W WELLS ST
N 64TH ST
N 65TH ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

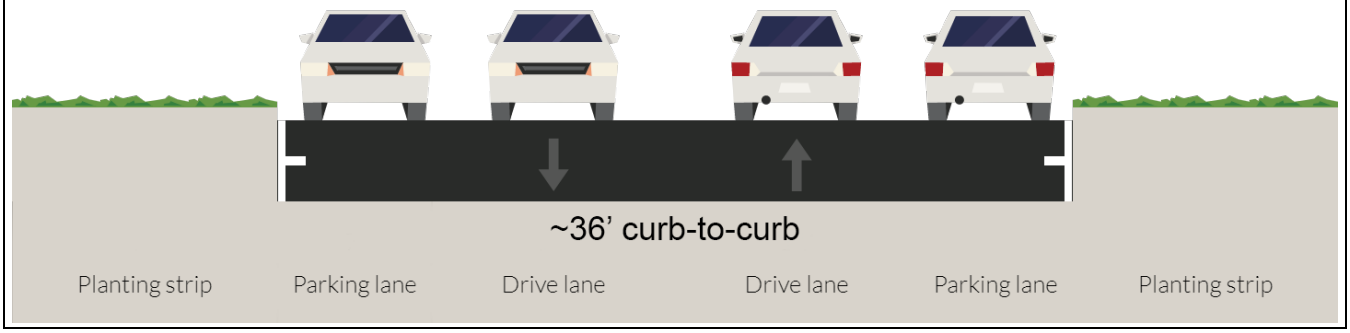
W State Street (N 62nd Street to N 63rd Street) – **Existing**



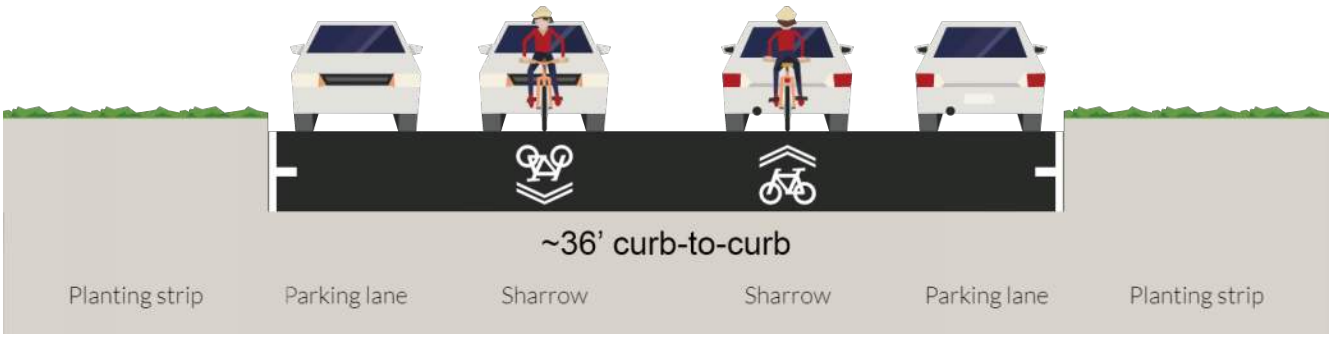
W State Street (N 62nd Street to N 63rd Street) – **Proposed**



N 63rd Street / River Parkway (W State Street to N 68th Street)– **Existing**



N 63rd Street / River Parkway (W State Street to N 68th Street) – **Proposed**



WAUWATOSA NEIGHBORHOOD GREENWAY ASSESSMENTS
NORTH 63RD STREET / RIVER PARKWAY

To provide a connection from N. 62nd Street to River Parkway and Hart Park, safe crossing of W. State Street is required. Proposed improvements include additional crosswalks, sidewalk connectors, and pavement markers to clearly indicate use of the right-of-way.

Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (3)
- Install neighborhood greenway signs (2 per block)
- Install bike lanes on W State Street
- Install sidewalk along south side of W State Street from N 62nd Street to N 63rd Street
- Intersection Treatments
  - **W State Street and N 62nd Street:** High visibility crosswalks (3); bike crossing (1); curb extensions (1); a proposed development to the south may include street realignments that could impact the crossing location
  - **W State Street and N 63rd Street:** High visibility crosswalks (2); RRFBs (2); curb extensions (1); bike crossing (1)
- Wayfinding
  - **N 68th Street**: Direct users to the path and to the neighborhood greenway on N 70th Street
  - **N 63rd Street**: Direct users to the path and to the neighborhood greenway on N 62nd Street

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides numerous connections to a park and a trail near Tosa Village

Other Considerations

- High visibility crosswalks at W State Street and N 62nd Street, and at W State Street and N 63rd Street

Planning-Level Cost Estimates

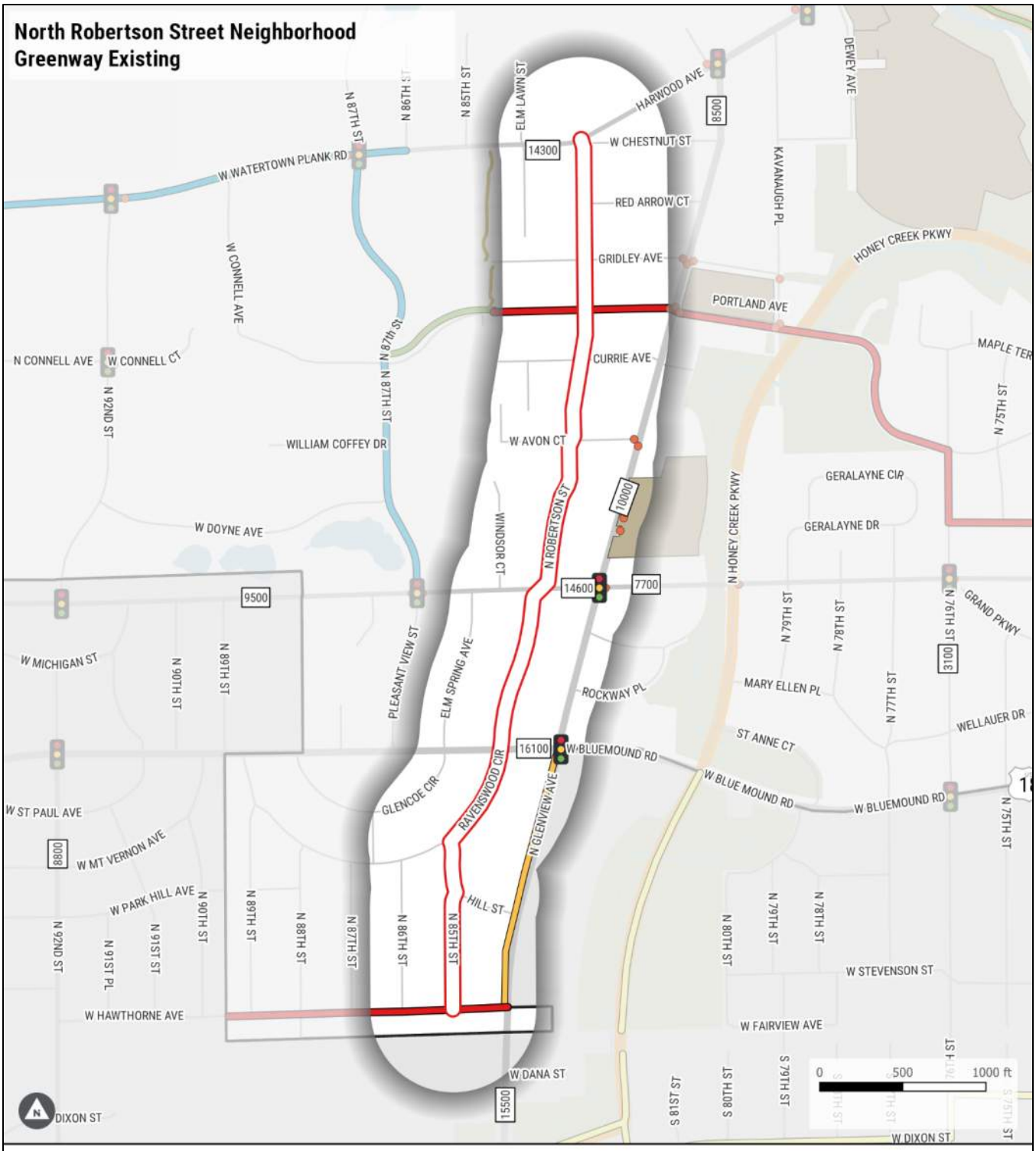
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	1	$250
Greenway Sign-Existing Post	$100	Per sign	2	$200
Shared Lane Marking	$250	Per Marking	3	$750
High Visibility Crosswalk	$2,500	Each	5	$12,500
High Visibility Bike Crossing	$2,500	Each	2	$5,000
Rapid Flash Beacon	$15,000	Each	2	$30,000
Curb Extension	$7,500	Each	2	$15,000
Sidewalk (6’ wide, 5” depth)	$475,000	Per mile	0.06	$28,500
			Subtotal	**$92,200**
	20% for incidentals (traffic control, etc.) and contingency			$18,440
			Total	**$110,640**

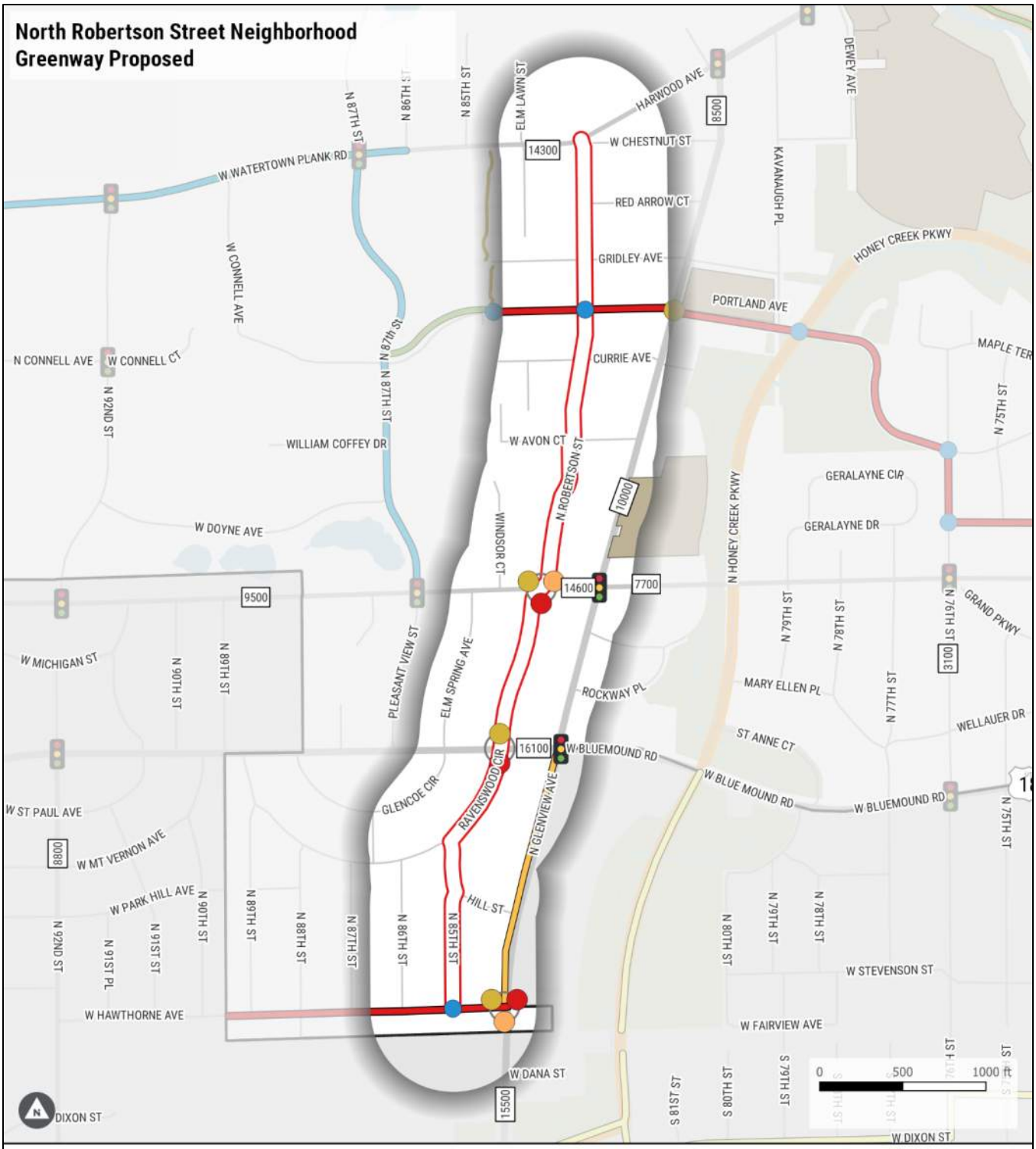
Potential Risks	Proposed Mitigation
• The proposed sidewalk connection along the south side of State Street is adjacent to railroad right of way and will require a new at-grade pedestrian crossing of the railroad	• Early and frequent outreach to the railroad to discuss the design of the path and the pedestrian connection to the existing sidewalk on the south side of the tracks

14. NORTH ROBERTSON STREET

Length: 1.03 miles **Posted Speed Limit:** 25 mph

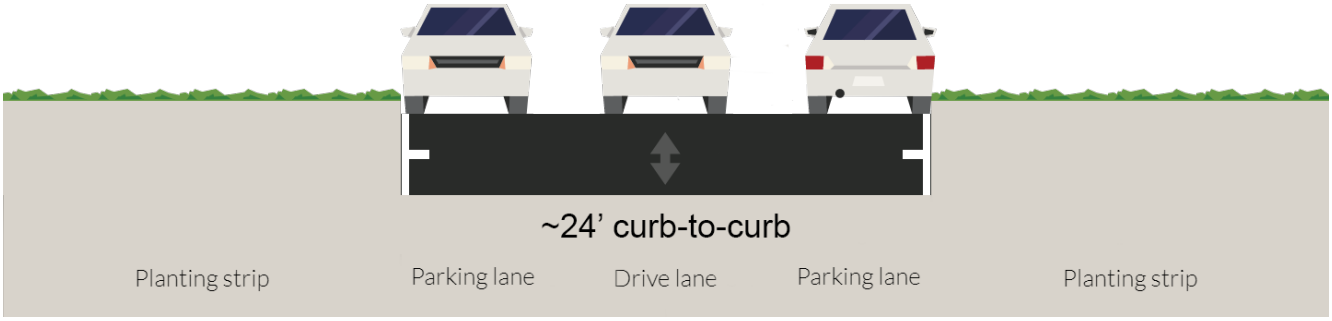
Considerations	Notes
Connectivity to Parks	• None, although close to Honey Creek Parkway
Connectivity to Schools	• None, although close to Saint Jude School
Connectivity to Existing Bikeways	• Proposed Neighborhood Greenway on Portland Avenue and W Hawthorne Avenue
Connectivity to Transit	• Connects with Routes 31 and 67D on Harwood Avenue / W Watertown Plank Road • Intersects with Route 10D on W Wisconsin Avenue, and with Route 85 on W Bluemound Road / US Highway 18
Major Barriers	• Watertown Plank Road (high traffic) • W Wisconsin Avenue (high traffic and a misaligned crossing) • W Bluemound Road / US Highway 18 (high traffic)


North Robertson Street Neighborhood
Greenway Existing
W WATERTOWN PLANK RD
W CHESTNUT ST
RED ARROW CT
GRIDLEY AVE
PORTLAND AVE
CURRIE AVE
W AVON CT
WILLIAM COFFEY DR
W DOYNE AVE
W MICHIGAN ST
W ST PAUL AVE
W MT VERNON AVE
W PARK HILL AVE
W HAWTHORNE AVE
W DANA ST
DIXON ST
W CONNELL AVE
N CONNELL AVE
W CONNELL CT
N 92ND ST
N 87TH ST
N 86TH ST
N 85TH ST
ELM LAWN ST
HARWOOD AVE
DEWEY AVE
KAVANAUGH PL
HONEY CREEK PKWY
N HONEY CREEK PKWY
MAPLE TER
N 75TH ST
GERALAYNE CIR
GERALAYNE DR
GRAND PKWY
N 76TH ST
N 79TH ST
N 78TH ST
N 77TH ST
MARY ELLEN PL
WELLAUER DR
ST ANNE CT
W BLUEMOUND RD
W BLUE MOUND RD
N 75TH ST
ROCKWAY PL
N ROBERTSON ST
DUNOSON CT
PLEASANT VIEW ST
ELM SPRING AVE
GLENCOE CIR
RAVENSWOOD CIR
N GLENVIEW AVE
HILL ST
N 89TH ST
N 88TH ST
N 87TH ST
N 86TH ST
N 85TH ST
N 91ST PL
N 91ST ST
N 90TH ST
N 80TH ST
W STEVENSON ST
W FAIRVIEW AVE
S 81ST ST
S 80TH ST
S 79TH ST
14300
8500
9500
14600
7700
10000
3100
16100
8800
15500
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

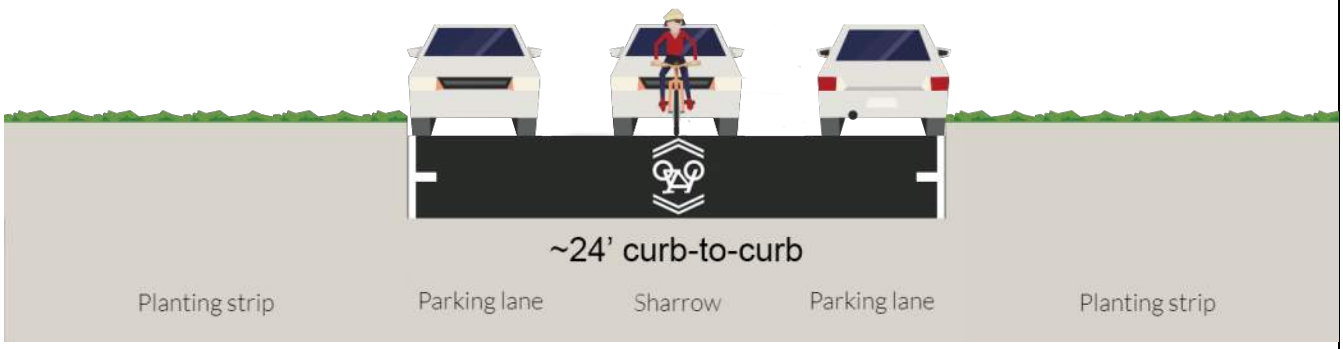

North Robertson Street Neighborhood Greenway Proposed
W WATERTOWN PLANK RD
W CHESTNUT ST
RED ARROW CT
GRIDLEY AVE
PORTLAND AVE
CURRIE AVE
W AVON CT
N ROBERTSON ST
WILLIAM COFFEY DR
W DOYNE AVE
W MICHIGAN ST
ROCKWAY PL
MARY ELLEN PL
ST ANNE CT
W BLUEMOUND RD
W BLUE MOUND RD
GLENCOE CIR
RAVENSWOOD CIR
N GLENVIEW AVE
HILL ST
W ST PAUL AVE
W MT VERNON AVE
W PARK HILL AVE
W HAWTHORNE AVE
W STEVENSON ST
W FAIRVIEW AVE
W DANA ST
W DIXON ST
HARWOOD AVE
ELM LAWN ST
KAVANAUGH PL
DEWEY AVE
HONEY CREEK PKWY
N HONEY CREEK PKWY
GERALAYNE CIR
GERALAYNE DR
MAPLE TER
GRAND PKWY
WELLAUER DR
W CONNELL AVE
N CONNELL AVE
W CONNELL CT
PLEASANT VIEW ST
ELM SPRING AVE
WINNOSOR CT
N 87TH ST
N 86TH ST
N 85TH ST
N 92ND ST
N 91ST PL
N 91ST ST
N 90TH ST
N 89TH ST
N 88TH ST
N 87TH ST
N 86TH ST
N 85TH ST
N 80TH ST
N 79TH ST
N 78TH ST
N 77TH ST
N 76TH ST
N 75TH ST
S 81ST ST
S 80TH ST
S 79TH ST
14300
8500
14600
7700
10000
9500
3100
16100
8800
15500
0
500
1000 ft
DIXON ST
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

Typical Cross-Sections

N Robertson Street (W Watertown Plank Road to W Avon Court) and Ravenswood Circle / N 85th Street (W Bluemound Road to W Hawthorne Avenue) – **Existing**

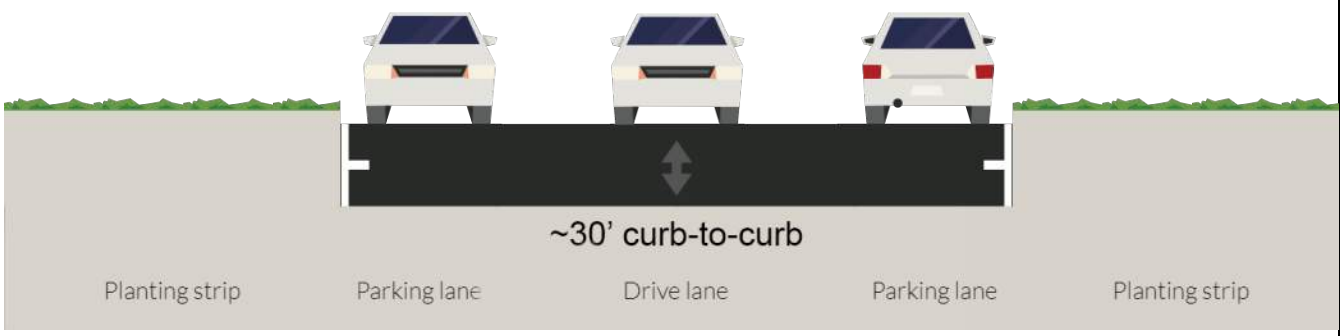


N Robertson Street (W Watertown Plank Road to W Avon Court) and Ravenswood Circle / N 85th Street (W Bluemound Road to W Hawthorne Avenue) – **Proposed**



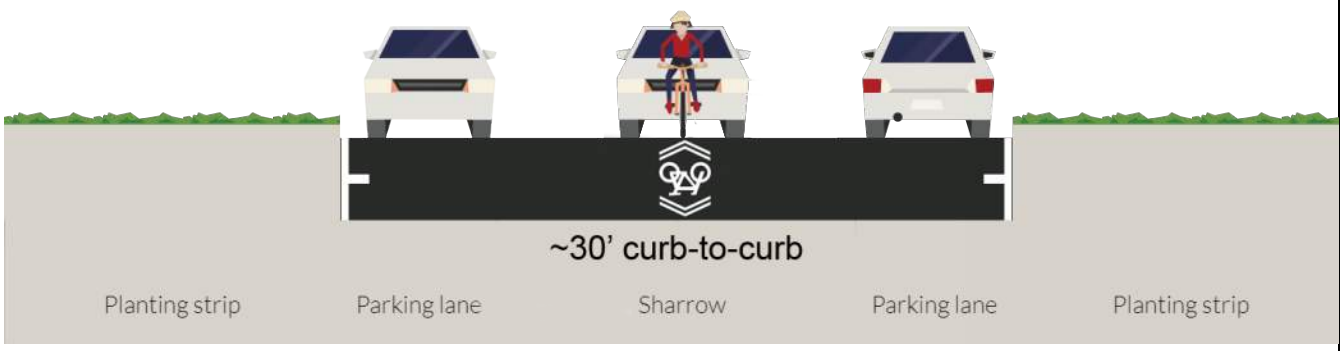
Note: Bidirectional SLMs may require FHWA experimentation.

N Robertson Street / Ravenswood Circle (W Avon Court to N 85th Street) – **Existing**



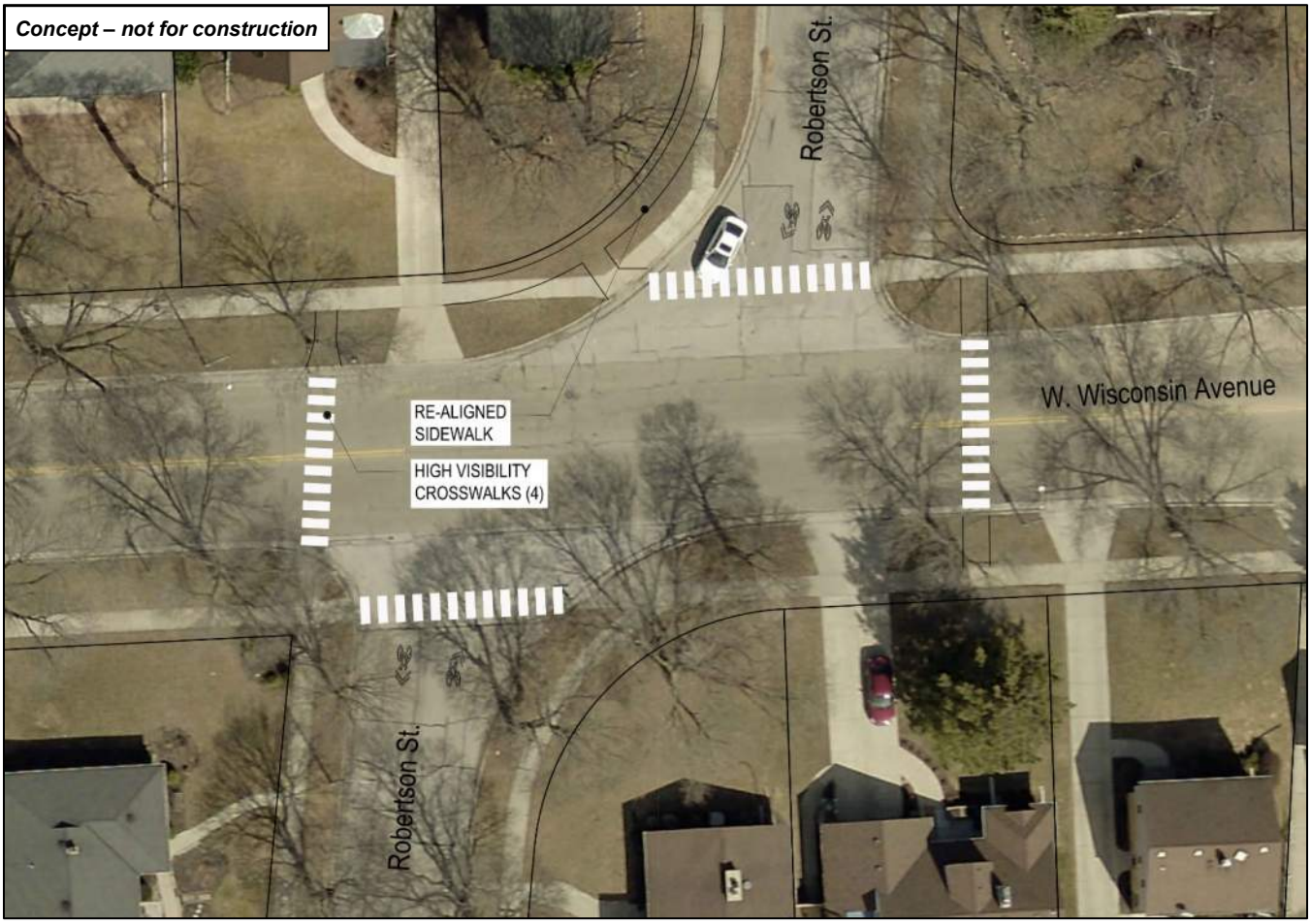
Note: Parking is not allowed on one side of the street in the segment between W Wisconsin Avenue and W Bluemound Road/ US Highway 18.

N Robertson Street / Ravenswood Circle (W Avon Court to N 85th Street) – **Proposed**

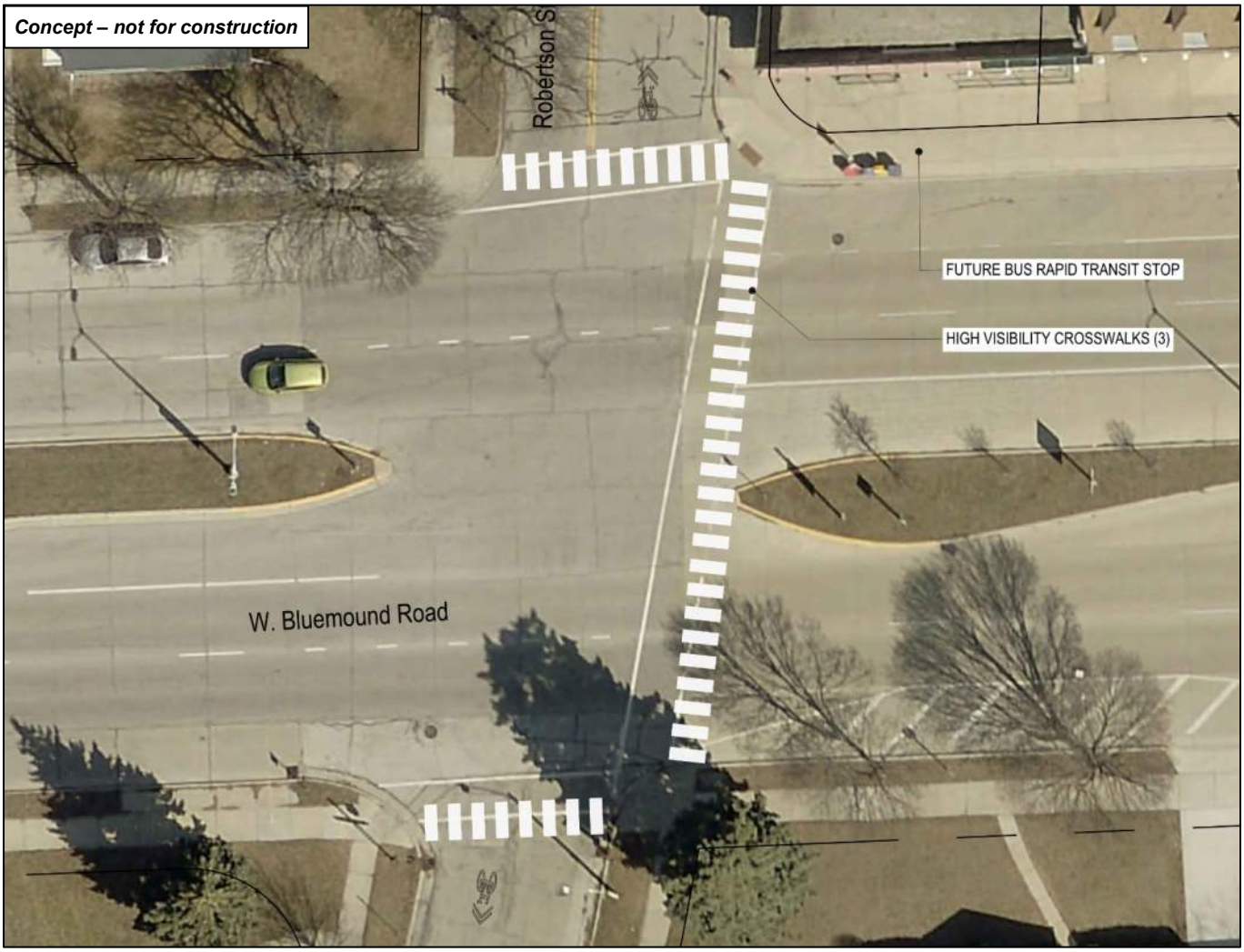


Note: Parking is not allowed on one side of the street in the segment between W Wisconsin Avenue and W Bluemound Road/ US Highway 18. Bidirectional SLMs may require FHWA experimentation.

Proposed intersection improvements at N Robertson Street and W Wisconsin Avenue. Rapid flashing beacons should be considered in this location



Proposed improvements at Robertson Street and W. Bluemound Road



Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (15)
- Install neighborhood greenway signs (2 per block)
- Look at spacing of STOP signs, especially in the northern section of the route; consider turning signs to face traffic crossing the greenway based on engineering guidance
- Intersection Treatments
  - **Watertown Plank Road / Harwood Avenue:** No recommendation currently, but this street could be impacted by: 1) a planned shared use path on the north side; and 2) the Medical College of Wisconsin desire for a signal at N 85th Street
  - **W Wisconsin Avenue:** High visibility crosswalks at the top of the hill (to ensure visibility) (4); Provide high visibility bike crossings (2); Consider adding RRFBs (2); there is a planned multi-use path on the north side of W Wisconsin Avenue west of Windsor Court that should connect to this route
  - **W Bluemound Road:** High visibility crosswalks (3) and bike crossings (2); coordinate with future BRT stops; retrofit medians to extend through the crosswalks (long-term); only high visibility crosswalks are included in the map and cost estimates below
- Wayfinding (future)
  - **Portland Avenue:** Connection to greenway
  - **W Hawthorne Avenue:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; also provides connections to several different Neighborhood Greenways, as well as to Milwaukee Regional Medical Center

Other Considerations

- No high visibility crosswalks at intersections along the corridor.
- Misaligned crosswalk at W Wisconsin Avenue

Planning-Level Cost Estimates

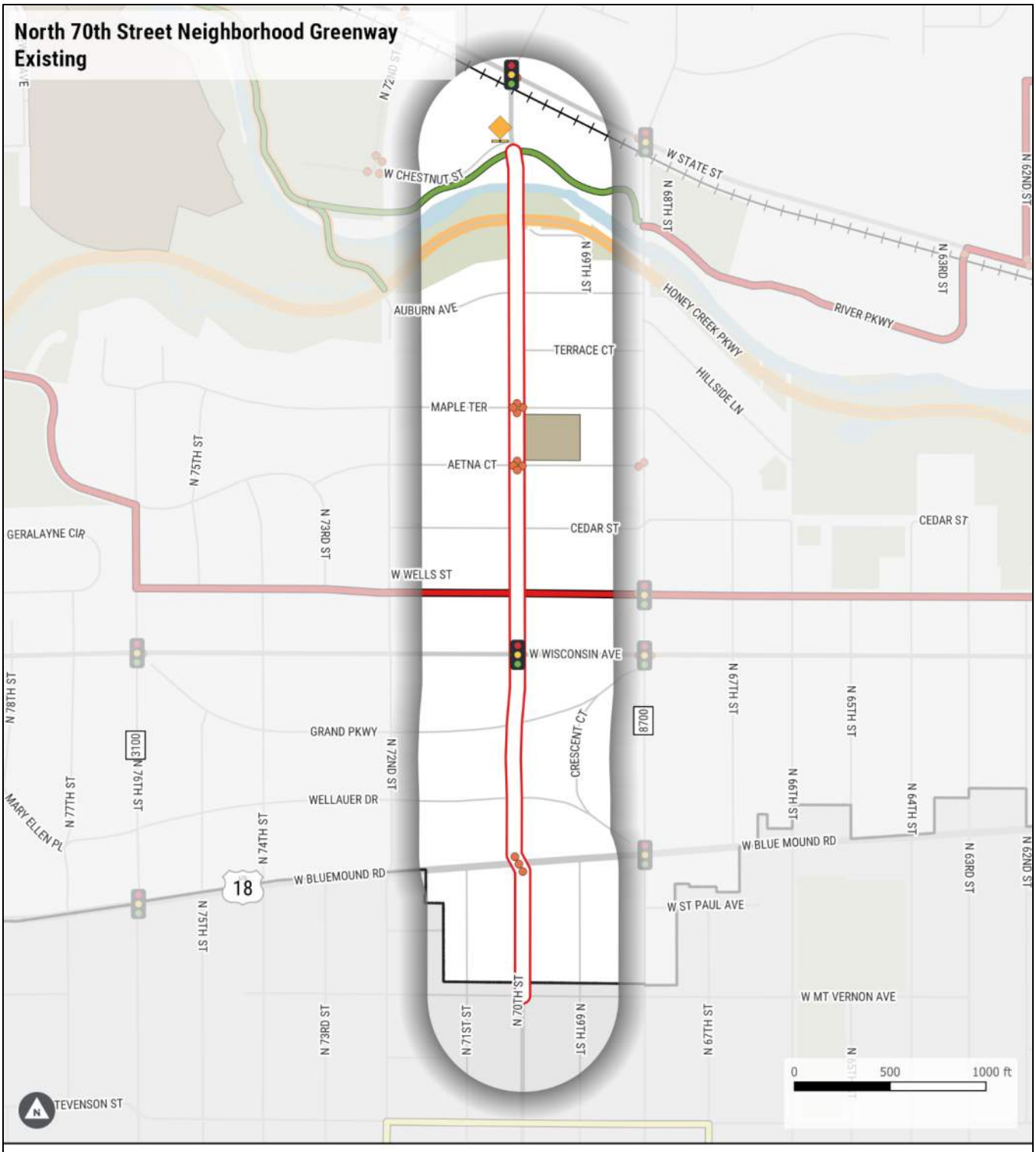
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-Existing Post	$100	Per sign	15	$1,500
Shared Lane Marking	$250	Per Marking	15	$3,750
High Visibility Crosswalk	$2,500	Each	7	$17,500
High Visibility Bike Crossing	$2,500	Each	4	$10,000
RRFB	$15,000	Each	2	$30,000
			Subtotal	**$62,750**
	20% for incidentals (traffic control, etc.) and contingency			**$12,550**
			Total	**$75,300**

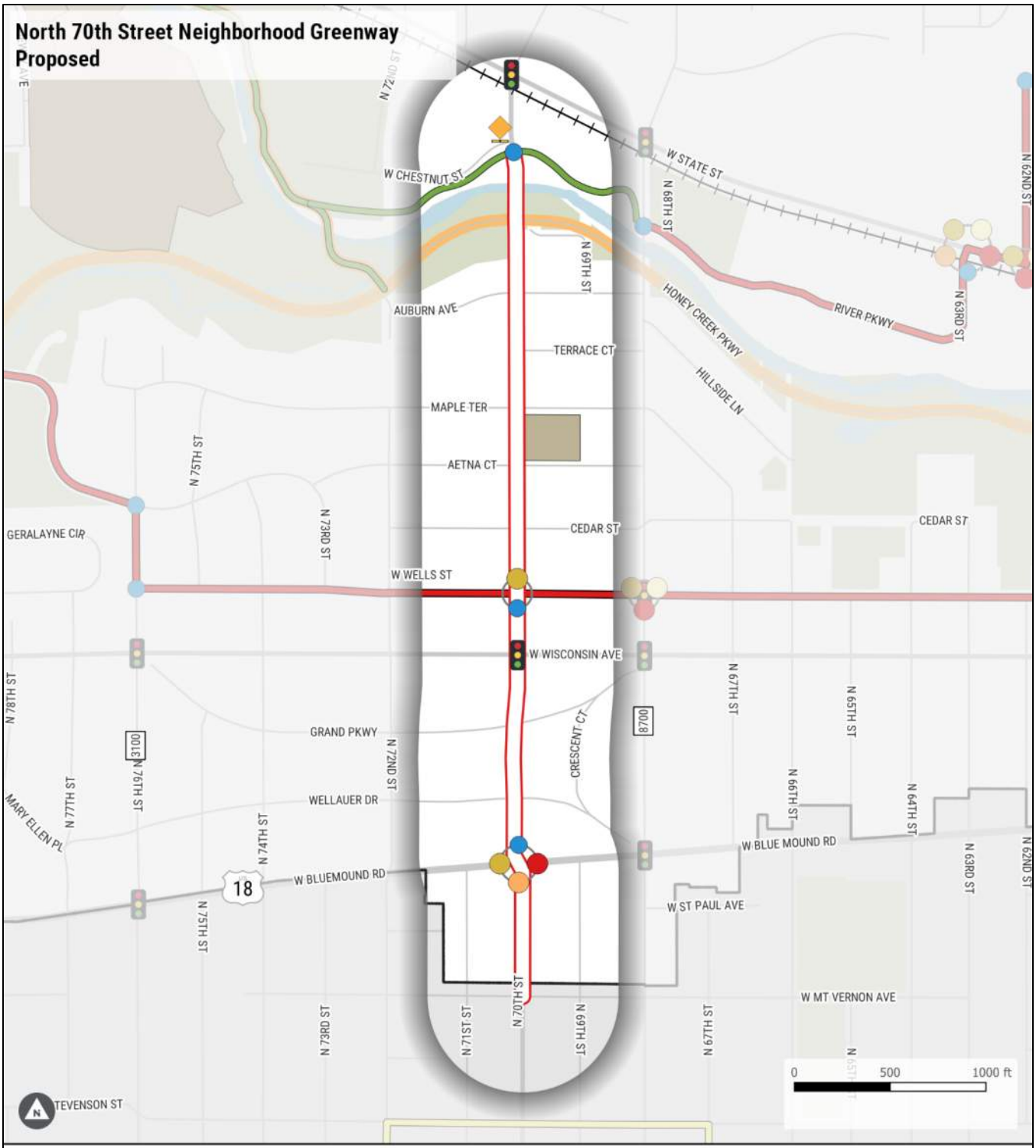
Potential Risks	Proposed Mitigation
None	

15. NORTH 70TH STREET

Length: 0.84 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Menomonee River Parkway • Hart Park • Tosa Skate Park
Connectivity to Schools	• Jefferson Elementary School
Connectivity to Existing Bikeways	• Oak Leaf Trail north of the river; on-street segment of the Oak Leaf Trail on Honey Creek Parkway • Proposed Neighborhood Greenway on W Wells Street and on River Parkway (~200' east, accessible via an existing path)
Connectivity to Transit	• Route 31 on W State Street is nearby • Intersects with Route 10D on W Wisconsin Ave, and with Route 76 on W Bluemound Road
Major Barriers	• W Wisconsin Avenue (high traffic) • W Bluemound Road (high traffic and misaligned intersection)


North 70th Street Neighborhood Greenway
Existing
W CHESTNUT ST
W STATE ST
N 72ND ST
N 68TH ST
N 69TH ST
N 63RD ST
N 62ND ST
AUBURN AVE
HONEY CREEK PKWY
RIVER PKWY
TERRACE CT
HILLSIDE LN
MAPLE TER
AETNA CT
N 75TH ST
N 73RD ST
GERALAYNE CIR
CEDAR ST
W WELLS ST
W WISCONSIN AVE
N 78TH ST
N 76TH ST
GRAND PKWY
N 72ND ST
CRESCENT CT
N 67TH ST
N 65TH ST
N 66TH ST
N 64TH ST
N 77TH ST
MARY ELLEN PL
WELLAUER DR
N 74TH ST
W BLUE MOUND RD
W BLUEMOUND RD
18
W ST PAUL AVE
N 75TH ST
N 70TH ST
N 71ST ST
N 69TH ST
W MT VERNON AVE
TEVENSON ST
0
500
1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

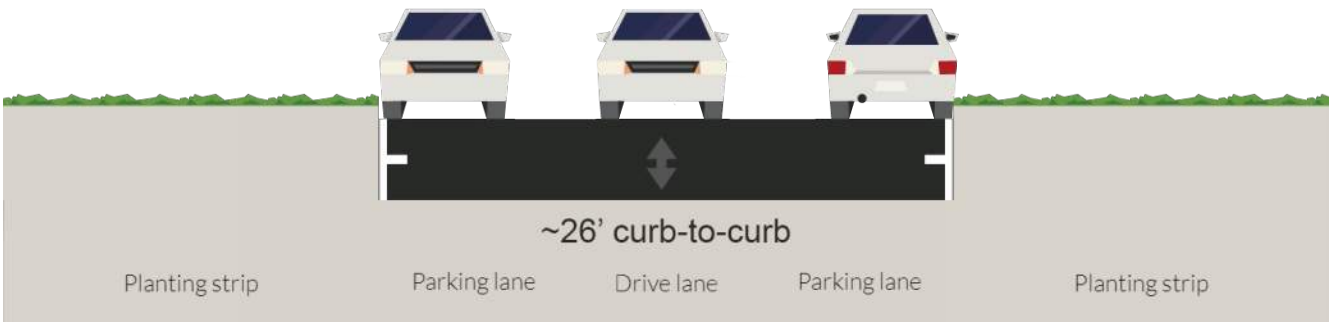
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

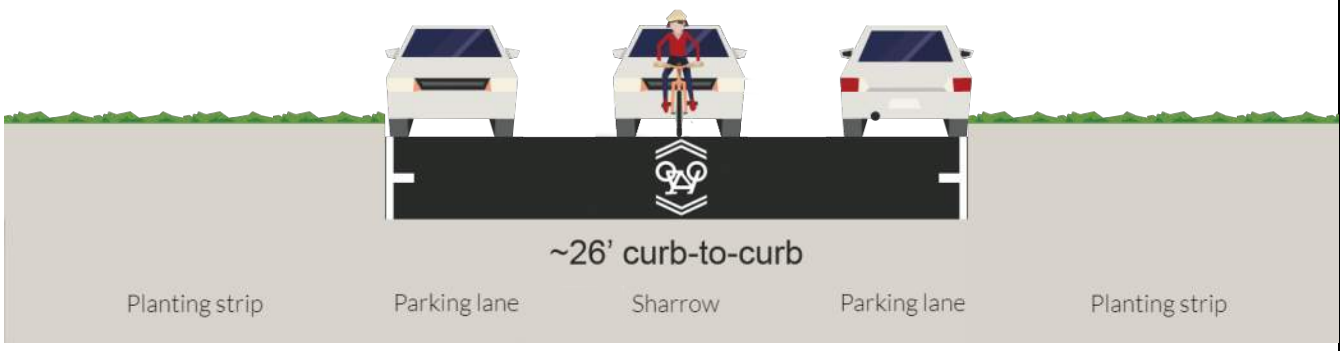
Typical Cross-Sections

N 70th Street (Auburn Avenue to W Wisconsin Avenue and south of W Bluemound Road) – **Existing**



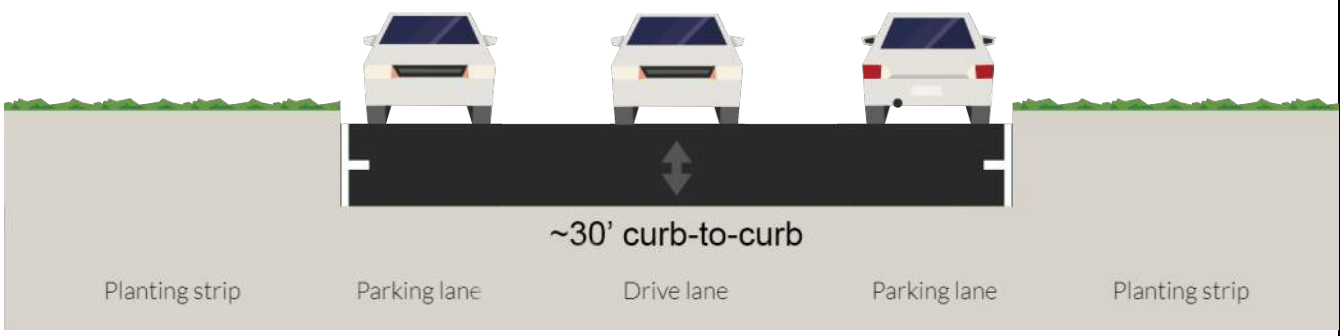
Note: The segment south of W Bluemound Road is slightly narrower (24'). Additionally, there are NO PARKING signs on both sides that apply to certain time frames (generally during the school/work day). Parking is shown in the image above.

N 70th Street (Auburn Avenue to W Wisconsin Avenue and south of W Bluemound Road) – **Proposed**



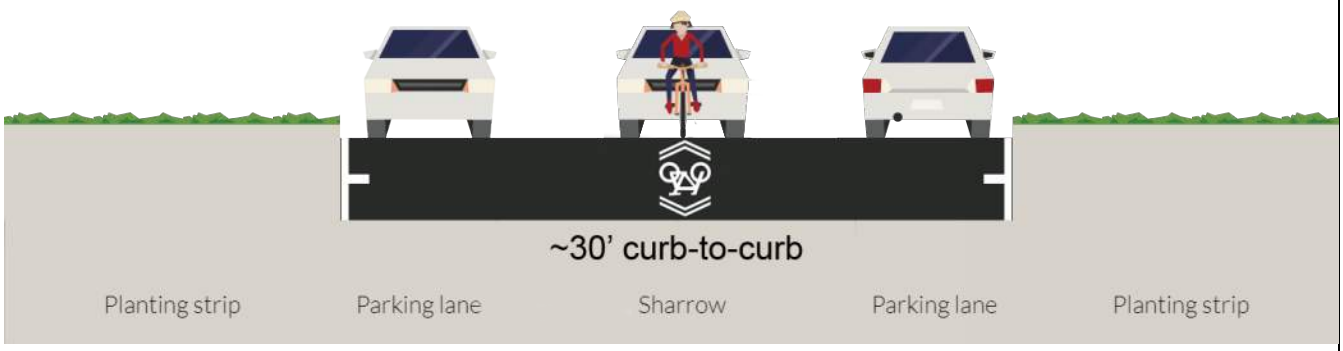
Note: The segment south of W Bluemound Road is slightly narrower (24'). Additionally, there are NO PARKING signs on both sides that apply to certain time frames (generally during the school/workday). Parking is shown in the image above. Bidirectional SLMs may require FHWA experimentation.

N 70th Street (Menomonee River to W Auburn, and W Wisconsin Avenue to W Bluemound Road) – **Existing**



Note: There are NO PARKING signs on both sides that apply to certain time frames (generally during the school/work day). Parking is shown in the image above.

N 70th Street (Menomonee River to W Auburn, and W Wisconsin Avenue to W Bluemound Road) – **Proposed**



Note: There are NO PARKING signs on both sides that apply to certain time frames (generally during the school/workday). Parking is shown in the image above. Bidirectional SLMs may require FHWA experimentation.

Design Recommendations

Recommendations

- Install shared lane markings along entire corridor (18)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments:
  - **W Bluemound Road:** Install high visibility crosswalk (1) and bike crossings (2); improve signage (the right-turn only signs may need "EXCEPT BIKES"); consider RRFBs (2)
  - **W Wells Street:** Install high visibility bike crossings (2)
- Wayfinding (future)
  - **Oak Leaf Trail:** Direct users onto and off the trail
  - **W Wells Street:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to parks, a trail, and a school

Other Considerations

- Existing high visibility crosswalks at W Wisconsin Avenue and W Bluemound Road
- Existing RRFBs (4) at W Chestnut Street (north of the bridge)
- There are two existing school beacons on W Bluemound Road

Planning-Level Cost Estimates

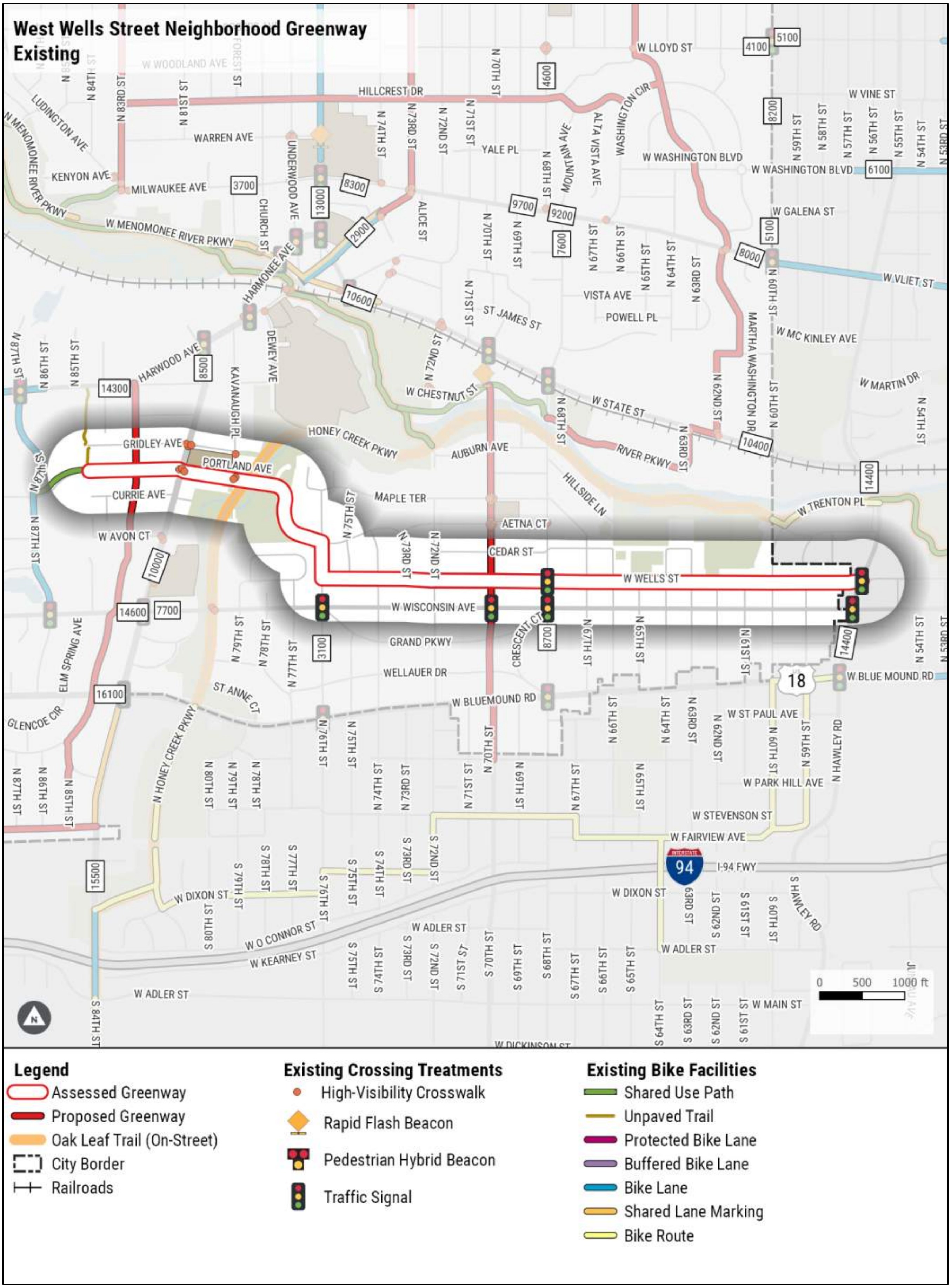
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	7	$1,750
Greenway Sign-Existing Post	$100	Per sign	13	$1,300
Shared Lane Marking	$250	Per Marking	18	$4,500
High Visibility Crosswalk	$2,500	Each	1	$2,500
High Visibility Bike Crossings	$2,500	Each	4	$10,000
Rapid Flash Beacon	$15,000	Each	2	$30,000
			Subtotal	**$50,050**
	20% for incidentals (traffic control, etc.) and contingency			$10,010
			Total	**$60,060**

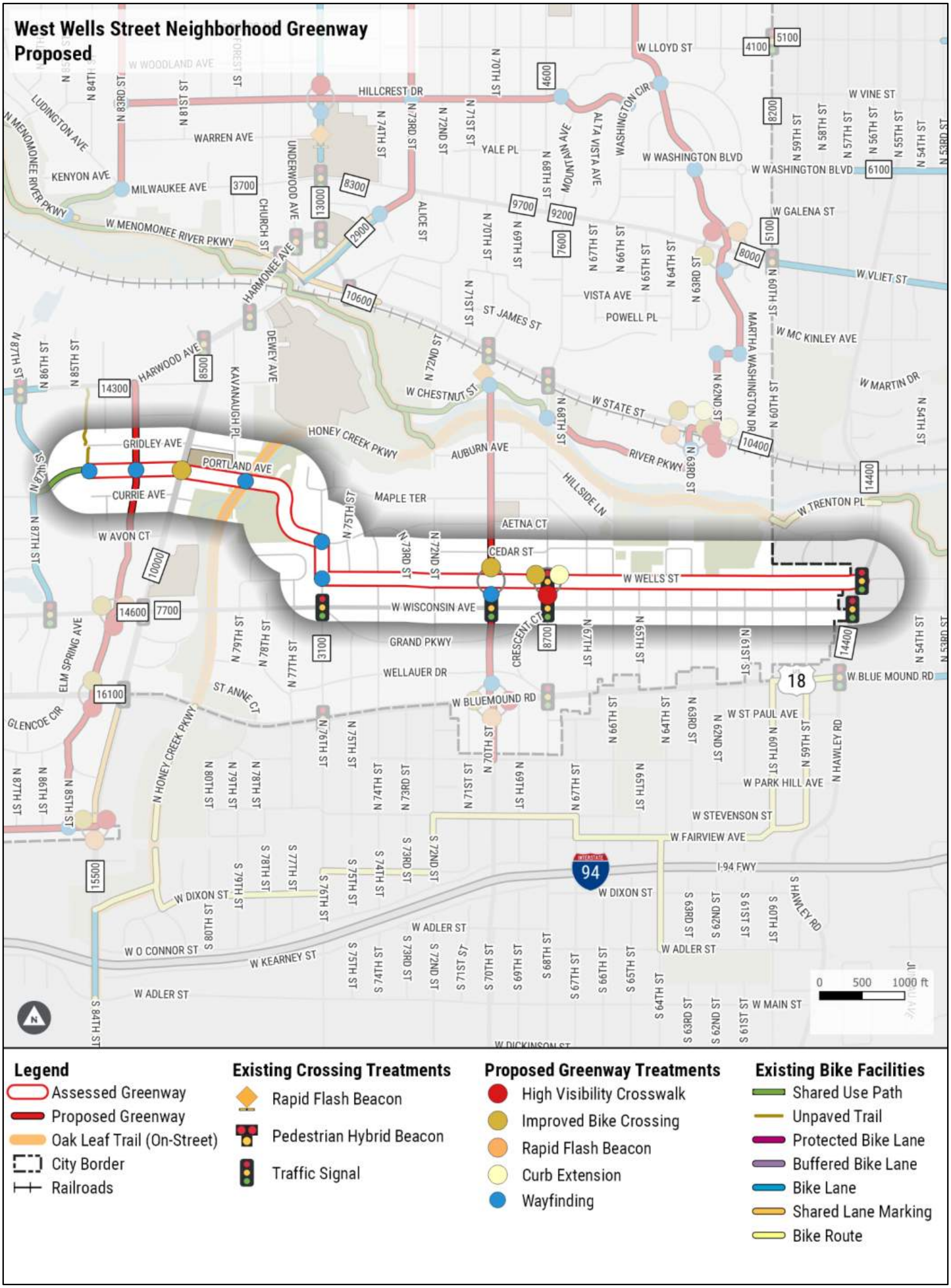
Potential Risks	Proposed Mitigation
None	

16. WEST WELLS STREET

Length: 1.89 miles **Posted Speed Limit:** 25 mph

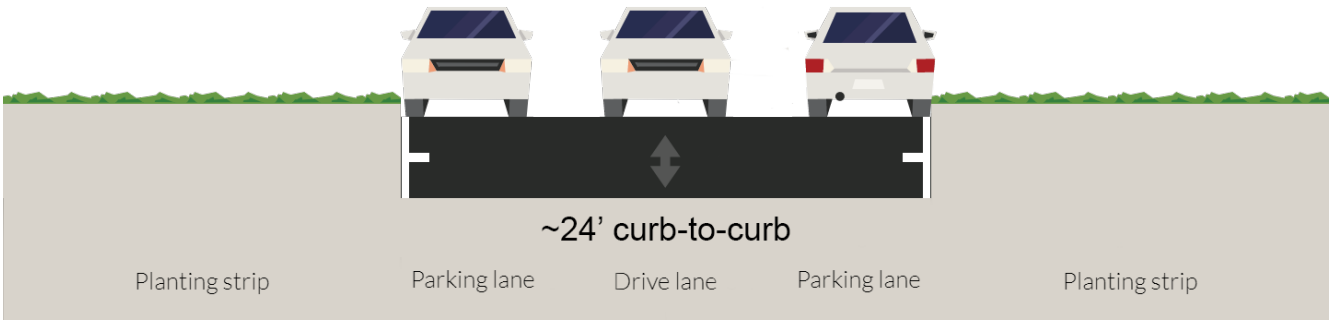
Considerations	Notes
Connectivity to Parks	• Hawthorne Outdoor Soccer Park • Honey Creek Parkway / Dewey Hill
Connectivity to Schools	• Wilson Elementary School
Connectivity to Existing Bikeways	• On-street segment of the Oak Leaf Trail along Honey Creek Parkway • Shared use path connecting to N 87th Street • Unpaved north-south paths connecting Portland Avenue and W Watertown Plank Road • Proposed Neighborhood Greenways on N Robertson Street and N 70th Street
Connectivity to Transit	• Intersects with Route 76 on N 68th Street • Connects directly with Route 64 on N Hawley Road, and indirectly (via a shared use path) to 10D on N 87th Street
Major Barriers	• N Glenview Avenue and N Hawley Road (high traffic)


West Wells Street Neighborhood Greenway
Existing
W WELLS ST
W WISCONSIN AVE
GRIDLEY AVE
PORTLAND AVE
CURRIE AVE
W AVON CT
HONEY CREEK PKWY
AUBURN AVE
MAPLE TER
AETNA CT
CEDAR ST
GRAND PKWY
WELLAUER DR
W BLUEMOUND RD
W STATE ST
W CHESTNUT ST
HARWOOD AVE
HILLCREST DR
W LLOYD ST
W WASHINGTON BLVD
W VLIET ST
W MC KINLEY AVE
W MARTIN DR
W TRENTON PL
RIVER PKWY
MILWAUKEE AVE
W MENOMONEE RIVER PKWY
ST JAMES ST
VISTA AVE
POWELL PL
W ST PAUL AVE
W PARK HILL AVE
W STEVENSON ST
W FAIRVIEW AVE
I-94 FWY
W DIXON ST
W O CONNOR ST
W KEARNEY ST
W ADLER ST
W MAIN ST
N 70TH ST
N 68TH ST
N 76TH ST
N 60TH ST
N 87TH ST
0 500 1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
High-Visibility Crosswalk
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route


West Wells Street Neighborhood Greenway
Proposed
W WELLS ST
W WISCONSIN AVE
PORTLAND AVE
GRIDLEY AVE
CURRIE AVE
CEDAR ST
W BLUEMOUND RD
HILLCREST DR
W STATE ST
W VLIET ST
I-94 FWY
94
18
0 500 1000 ft
Legend
Assessed Greenway
Proposed Greenway
Oak Leaf Trail (On-Street)
City Border
Railroads
Existing Crossing Treatments
Rapid Flash Beacon
Pedestrian Hybrid Beacon
Traffic Signal
Proposed Greenway Treatments
High Visibility Crosswalk
Improved Bike Crossing
Rapid Flash Beacon
Curb Extension
Wayfinding
Existing Bike Facilities
Shared Use Path
Unpaved Trail
Protected Bike Lane
Buffered Bike Lane
Bike Lane
Shared Lane Marking
Bike Route

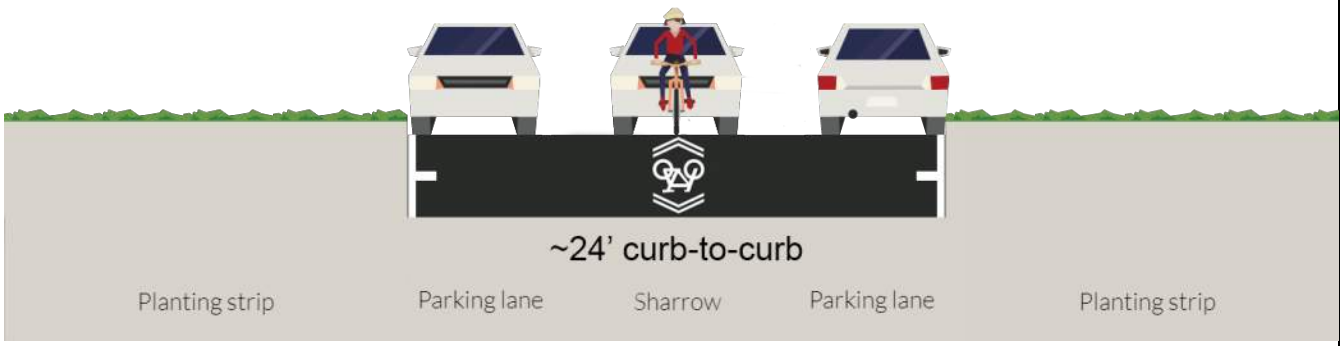
Typical Cross-Sections

Portland Avenue (west of N Glenview Avenue) and West Wells Street (N 72nd Street to N 68th Street) – **Existing**



Note: There are NO PARKING signs on one side of the street west of N Robertson Street. Parking is allowed on this segment east of that point. Parking is not shown in the image above.

Portland Avenue (west of N Glenview Avenue) and West Wells Street (N 72nd Street to N 68th Street)– **Proposed**

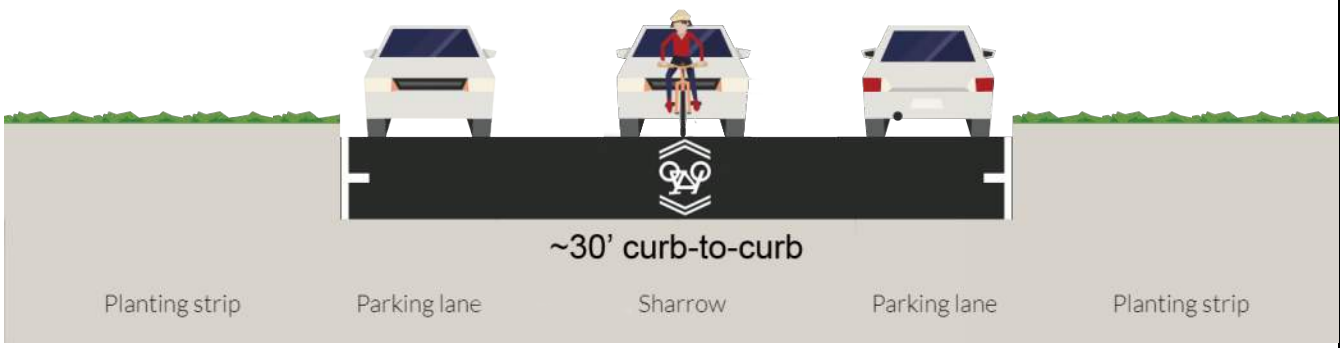


Note: There are NO PARKING signs on one side of the street west of N Robertson Street. Parking is allowed on this segment east of that point. Parking is not shown in the image above. Bidirectional SLMs may require FHWA experimentation.

Portland Avenue (N Glenview Avenue to N Honey Creek Parkway) and W Wells Street (N 76th Street to N 72nd Street) – **Existing**

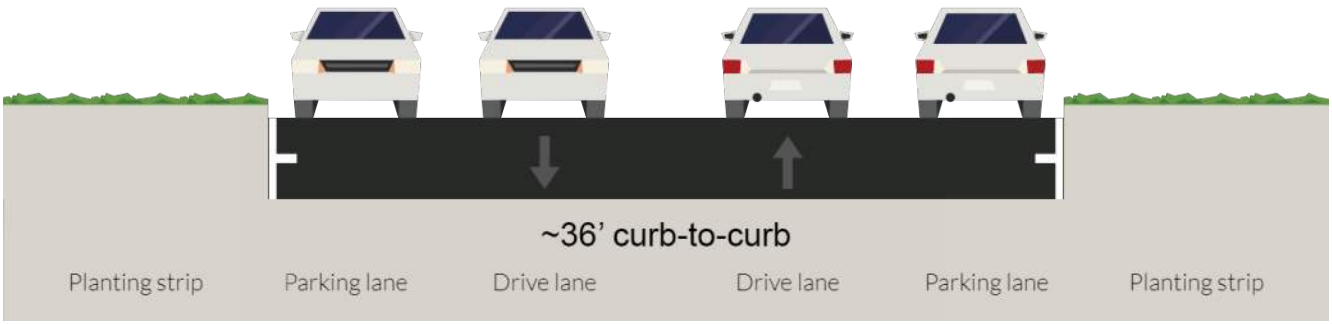
Note: There are NO PARKING signs on one side for specific hours on Portland Avenue near the school. Parking is shown above. Also, between N 72nd and N 73rd, the road widens to ~ 36 feet.

Portland Avenue (N Glenview Avenue to N Honey Creek Parkway) and W Wells Street (N 76th Street to N 72nd Street) – **Proposed**



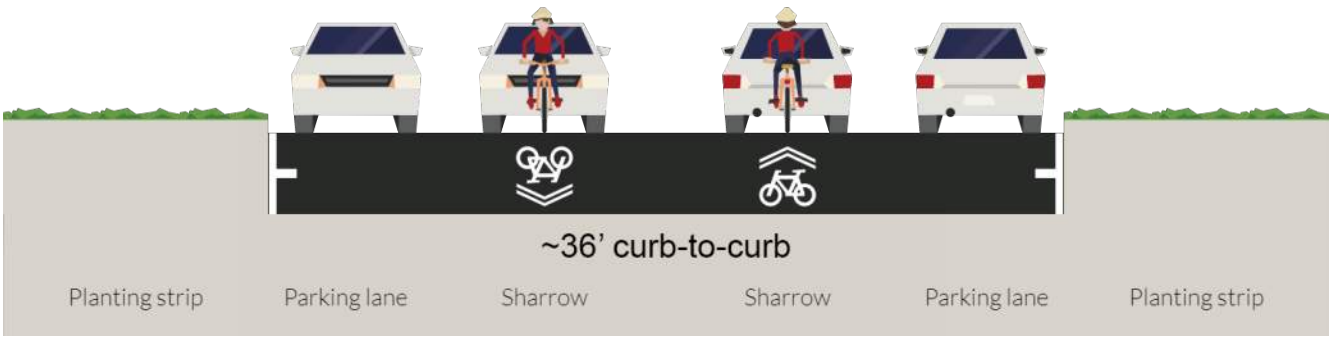
Note: There are NO PARKING signs on one side for specific hours on Portland Avenue near the school. Parking is shown above. Also, between N 72nd and N 73rd, the road widens to ~36 feet and should use standard shared lane markings. Bidirectional SLMs may require FHWA experimentation.

Portland Avenue / N 76th Street (N Honey Creek Parkway to W Wells Street) and W Wells Street (N 68th Street to N Hawley Road) – **Existing**



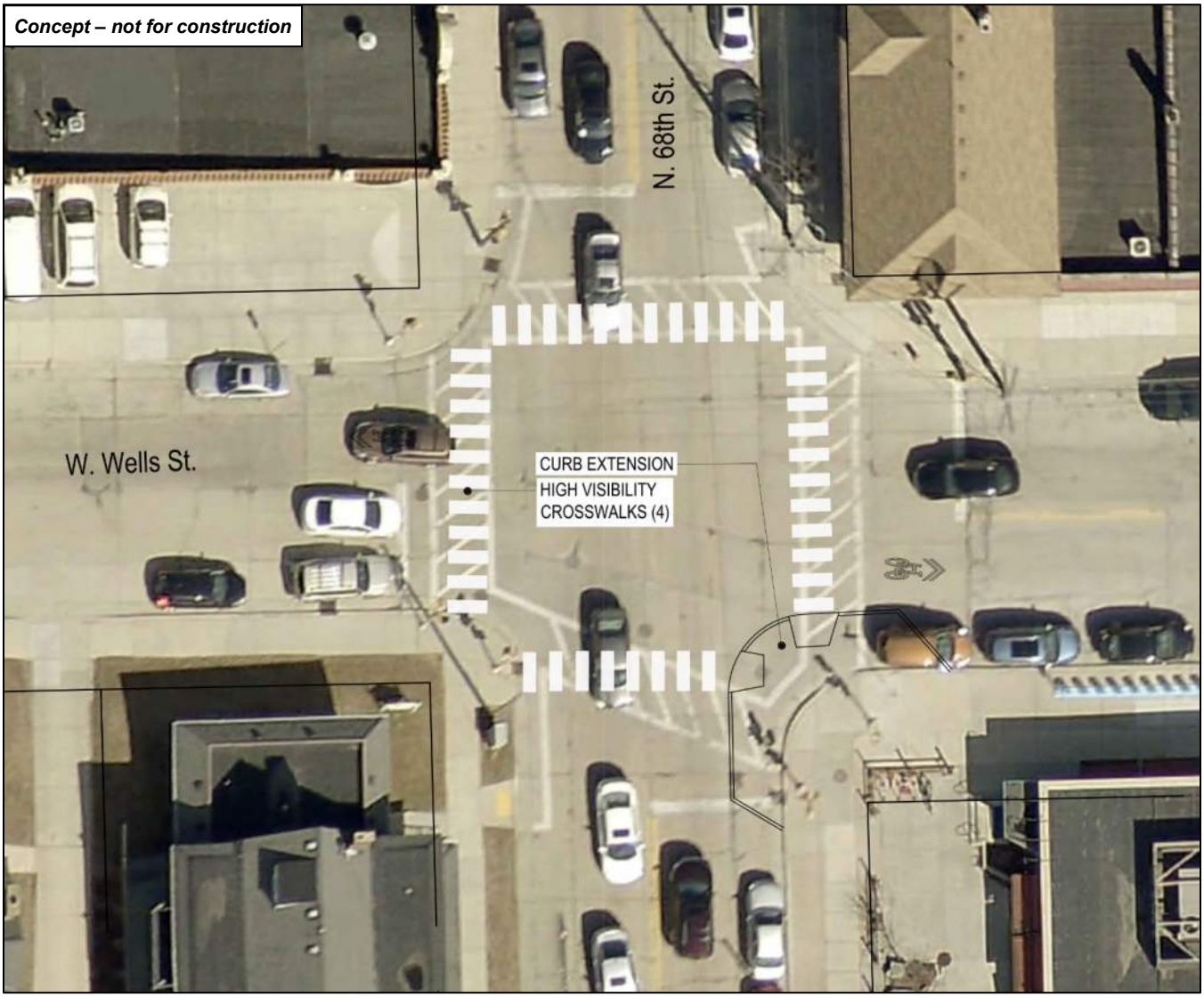
Note: There are NO PARKING signs on brief sections east of N honey Creek Parkway. Parking is shown in the image above. Also, the width widens to 40' for the section on W Wells Street, although the image above shows 36.'

Portland Avenue / N 76th Street (N Honey Creek Parkway to W Wells Street) and W Wells Street (N 68th Street to N Hawley Road) – **Proposed**



Note: There are NO PARKING signs on brief sections east of N honey Creek Parkway. Parking is shown in the image above. Also, the width widens to 40' for the section on W Wells Street, although the image above shows 36.'

Proposed improvement at the intersection of N. 68th Street and W. Wells Street. Further improvements to be considered as part of a capital improvement project.



Design Recommendations

Recommendations

- Install shared lane markings along the entire corridor (28)
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments:
  - **Glenview Ave:** Install high visibility bike crossings (2)
  - **N 70th Street:** Install high visibility bike crossings (2)
  - **N 68th Street:** Install high visibility crosswalks (4), bike crossings (2), and a curb extension (1)
- Wayfinding (future)
  - **End of Portland Avenue:** Connection to shared use path through the hospital complex
  - **N Robertson Street:** Connection to greenway
  - **N Honey Creek Parkway:** Connection to Oak Leaf Trail (on-street segment)
  - **N 76th Street and Portland Avenue, and N 76th Street and W Wells Street:** Direct users through multiple turns
  - **N 70th Street:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to parks, trails, and a school

Other Considerations

- Existing RRFB and high visibility crosswalks at Glenview Avenue
- Signalized crossing at N 68th Street

Planning-Level Cost Estimates

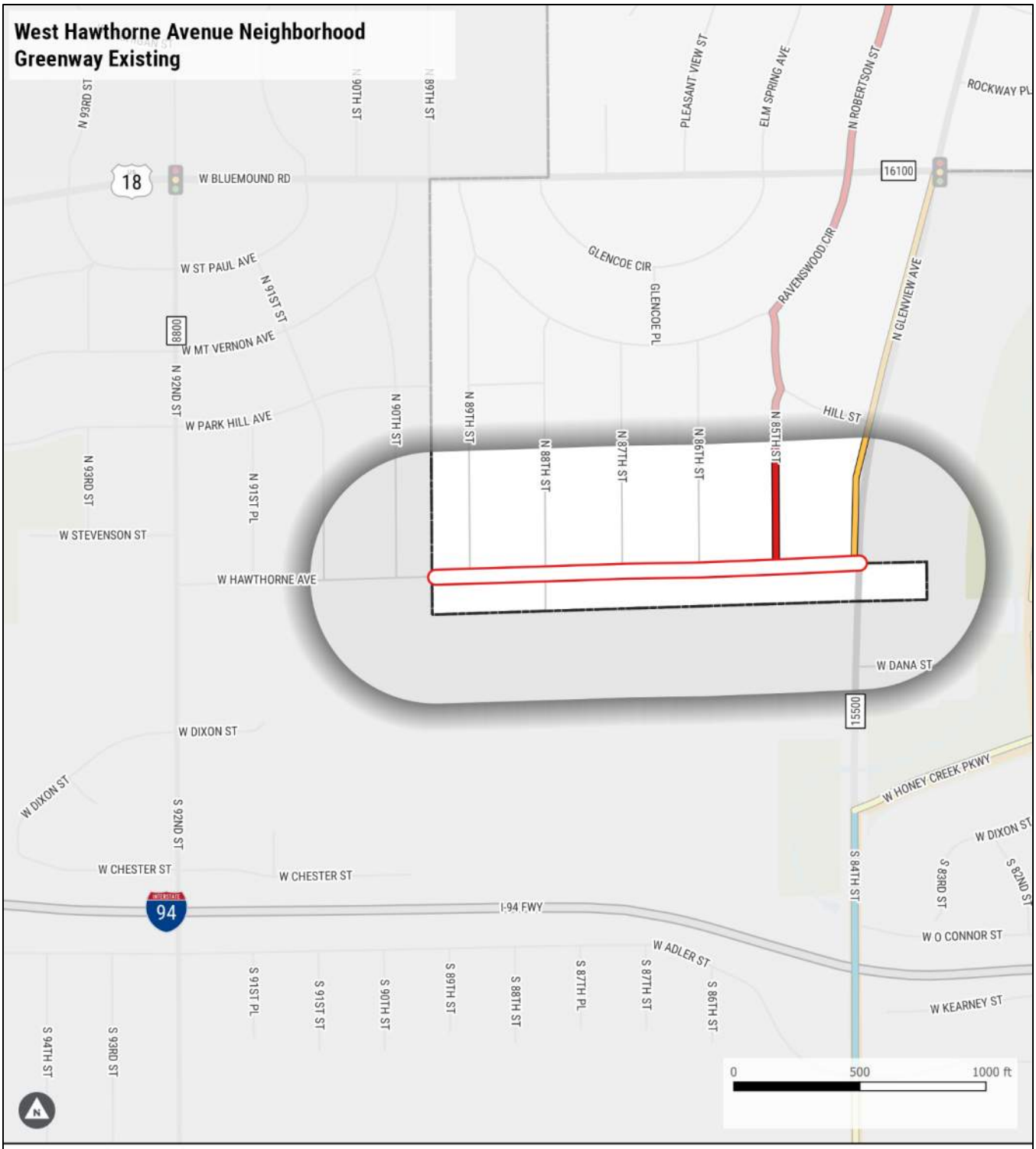
Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	5	$1,250
Greenway Sign-Existing Post	$100	Per sign	28	$2,800
Shared Lane Marking	$250	Per Marking	28	$7,000
High Visibility Crosswalk	$2,500	Each	4	$10,000
High Visibility Bike Crossing	$2,500	Each	6	$15,000
Curb Extension	$7,500	Each	1	$7,500
			Subtotal	**$43,550**
	20% for incidentals (traffic control, etc.) and contingency			$8,710
			Total	**$52,260**

Potential Risks	Proposed Mitigation
None	

17. WEST HAWTHORNE AVENUE

Length: 0.51 miles **Posted Speed Limit:** 25 mph

Considerations	Notes
Connectivity to Parks	• Cannon Park • Honey Creek Parkway / Dyer Playfield
Connectivity to Schools	• None
Connectivity to Existing Bikeways	• Sharrows on N Glenview Avenue • Proposed Neighborhood Greenway on N 85th Street
Connectivity to Transit	• Intersects with Route 67D on S 92nd Street
Major Barriers	• N Glenview Avenue (high traffic)



Legend

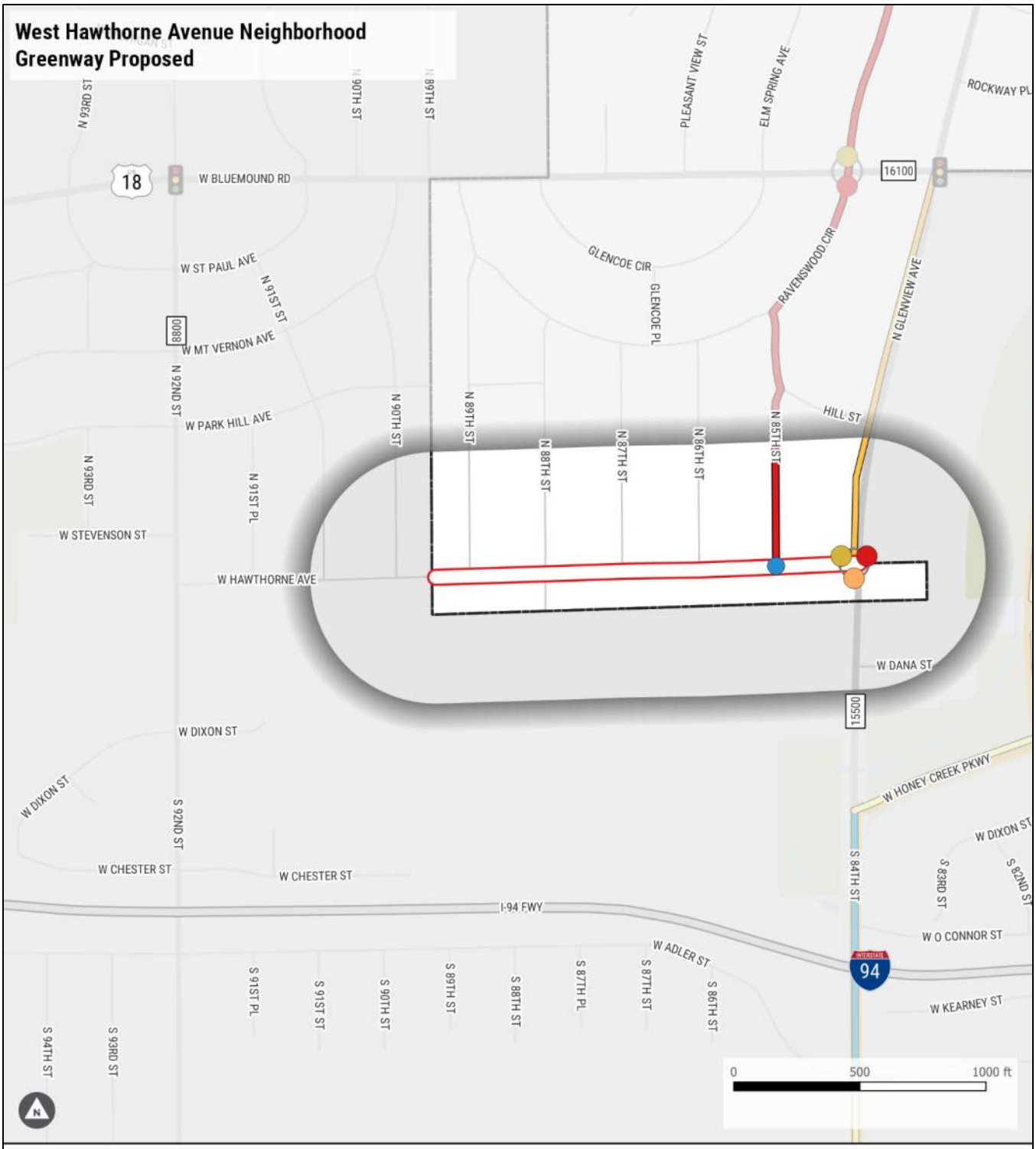
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

Existing Crossing Treatments

- High-Visibility Crosswalk
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Existing Bike Facilities

- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route



Legend
- Assessed Greenway
- Proposed Greenway
- Oak Leaf Trail (On-Street)
- City Border
- Railroads

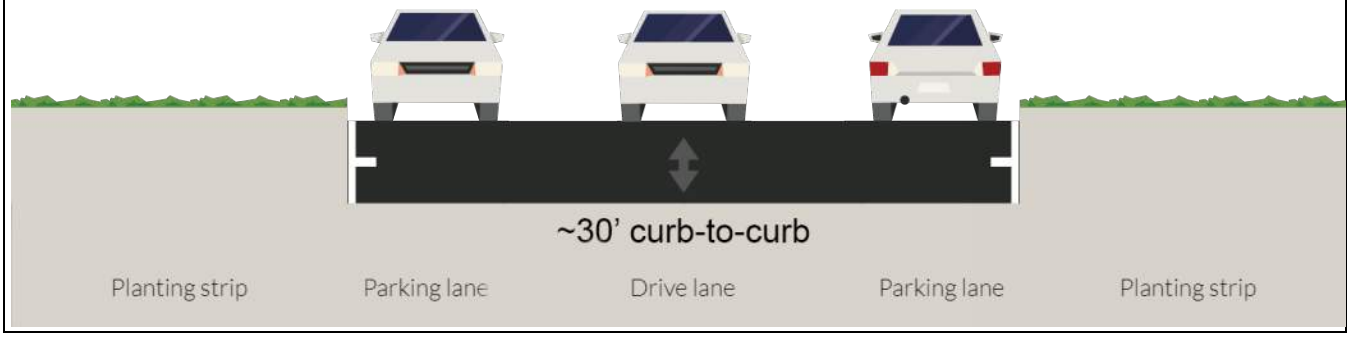
Existing Crossing Treatments
- Rapid Flash Beacon
- Pedestrian Hybrid Beacon
- Traffic Signal

Proposed Greenway Treatments
- High Visibility Crosswalk
- Improved Bike Crossing
- Rapid Flash Beacon
- Curb Extension
- Wayfinding

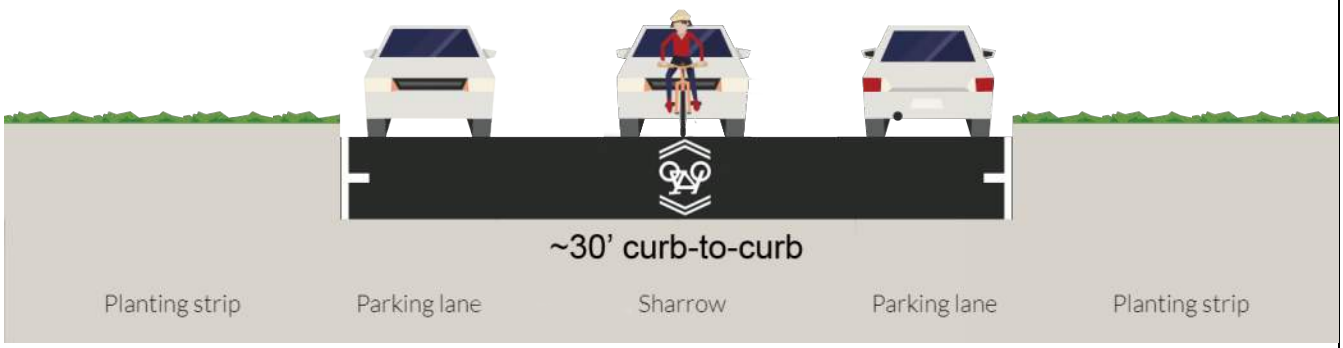
Existing Bike Facilities
- Shared Use Path
- Unpaved Trail
- Protected Bike Lane
- Buffered Bike Lane
- Bike Lane
- Shared Lane Marking
- Bike Route

Typical Cross-Sections

W Hathorne Avenue (S 92nd Street to S 84th Street) – **Existing**



W Hathorne Avenue (S 92nd Street to S 84th Street) – **Proposed**



Note: Bidirectional SLMs may require FHWA experimentation.

Design Recommendations

Recommendations

- Install shared lane along entire corridor
- Install neighborhood greenway signs (2 per block)
- Intersection Treatments:
  - **N Glenview Avenue:** High visibility crosswalk (1) on the north side of the intersection; high visibility bike crossing (1); consider RRFBs (3)
- Wayfinding (future)
  - **N 85th Street:** Connection to greenway

Rationale

- Low traffic neighborhood street is ideal for Neighborhood Greenway; provides connections to parks and bike facilities

Other Considerations

- None

Planning-Level Cost Estimates

Item	Unit Cost	Unit	Quantity	Cost ($)
Greenway Sign-New Post	$250	Per sign	2	$500
Greenway Sign-Existing Post	$100	Per sign	7	$700
Shared Lane Marking	$250	Per Marking	2	$500
High Visibility Crosswalk	$2,500	Each	1	$2,500
High Visibility Bike Crossing	$2,500	Each	1	$2,500
Rapid Flash Beacon*	$15,000	Each	3	$45,000
			Subtotal	**$51,700**
	20% for incidentals (traffic control, etc.) and contingency			$10,340
			Total	**$62,040**

** RRFB installation depends a detailed study of this location.*

Potential Risks	Proposed Mitigation
• None	