



# Monroe Street Neighborhood Greenway Concept Plan



June 2015

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*The contents of this document do not necessarily reflect views or policies of the State of Oregon.*

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# PROJECT PURPOSE AND BACKGROUND

## Project Description

Monroe Street runs through the City of Milwaukie, connecting downtown at the west end to the eastern city boundary at Linwood Avenue. One of only a few continuous east/west connections through the area, Monroe is a two-lane street with a neighborhood character for most of its length through Milwaukie. Because of its connectivity and central location, the route attracts a substantial number of cut-through auto trips in addition to serving residents and businesses located on the street itself.

The Monroe Street Neighborhood Greenway Project is a planning effort to strengthen the "neighborhood street" character of Monroe Street by reducing the speed and volume of cut-through traffic and creating a low-stress environment that is safe and comfortable for all users. The project area extends along Monroe Street from 21st Avenue in downtown Milwaukie to Linwood Avenue at the city's eastern boundary.

As a matter of historical accident, the original Monroe Street Greenway proposed in the 2007 TSP begins at 21st Avenue, two blocks to the east of OR 99E and the Trolley Trail. Construction of the trail in the intervening years, however, created a need to better connect the trail to Monroe Street. While this connection is not scoped as a part of the Monroe Street Neighborhood Greenway concept design, it presents an opportunity to link the neighborhood greenway with a variety of regional connections via the Trolley Trail and future path along SE 17th Avenue.

A separate planning effort will consider extending bicycle and pedestrian improvements east of Linwood Avenue into unincorporated Clackamas County to connect with the I-205 multi-use path.

## Project Objectives

The city of Milwaukie's *Transportation System Plan* (TSP; City of Milwaukie, 2013) identifies Monroe Street as the city's first Neighborhood Greenway, with the primary objective of creating shared travel space that is safe for pedestrians and bicyclists by reducing motor vehicle speeds and volumes. In addition, the plan incorporates stormwater management features to address surface drainage issues in the project area.

Monroe Street is ideally situated to provide safe, direct bicycle and pedestrian connections in Milwaukie, connecting downtown to several local neighborhoods, schools, and parks. The corridor provides access to the MAX Orange Line light rail station at Main Street in downtown Milwaukie and a connection to the newly-constructed Trolley Trail located just west of OR 99E. In addition, the street parallels several arterial and collector routes (including Harrison Street/King Road and Railroad Avenue) onto which cut-through vehicle traffic can be redirected.

Today, Monroe Street is characterized by motor vehicle speeds and volumes that are generally not compatible with the character of a successful neighborhood greenway. To achieve the vision of better pedestrian and bicycle conditions, the Monroe Street Neighborhood Greenway Concept Design includes a range of traffic calming, placemaking, and stormwater management features. The Concept Design Plan will guide funding efforts and implementation of the project.

## Policy Context

To improve pedestrian and bicycle safety throughout Milwaukie over the next 20 years, the Milwaukie Transportation System Plan (TSP) envisions a network of greenways across the city, connecting local neighborhoods with downtown and the Portland-Milwaukie Light Rail extension slated to open in 2015. The Monroe Street Neighborhood Greenway is a linchpin of that network.

Vicinity Map



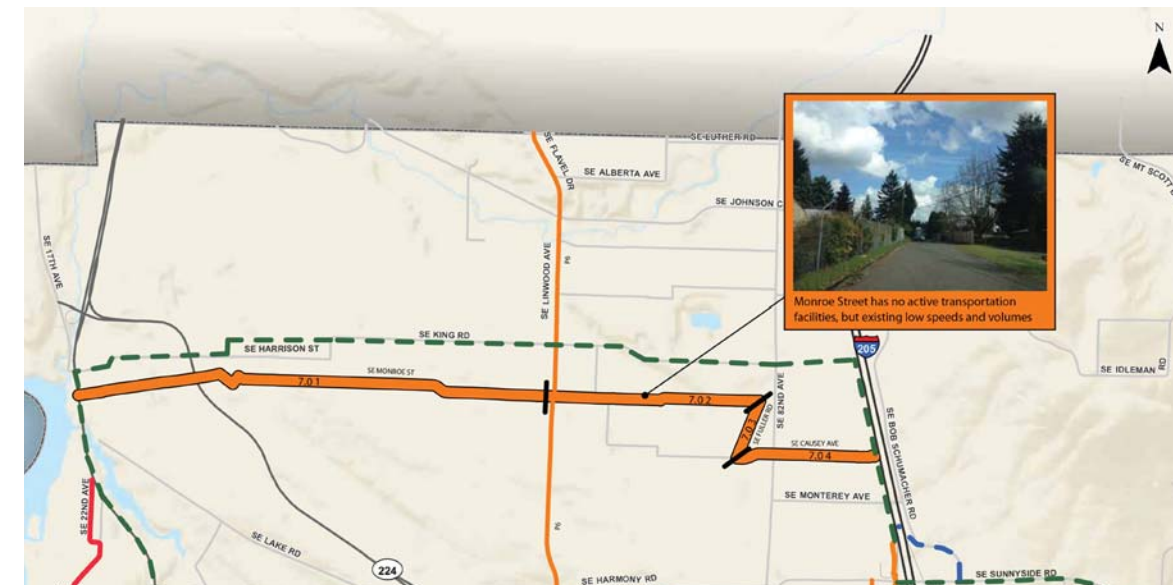
In addition to Monroe Street, the TSP proposes neighborhood greenways on 29th Avenue, Harvey Street, 40th Avenue, Stanley Avenue and others. These investments in the transit and neighborhood greenway networks are integral to Milwaukie's effort to attain regionally-mandated targets of 45%-55% non-single occupant vehicle (SOV) mode share by 2035. Developing neighborhood greenway corridors such as Monroe Street can help the city reach desired mode split goals.

In addition to the neighborhood greenway network, the TSP identifies a set of proposed safety improvements, including sidewalks on Monroe Street east of 42nd Avenue and enhanced crossings to improve pedestrian and bicycle safety where Monroe Street intersects with OR 224 and Linwood Avenue. In the near future, the City will develop a Corridor Refinement Plan in coordination with the Oregon Department of Transportation (ODOT) along OR 224 to identify mobility targets that will likely incorporate strategies to better manage congestion and reduce SOV trips.

Monroe Street was identified as a Bicycle Parkway in the *Metro Regional Active Transportation Plan* and as a Principal Active Transportation Route in the *Clackamas County Active Transportation Plan*. These routes are considered the "highest order" bicycle routes, key to connecting communities and destinations such as transit, shopping, employment centers, and recreation areas.

The Monroe Street Neighborhood Greenway has the potential to help meet these goals.

Monroe Street Active Transportation Link



## Active Transportation is a Key Strategy to Improve Public Health

Numerous studies have documented better health and lower obesity rates in places where people can easily walk and bicycle. Active transportation (walking, bicycling, and transit) offers transportation choices for the young, old, poor, disabled and those who cannot drive. Furthermore, numerous studies have documented lower obesity rates in places with higher active transportation levels.

The *Metro 2014 Regional Active Transportation Plan* (adopted July 17, 2014) describes a strategy to increase walking and bicycling throughout the Portland Metro region. The plan identifies improved public health as a desired outcome for the region that is supported by active transportation, in addition to vibrant communities and economic prosperity.

The City of Milwaukie is one of 24 cities partnering with Metro to develop the regional active transportation network to help achieve these outcomes, and the Monroe Street Neighborhood Greenway project is a key component of that network.

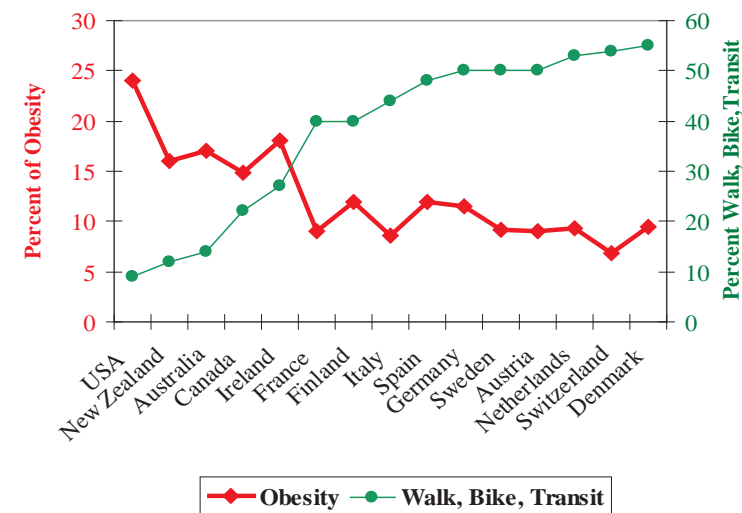


Chart showing relationship between obesity and active transportation  
(Credit: John Pucher)



Monroe Street provides a direct link to downtown Milwaukie



The nearby Logus Road project incorporates stormwater treatment and traffic calming features

## Recent and Related Projects

The *Moving Forward Milwaukie* project is an ongoing planning process looking at policy and regulatory revisions, financial approaches and tools, and economic development strategies to remove barriers and encourage appropriate development in Milwaukie's commercial areas. The plan's focus includes downtown and Central Milwaukie, which are within the Monroe Street Neighborhood Greenway study area. The *Central Milwaukie Land Use and Transportation Plan* is a component of this larger effort that will develop multimodal access and connectivity improvements and refine land use, design and development standards in the area between OR 224 and 37th Avenue.

In addition to these current planning efforts, several key active transportation projects are underway in Milwaukie. The 6-mile Trolley Trail was completed along the former Portland Traction Company streetcar line in 2014, connecting Milwaukie and the City of Gladstone. Work has begun on a new off-street path adjacent to 17th Avenue to connect the Trolley Trail with the Springwater Corridor. Construction of the path is scheduled for 2016, which will extend a safe and direct off-street connection north to the City of Portland and linking it with the regional Springwater Corridor trail system.



# CHARACTERISTICS OF NEIGHBORHOOD GREENWAYS



Photo: Greg Raisman

The concept of neighborhood greenways evolved from “bicycle boulevards” designed to provide low-stress, low-volume routes for cyclists. These “boulevards” are distinct from separated facilities such as bicycle lanes, and often serve as alternatives to busier parallel routes. The primary objective of a neighborhood greenway is to create a space shared with motor vehicles that is safe for pedestrians and bicyclists. In addition, neighborhood greenways often incorporate stormwater management features that enhance traffic-calming measures.

## Low-Speed, Low-Traffic Streets

The *Urban Bikeway Design Guide* produced by the National Association of City Transportation Officials (NACTO) recommends a maximum daily travel volume of 3,000 vehicles per day for neighborhood greenways, with an ideal volume of 1,500 vehicles per day (NACTO, 2013). The City of Portland has an even higher threshold of 1,000 vehicles per day. In addition, streets developed as bicycle boulevards should have 85th percentile speeds at 25 miles per hour or less, with 20 miles per hour (mph) preferred (NACTO, 2013). The *Bicycle Facility Improvement Toolbox* in Milwaukee’s TSP describes potential design features for neighborhood greenways, including those in Table 1.

Neighborhood greenways improve safety and comfort for pedestrians and residents, as well as for bicyclists, and may include new sidewalks and safety crossing treatments at busy intersections. Landscaped elements provide “green” stormwater treatment, including bioswales, infiltration basins, and rain gardens. These help to calm traffic and improve streetscape aesthetics. Finally, neighborhood greenways can feature decorative elements, such as sign toppers, painted intersections, and other features to create a distinctive place.

Traffic calming tools to reduce speed include speed humps, curb extensions, chicanes, and traffic circles. These tools can minimize the

speed differential between bicycles and automobiles, allowing vulnerable road users to feel comfortable on roadways where space is shared with motorists.

In addition to reduced speeds, neighborhood greenway success depends on lower volumes to make active transportation safe, comfortable and accessible for pedestrians and bicyclists of all ages and abilities. To achieve this, neighborhood greenways may utilize semi-diverters to reduce “through” traffic and lower volumes. Traffic control devices such as pedestrian- and bicycle-activated signals and flashing beacons can be incorporated with median refuge islands and/or bicycle signals to protect pedestrians and bicyclists at difficult intersections.

Once speeds and volumes are reduced, pavement markings (“sharrows”) and wayfinding signage can help establish the street as a place for slower-moving traffic and direct users to shopping, schools, parks, and other community amenities. Wayfinding signage often includes time and distance indicators, helping users get to their destination efficiently and reassuring them that they are following the designated route. Additional enhancements include painted intersections and thematic “sign toppers.”

Table 1. Neighborhood Greenway Design Features	
Type of Treatment	Sample Features
Signage	Wayfinding and warning signs along and approaching the neighborhood greenway
Pavement Markings	Directional pavement markings, shared lane markings
Intersection Treatment	Signalization, curb extensions, refuge islands
Traffic Calming	Speed humps, mini traffic circles
Traffic Diversion	Choker entrances, traffic diverters

<sup>1</sup> City of Portland, Portland Neighborhood Greenways - Goals, 2013. Available at <http://nacto.org/wp-content/uploads/2012/06/Cityof-Portland-2010-Neighborhood-Greenway-Goals.pdf>

<sup>2</sup> 85th percentile speed is the speed at which 85 percent of traffic is observed traveling at or below. With findings and review approval from ODOT, posted speeds may be within 10 mph of the 85th percentile observed speed.

## Stormwater Management

Stormwater management features on neighborhood greenways include bioswales and pervious pavement. Bioswales are typically oblong, gently sloping, landscaped depressions that capture and hold stormwater runoff, allowing special plantings to absorb the water, keeping it off of adjacent properties or out of inadequate underground systems. Pervious pavement allows water to seep down through a smooth, permeable surface used for walkways, driveways and parking areas.

These stormwater features provide a triple benefit. They create safe space for pedestrians and help slow traffic. At the same time, they absorb excess runoff, keeping it away from adjacent properties. Finally, they serve as neighborhood amenities, adding “green” appeal and helping to create a distinctive identity for the street.



Photo: Dylan Passmore



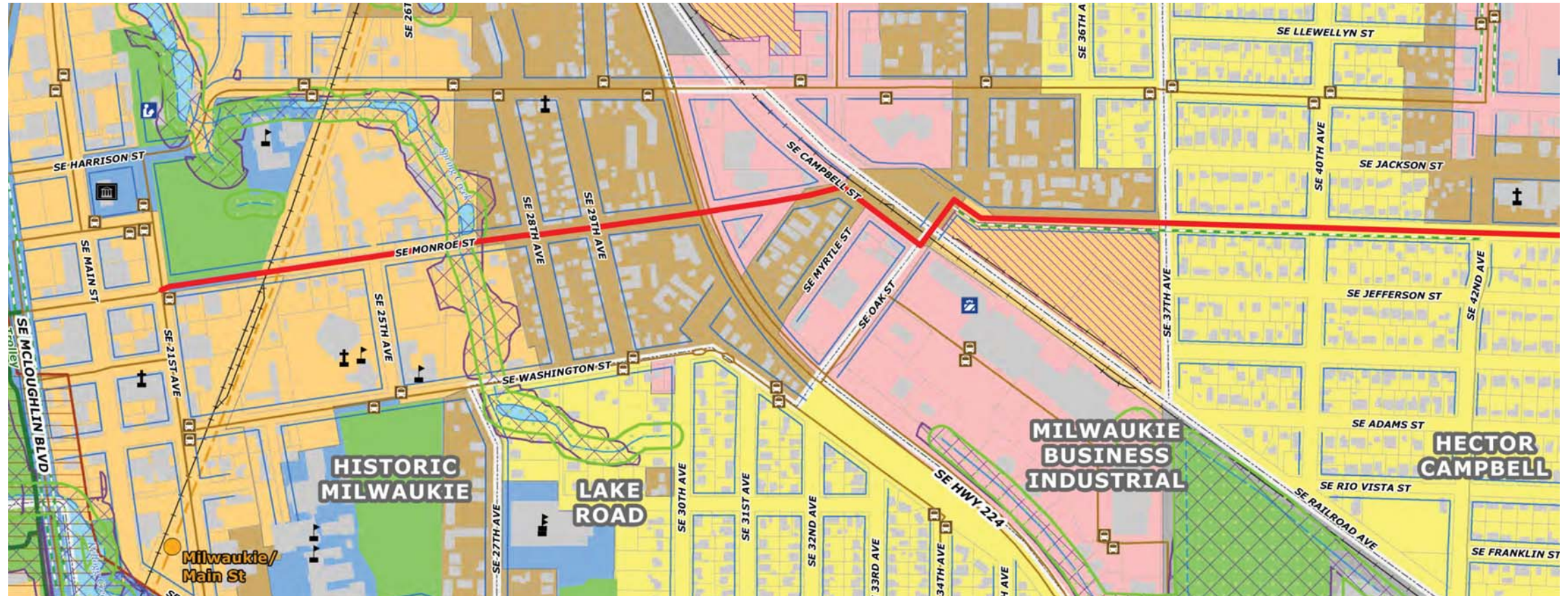
## EXISTING CONDITIONS

Early in the Concept Plan development process, the project team developed a Needs, Opportunities Constraints and Tools Memorandum. This document contains a detailed description of existing conditions on Monroe Street as well as a discussion of potential design tools to address opportunities and needs. The entire memorandum is included as Attachment A to this report. Elements of the Monroe Street Greenway Concept Plan were selected and refined based on a review of these conditions, in addition to stakeholder feedback.

While the cross section and overall character of Monroe Street vary considerably along its two-mile length, there are several common themes and conditions along the entire corridor.

### General Travel Patterns

Traffic in the study area generally moves in the east-west direction, with OR 224 as the primary regional route between Milwaukie and Clackamas and points east. Harrison Street/King Road also carries significant east-west traffic between OR 99E and OR 213. Oak Street/Monroe Street between OR 224 and Linwood Avenue experience moderately heavy peak traffic within the area, while Railroad Avenue is serves as another through route that is generally less congested. Few continuous north-south routes exist in this area; those that do (including OR 99E and Linwood Avenue) carry heavy traffic during peak periods. There are a few bicycle connections in the area – including partial bike lanes on Harrison Street/King Road – but no safe, continuous east-west route.



Excerpt from base map showing zoning, land uses, property lines and environmentally sensitive areas



## Collector Roadway Classification; Higher Volumes, Higher Speeds

Monroe Street is currently classified as a collector for its entire length. According to the Milwaukie TSP, collector streets are moderate volume, moderate speed streets that serve a citywide function of connectivity. While Monroe is classified as a collector, it does not function as one. Traffic volumes are more consistent with a local street classification due to sections with narrow pavement and no curbs.

Nevertheless, with approximately 1,000 to 8,000 vehicles per day (depending on location), Monroe Street volumes are generally higher than recommended for neighborhood greenways. Typical collector roadways carry 5,000 to 10,000 vehicles per day, a level of traffic volume high enough to warrant bicycle lanes to segregate motorists and bicyclists. Greater volumes tend to create a higher-stress environment, discouraging less confident cyclists from using the facility.

Monroe Street has a posted 25 mph speed limit along its entire length, with observed speeds ranging between 23 mph and 31 mph along the corridor. This is well above the preferred 20 mph speed for greenways.

In 2011, the Oregon Legislature passed a law allowing municipalities to lower the speed limits on local residential streets from 25 mph to 20 mph, provided average daily traffic is fewer than 2,000 vehicles per day and the 85th percentile vehicle speed is below 30 mph. While Monroe Street could qualify for reduced speed limits based on its average observed speed, it currently experiences traffic volumes well above the maximum limit of 2,000 vehicles per day in most sections.

Lowering speeds and volumes on Monroe Street would enable re-classification from a collector to a local street, a designation more consistent with a neighborhood greenway. Potential traffic system impacts of lowering Monroe Street's carrying capacity - and actions to mitigate those impacts - are discussed in detail in the Summary of Traffic Impacts section of this report (page 28) and in the Traffic Impact Analysis Memorandum in Appendix B.

## Double Yellow Centerline

Monroe Street is characterized by a double yellow centerline for most of its length through Milwaukie, with the exception of the section between 21st Avenue and Oak Street where a recent repaving project removed the centerline and has not replaced it pending the outcome of this plan. Best practices for developing neighborhood greenways suggest removing the centerline to increase safety for cyclists, encouraging motorists to give more space when overtaking bicycles and signaling to users that the street is a lower-speed, shared environment. Removing the centerline is feasible on Monroe Street, particularly if volumes are reduced by greenway treatments.



## Sharrows and Wayfinding Signs

Sharrows and wayfinding signs are present intermittently along the length of Monroe Street. Both are important neighborhood greenway elements, and the opportunity exists to apply them with greater frequency and consistency throughout the corridor. There are also bicycle-specific wayfinding signs placed at certain intersections with key destinations, distances and estimated journey times.

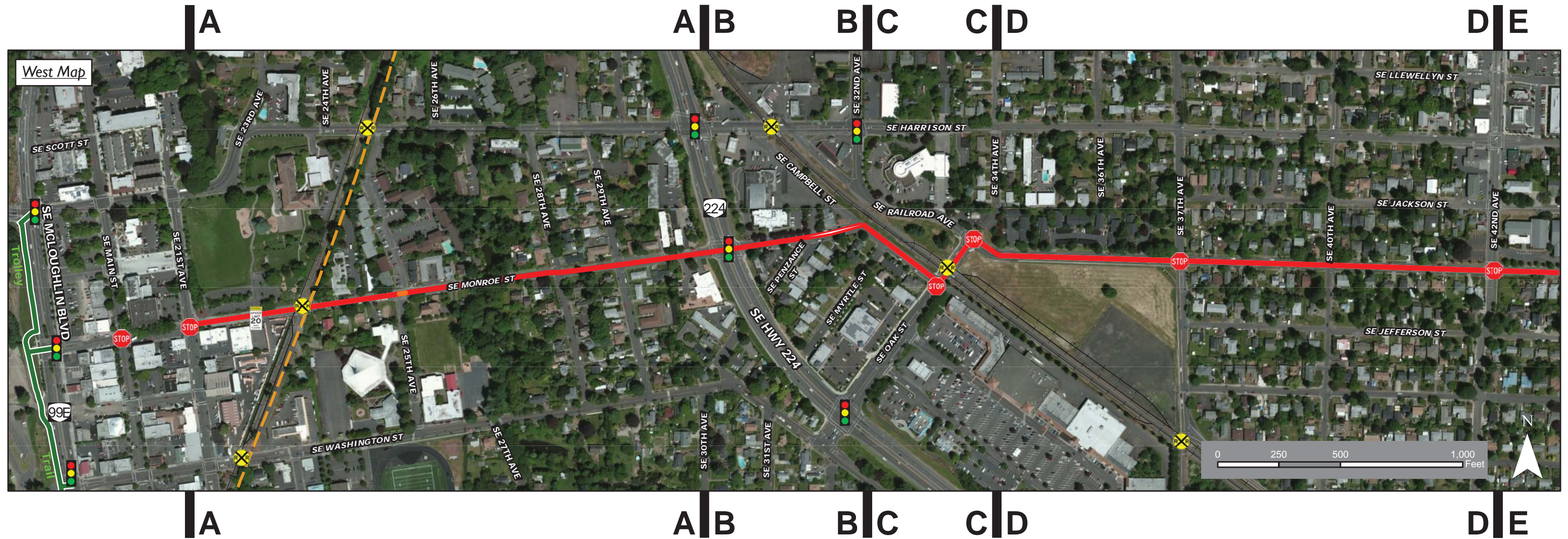




# Section-by-Section Summary of Existing Conditions

For purposes of the Neighborhood Greenway Concept Plan, Monroe Street was divided into five sections:

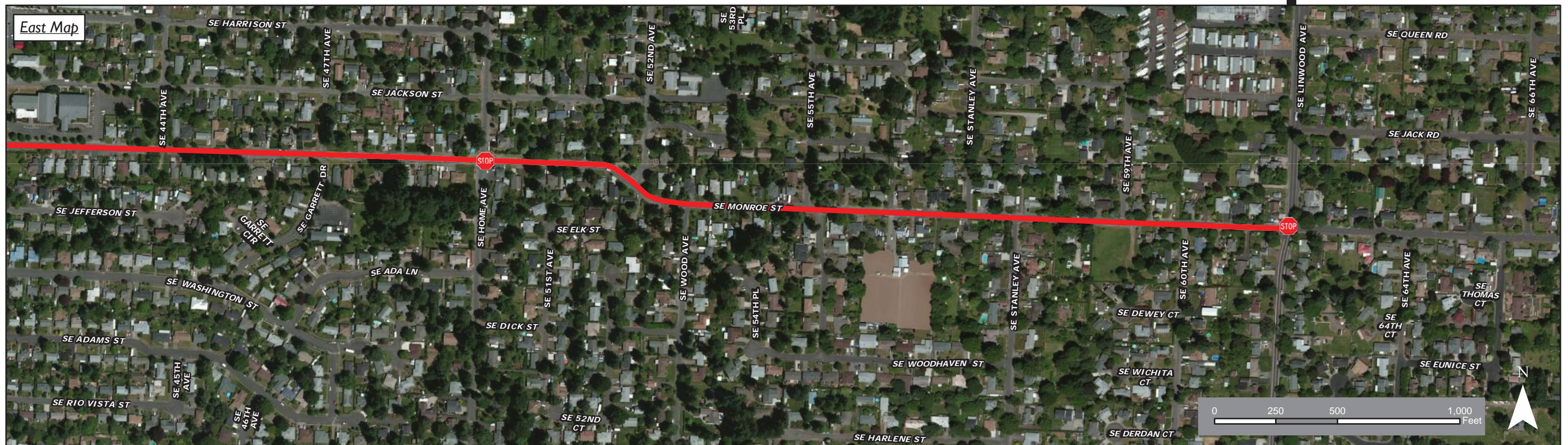
- Section A: 21st Avenue to just west of OR 224
- Section B: OR 224 to Campbell Street
- Section C: Campbell Street to Oak Street/Railroad Avenue through UPRR Main Line Crossing
- Section D: Oak Street/Railroad Avenue to 42nd Avenue
- Section E: 42nd Avenue to Linwood Avenue



Conditions in each section are described in detail in Appendix A, the Monroe Street Greenway Concept Plan Needs, Opportunities Constraints and Tools Memorandum



- A | B** Section Boundaries
-  Existing Traffic Signals
-  Existing Stop Signs  
*(for Monroe Street traffic)*
-  Speed Zones
-  Monroe Street Study Area
-  Future MAX Light Rail
-  Multi-Use Paths
-  Railroads
-  Railroad Crossings







*TriMet MAX crossing*



*Sidewalks in this section are deteriorating in the vicinity of Spring Creek*



*Intersections frequently lack curb ramps and other enhancements necessary for ADA compliance*



*Truck traffic is currently prohibited on Monroe Street between OR 99E and Downtown Milwaukie*



*The intersection at OR 224 is wide and imposing, acting as a barrier to bicycle and pedestrian travel.*

### Existing Conditions: Section A (21st Avenue to OR 224)

Heading east out of downtown Milwaukie, Monroe Street narrows to 27 feet curb-to-curb as it climbs a moderate hill. While sidewalks are present on both sides of the street, they are narrow, overgrown, and in poor condition. American with Disabilities Act (ADA)-compliant ramps are missing in many locations. Vehicle volumes in this section are within the preferred neighborhood greenway range, although the steepness of the hill slows eastbound cyclists considerably, creating an uncomfortable speed differential between motorists and bicycle riders.

Several improvements, including chicanes and curb extensions, would help keep speeds low and increase comfort for bicyclists. Recent removal of the centerline during a repaving project has led to fewer perceived conflicts between motorists and bicyclists.

While existing buildings and the bridge across Spring Creek (just west of 28th Avenue) make widening the roadway expensive and unlikely, expanding sidewalks toward the street could be done with minimal impact on on-street parking. Sidewalk widening, rehabilitation and replacement could occur in phases as funding becomes available.

A connection to the Trolley Trail on the west side of 99E would link the Monroe Street Neighborhood Greenway to the newly-constructed path, ultimately connecting to the regional Springwater Corridor trail system.

### Existing Conditions: Section B (OR 224 to Campbell Street)

This section includes the Monroe Street intersection with the Milwaukie Expressway (OR 224) and continues east to the T-intersection with Campbell Street. OR 224 at Monroe Street is a wide, high-speed, high-traffic roadway that can be daunting for pedestrians and cyclists. Enhanced crossing safety features are needed to link eastside neighborhoods with downtown and provide safer access to businesses (including the YMCA Day Care Center on the SW corner) for families with strollers or children on bikes crossing OR 224.

East of the intersection, lower travel volumes make this section fairly comfortable for bicyclists, although the wide roadway and underutilized on-street parking lanes can encourage speeding motor vehicles. Some sidewalks – especially those near the Campbell intersection – are narrow and intermittent, lacking ADA-compliant curb ramps.

Some bicycle-specific signage exists, but no pavement markings. Sharrows and additional signage are needed to help users navigate the jog from Monroe Street onto Campbell Street.





*UPRR Crossing on Oak Street*



*Looking east on Oak Street at the UPRR crossing, traffic has the right-of-way at the intersection with Monroe Street and Railroad Avenue*



*Difficult crossing at the Monroe Street at Oak Street/Railroad Avenue intersection*



*At 37th Avenue, looking east; the narrow uphill bike lane is substandard, with no downhill bicycle facility*



*At 42nd Avenue, looking east, where the bicycle lane ends*

### Existing Conditions: Section C (Campbell Street through the Union Pacific Railroad Main Line Crossing)

This section begins at the intersection of Monroe and Campbell Streets, continuing through a series of three jogs and the Union Pacific Railroad (UPRR) Main Line crossing. A large vacant parcel slated for redevelopment (the "McFarland site") is bounded by the UPRR rail line, Monroe Street, and 37th Avenue.

Although the terrain is flat, this section presents some of the most significant challenges in the corridor for safe pedestrian and bicycle travel, with relatively high volumes and an active railroad crossing adjacent to a busy commercial intersection. Any proposed changes to traffic control on Oak Street will require coordination with railroad and the ODOT Rail Division.

Sidewalks are lacking or in poor condition throughout this section, with missing ADA ramps. There is no bicycle-specific infrastructure or pavement markings. A clearly identified, safe and continuous route for pedestrians and bicycle riders through the UPRR crossing is needed to protect vulnerable users, calm traffic and support redevelopment efforts for the vacant McFarland site.

### Existing Conditions: Section D (Oak Street to 42nd Avenue)

East of the railroad crossing and after the turn from Oak, Monroe Street widens and heads up the steepest hill along the corridor. An existing 5-foot bicycle lane on the eastbound side separates cyclists from motor vehicles as they climb the hill. Between 37th and 40th Avenues the grade steepens, and the bicycle lane narrows to 4 feet. There is no westbound bicycle lane; instead, intermittent sharrow markings mark the pavement going downhill. The north side of the street has parking throughout the length of this section.

The steep grade and narrow bike lane results in a higher-stress environment for slow moving cyclists climbing next to relatively fast moving traffic. Heading west (downhill), sharrow placement can encourage cyclists to ride in a dangerous position close to the parking lane "door zone". While the space is technically shared between bikes and motorists, the character of this stretch is not a low-speed, low-volume environment where bicycle riders of all ages and abilities can feel comfortable. Reducing vehicle speeds would create safer, more attractive conditions for families and less experienced cyclists.

Sidewalks on both sides of the street range from 4 to 5 feet in this section, all of which are buffered from the street by a landscaped strip. While the sidewalks on the south side of Monroe Street between Oak Street and 37th Avenue are 7 feet wide, they are narrow elsewhere, making it difficult for pedestrians to walk side-by-side or pass one another on the steep grade. The intersections at 37th, 40th, and 42nd Avenues lack ADA-compliant curb ramps.



*Moderately fast and heavy auto traffic without a shoulder can make Monroe Street stressful for all but the strongest riders*



*Eastern section of Monroe Street with no curbs or sidewalks*



*The intersection at Linwood Avenue has inadequate sidewalks, no crosswalks, and difficult sightlines*



*Pedestrians crossing Linwood Avenue*

### Existing Conditions: Section E (42nd Avenue to Linwood Avenue)

The eastern section of the corridor is characterized by a rural cross-section through rolling topography with no sidewalk, curbs, or gutters (except for a short section just east of 42nd Avenue). While the public right-of-way is technically 40 feet wide, the existing pavement is only 22 feet from edge to edge. Front yards and vegetation encroach on Monroe Street along the length of the section, and gravel shoulders are frequently used as on-street parking. Vehicle speeds are relatively high, and residents report that fast-moving vehicles regularly run the four-way stop at Home Avenue without seeing the sign or stopping.

Pedestrian safety is a major concern throughout this section. The lack of sidewalks means neighbors must walk in the street to access their homes. There are no established pedestrian crossings at any of the intersections; visibility is limited in many places, including the intersections at 52nd, Stanley, and Linwood Avenues. There is no protected walking or bicycling access to Wichita Park, a key destination in the area.

Section E currently contains no bicycle-specific infrastructure except for one sharrow in each direction near 60th Avenue.

Stormwater drainage is also a significant issue. Regular flooding occurred frequently after heavy rainfalls, particularly around Home and 55th Avenues, until the City installed five drywells in recent years. These have eased but not eliminated the problem; flooded basements are still relatively common in conjunction with major storm events. Green street treatments (including permeable pavement and curb extensions and chicanes that feature bioswales to hold runoff) have the potential to reduce flooding even further.

At the eastern city limit, Monroe Street intersects with Linwood Avenue at a two-way stop controlled intersection. Linwood is a relatively high-speed, high-volume roadway, and the intersection lacks sidewalks, corners or crossing treatments. With poor sightlines from every angle, the intersection is considered difficult and dangerous by drivers, pedestrians and cyclists alike.



# CREATING THE PLAN

## Organizations and neighborhoods represented on the Monroe Street Greenway PAC

Chair: City of Milwaukie Planning Commission/Interim Mayor

Historic Milwaukie NDA

Ardenwald — Johnson Creek NDA

Hector Campbell NDA

Linwood NDA

Bike Milwaukie

Public Safety Advisory Committee (PSAC)

Clackamas County Pedestrian/Bikeway Advisory Committee

Project Manager (COM Planning)

Clackamas County Planning Department

Clackamas Fire District

City of Milwaukie Engineering

COM Public Works (Streets & Stormwater)

ODOT

City of Milwaukie City Council liaison

After adoption of the TSP in 2013, backed by strong community support for advancing a neighborhood greenway project on Monroe Street, the City of Milwaukie applied for and received a Transportation and Growth Management (TGM) grant from ODOT to create a concept design and plan for the neighborhood greenway. This concept design is the result of that grant.

## Project Advisory Committee

Creation of the Monroe Street Greenway Concept Design kicked off in late summer 2014 with the chartering of a Project Advisory Committee (PAC) to guide development of the plan. The PAC comprises neighborhood representatives, local bicycle advocates, community volunteers, and agency-based technical advisors.

The PAC met six times over the course of 12 months, including an initial site visit and tour to observe challenges and brainstorm potential solutions along Monroe Street. At subsequent meetings, the project team reported on existing conditions and brought design ideas for discussion and approval by the PAC.

## Public Workshops and Outreach

Three public workshops were held during the course of the project to allow members of the general public to see and comment on drafts of the Concept Design and discuss potential trade-offs. Workshops were well publicized and well attended, with a broad cross-section of neighbors and interested people at each meeting. Attendees reviewed aerial maps and concept plan rollouts and offered feedback for consideration by the project team and the PAC as the design was developed.

In addition to the public workshops, City staff reached out to the community by distributing door hangers and surveys to encourage meeting attendance and solicit feedback. A Monroe Street Neighborhood Greenway website hosted by the City (<http://www.milwaukieoregon.gov/planning/monroe-street-neighborhood-greenway-concept-plan>) kept the public apprised on project developments.

Community members and residents attended an open house in June to comment on the design



PAC members used specially-designed "best practices" flash cards to create their ideal neighborhood greenway





## Iterative Process to Create the Concept Design

In winter 2015, the project team presented a draft concept design to the PAC and to the public, proposing a set of on-street greenway treatments for Monroe Street as envisioned in the TSP. The initial concept was based on PAC input, existing conditions analysis and evaluation of potential project elements to determine which best supported the project's neighborhood greenway objectives. (The Evaluation Matrix included as Appendix C of this report documents this analysis).

The initial design presented a combination of crossing improvements, traffic calming elements to reduce speeds, sidewalk improvements, and a pedestrian path in the eastern section. In addition, partial diverters were proposed at OR 224, 37th Avenue, and Linwood Avenue to discourage cut-through traffic along Monroe Street and create a quieter, low-traffic neighborhood route.

An off-street path along the south side of Monroe between Oak and 37th had been considered earlier, but was ultimately rejected due to concerns about the transition back onto Monroe Street, as well as how the path would fit into future McFarland site development plans.

At the first Public Workshop and the PAC meeting following it, concerns were raised about the impacts of diverting auto traffic off of Monroe Street in general – and especially about the proposed diversion at 37th Avenue and its impacts on Monroe Street (and on Harrison Street to the north). Other issues included loss of parking, fire lane clearances, and overall cost of the “green” elements of the design. At the same time, strong support continued for a safer, quieter, more comfortable street.

The project team made substantial revisions to the concept design in response to these concerns. The revised design has several key changes:

- It contains fewer landscaped features
- Parking is preserved throughout the corridor
- Diversion and chicanes are located more strategically to provide the maximum traffic calming effect for the least cost

**Design Concept Evaluation Matrix**

Evaluation Measures	Proposed Concepts				
	Sharrows	Eliminate Centerline	Green Stormwater Treatment	ADA Curb Ramps	Curb Ext.
Lower traffic speeds	N/A	●	◐	N/A	
Lower traffic volumes	N/A	◐	◐	N/A	
Pedestrian accommodations	N/A	N/A	N/A		

Project elements were evaluated for their potential to provide safer conditions on Monroe Street

## PAC-Recommended Washington Street Bicycle Route

To address concerns about diversion at 37th Avenue, several PAC members and community advocates proposed a new route for bicycle travel between the railroad crossing at Campbell Street and the intersection of Monroe and Home Avenue. Instead of staying on Monroe Street, this route assumes a new path through the undeveloped McFarland site along the UPRR tracks to connect with Washington Street at 37th Avenue. Bicycle travel would shift over to Washington Street, a low-volume neighborhood street, between the end of the new path and either Garrett Drive or Home Avenue (via Ada Lane) where the alignment would return to Monroe Street. Pedestrians will likely remain on Monroe Street.

Regardless of which street is ultimately selected for the route back to Monroe, the Washington Street alignment will need additional design – and public input – to make sure the route does not encourage additional motor vehicle traffic on Washington, Garrett, Ada, and Home Streets.

PAC support coalesced around the Washington Street route, which offers bicycle riders a route with lighter traffic and a smaller hill to climb eastbound. At the same time, the alternative preserves some of the existing auto access on Monroe and eliminates the diverter at 37th Avenue. Instead, a new diverter would be installed at 42nd Avenue to reduce cut-through traffic on Monroe between 42nd and Linwood. As described in the Traffic Analysis section of this plan, traffic modeling reveals that a diverter at 42nd has less impact on the nearby streets than one at 37th.

The safety and success of this route depends on constructing a new shared-use path along the UPRR tracks through the currently vacant McFarland site, as envisioned in the *Moving Forward Milwaukie* vision. This would provide an off-street connection between Monroe/Campbell Street and Washington Street. This would be the preferred alternative for bicyclists. While it would be signed as the main bicycle route, it is likely that confident riders will continue to take the more direct route on Monroe Street. As a result, it is important for safety reasons to leave the existing uphill bike lane in place on Monroe between Campbell and 42nd.



Red line is Monroe only alignment; pink line shows possible options for the Monroe-Washington route



## THE PLAN: A DETAILED LOOK

### Moving toward the Final Concept Design

Changing the nature of Monroe Street from a street serving cut-through auto traffic to a locally oriented neighborhood street that is quiet enough to share with bicyclists and pedestrians does not happen without trade-offs. Achieving the goals of a neighborhood greenway will mean less direct, convenient auto access on and near Monroe. Not surprisingly, discussion around these trade-offs has centered around diversion. (Limited street connectivity means that diversion on Monroe will result in some out-of-the-way travel for residents, though all homes remain accessible.) These issues were central to the discussion at every PAC meeting and public workshop. Ultimately, PAC members and many members of the public acknowledged that shifting auto trips off of Monroe is critical to project success. Multiple neighbors commented during the process that they recognize the potential inconvenience, but look forward to a safer street where families can walk to nearby parks, schools and other destinations.

Other project elements have received nearly unanimous support. Stakeholders agree that the Monroe Street is inhospitable today for pedestrians, bicyclists, the elderly and families with children. Residents and community members strongly support the pedestrian path and traffic calming measures between 42nd and Linwood.

Finally, a traffic impact analysis conducted early in 2015 shows that while the project will likely increase traffic on nearby streets, the majority of that re-routed traffic will move to Harrison Street and King Road, two thoroughfares designed to carry much larger vehicle volumes. The analysis (discussed in further detail later in this report and in Appendix B) points out that these roadways will need improvement in the future – with or without the Monroe Street neighborhood greenway project. Moreover, impacts can be mitigated by optimizing existing traffic signals or installing new signals where impacts are anticipated to be highest.

The preferred alternative for the Monroe Street Greenway includes the Washington Street bicycle route between Oak Street and Garrett Drive or Home Avenue.

This alignment assumes a new path through the undeveloped McFarland site along the UPRR tracks to connect with Washington Street at 37th, shifting bicycle traffic over to Washington (instead of Monroe) between the end of the new path and either Garrett Drive or Home Avenue (via Ada Lane). The route would be contingent on constructing a multi-use path paralleling the Union Pacific tracks through the vacant McFarland site to connect Campbell Street with Washington Street, as proposed in the *Moving Forward Milwaukie* plan.

Partial diverters are proposed as part of the concept design to achieve preferred neighborhood greenway speeds and volumes on Monroe Street. Two of these are located at OR 224 and Linwood Avenue. The preferred Washington Street bicycle route includes a partial diverter at 42nd to create safer, slower conditions between 42nd and Linwood.

Throughout the design, the double yellow centerline has been removed and sharrow pavement markings (placed at the beginning of each block) have been added, in conjunction with wayfinding signage. Bicycle riders are encouraged to follow the sharrow markings near the middle of the street, away from the “door zone” of parked cars.

The entire concept design complies with a minimum fire clearance of 20 feet.

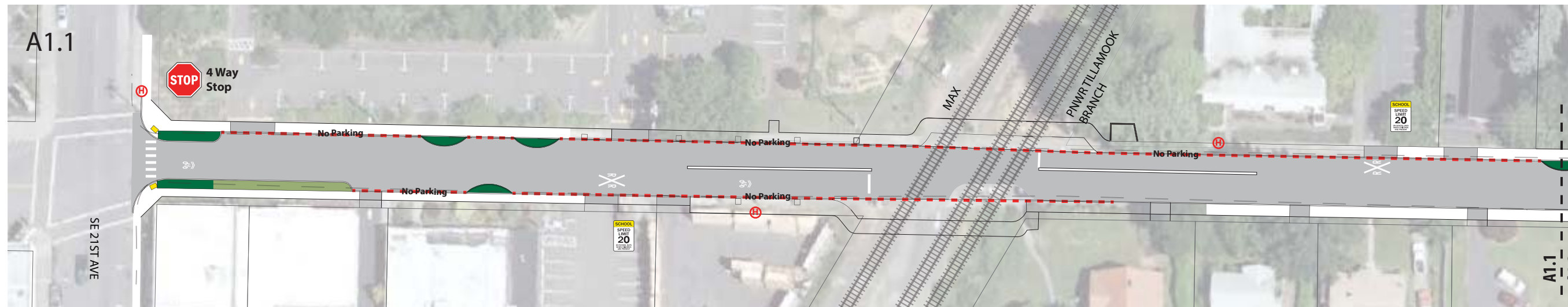
The following pages show the recommended concept design. Cross-section drawings are included to show general dimensions for both existing conditions and the proposed design.

All features are subject to modification in final design. Chicane locations are representative only. Final placement will consider factors such as parking and driveway location.



*Examples of traffic calming, pedestrian accommodations and stormwater management on a street with similar character as Monroe east of 42nd Avenue*

Note: dashed red lines represent existing "no parking" zones. Solid red lines denote new "no parking" locations.



## Monroe Street Greenway Concept Design

### Section A - 21st Avenue to OR 224

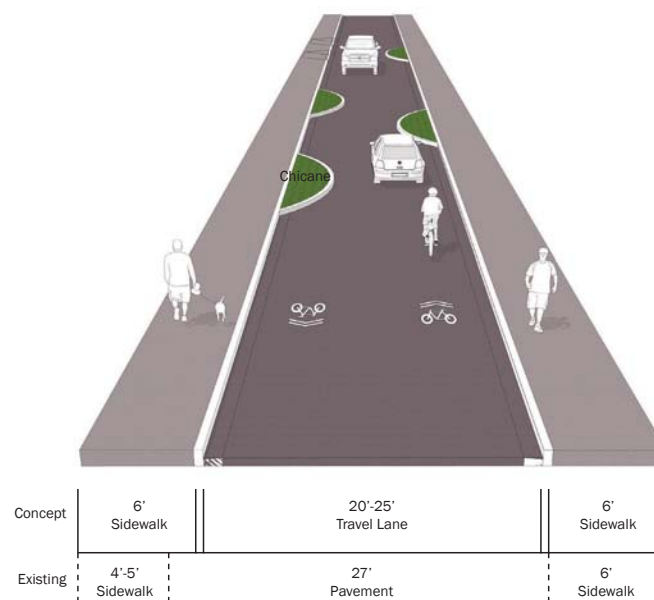
This the oldest section of Monroe Street, with constrained right-of-way and sidewalks that are functionally obsolete. At its narrowest, this section is 27 feet wide, with curb-tight 5 foot sidewalks and private properties abutting the sidewalk. There is no parking between 21st Avenue and the TriMet MAX crossing. To avoid private property impacts, the concept plan expands these sidewalks into the street for a total of 6 feet to comply with the City's sidewalk design standards. East of 29th Avenue, existing sidewalks are expanded into the landscape strip. New ADA-compliant curb ramps with tactile warning strips are shown at all required intersections.

Several traffic calming features are placed to reduce speeds in this section. These include chicanes, which are grouped to minimize the temptation to speed. Curb extensions at 21st Avenue, 25th Avenue, 28th Avenue and 29th Avenue narrow the street opening, focus driver attention on the intersection and provide a shorter pedestrian crossing. Curb extensions and chicanes incorporate stormwater treatment features.

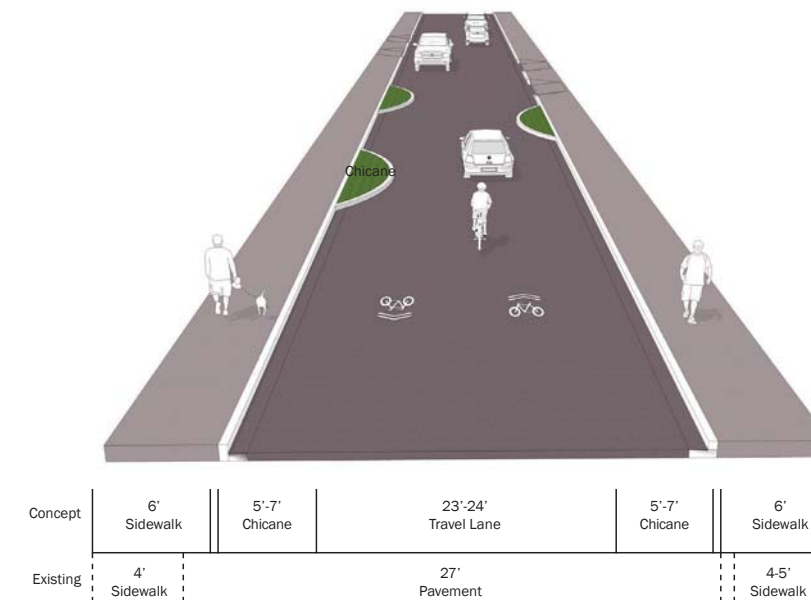
The 21st Avenue intersection is also suitable for a gateway feature (such as decorative signage or planters) to make it readily apparent that this a neighborhood street rather than a thoroughfare. New planter strips near the 21st Avenue intersection help retain stormwater and reduce runoff while reducing the street width and providing an entry into the neighborhood greenway.

On-street parking utilization is high in this section, and the design concept avoids parking impacts except at intersections and proposed chicane locations. While the curb extensions are relatively fixed, chicanes can be moved as needed to preserve key parking spots. Existing traffic islands are retained, including the MAX project splitter islands.

A connection to the Trolley Trail on the west side of 99E is not included in the concept design, as it was beyond the scope of this project. However, suggestions for improving that connection are included on page 27 of this report.

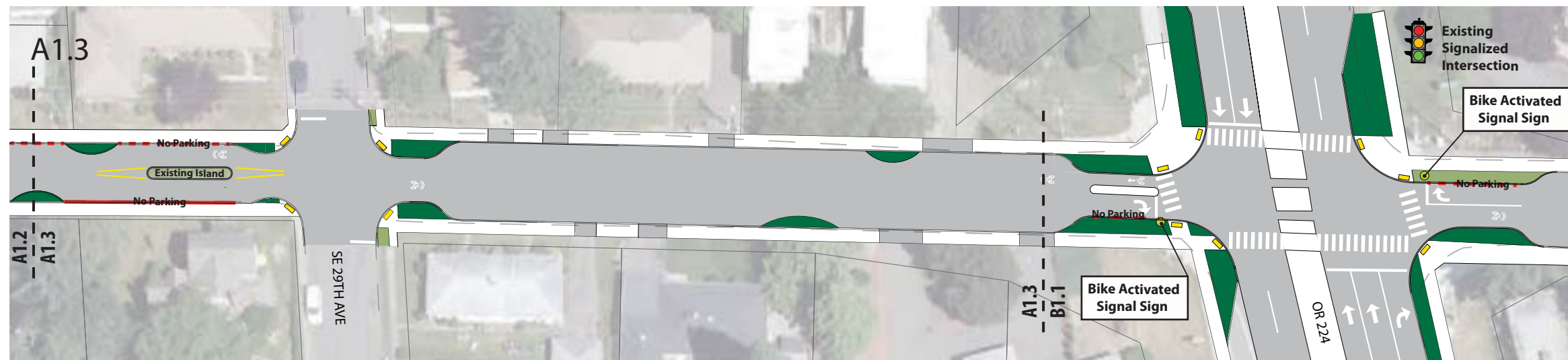
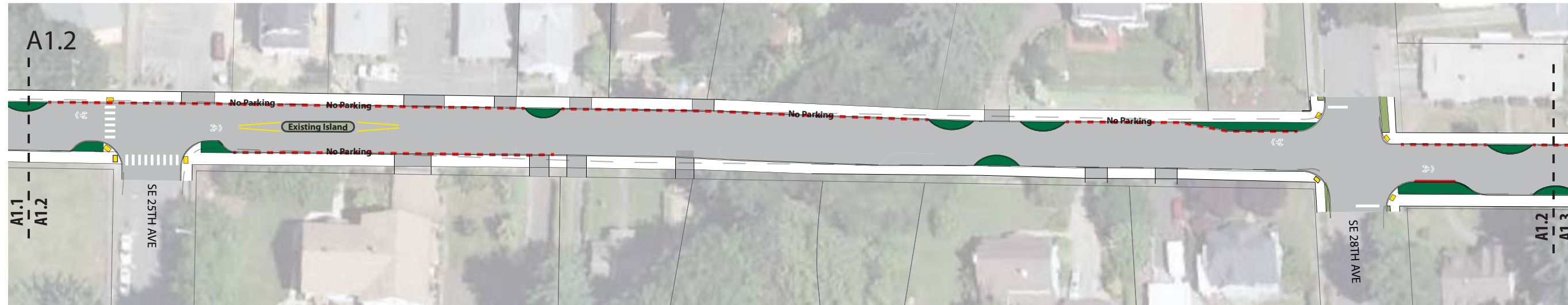


Section A: SE 21st Avenue to MAX Crossing



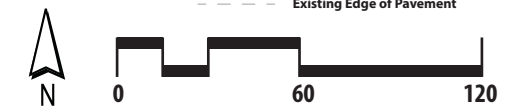
Section A: MAX Crossing to OR 224





**Legend**

-  Proposed Sidewalk
-  Proposed Pervious Asphalt Walk
-  Proposed Pervious Pavement
-  Existing Landscape
-  New Landscape Strip
-  Potential BioRetention Area
-  Curbed Chicane
-  Shared Path
-  Bike Sharrow
-  Existing Fire Hydrant
-  ADA Ramp
-  Activated Signal Sign
-  Signal
-  New No Parking
-  Existing No Parking
-  New Parking
-  Concrete Curb
-  Existing Edge of Pavement



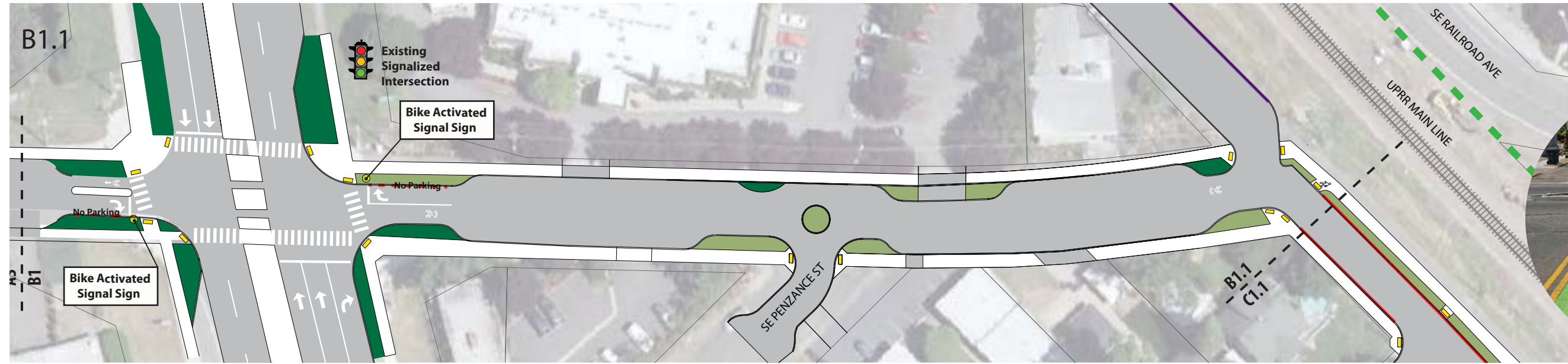


Photo: Michael McKisson



Photo: Greg Raisman

Potential intersection approaches at OR 224  
Top: Left hand bicycle lane  
Bottom: Bicycle box

### Section B - OR 224 to Campbell Street

This section includes a median diverter at the OR 224 intersection that prevents any through vehicle movement across OR 224, except for bicycles. The diverter prohibits all left turns from Monroe Street onto OR 224 and from OR 224 onto Monroe Street. Right-in/right-out movements are allowed at the east leg of the intersection. Traffic on eastbound OR 224 intending to access local medical offices in this area will use either Harrison Street or Oak Street eastbound to access Campbell Street. The median diverter serves as a refuge island for pedestrians in the middle of the intersection, occupying space formerly used for left turn lanes. Refuge areas include user-activated push button signals for pedestrians who need more time to cross the highway.

A partial closure diverter is shown at the west leg of the intersection, preventing any motor vehicles from making right turns from southbound OR 224 onto Monroe Street westbound toward downtown, while also allowing for a new curb extension to replace the existing southbound right turn lane.

The plan shows a bicycle activated signal for the OR 224 crossing. This signal could be activated by a push button and/or by new detector loops in the pavement. Options for intersection treatment include the two shown at right. Installing a painted "bicycle box" would allow bicyclists to move into the protected space ahead of waiting automobiles, requiring a "no right turn on red" restriction. Another option would provide a narrow through lane for bicycle riders to the left of the auto right turn lane. With this configuration, right turns on red would be permissible.

East of OR 224, sidewalks are widened into the street for a total of 6 feet to meet city design standards. Where required, new ADA-compliant curb ramps with tactile warning strips are shown.

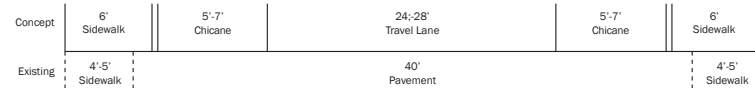
Future coordination with ODOT will be needed at the time of design to determine acceptable design details for the OR 224 crossing, including signalization. Appendix D lists these and other ODOT coordination requirements.

The concept design shows curb extensions throughout this section. The curb extension at Penzance Street decrease the severity of the angle at the intersection, improving sightlines for all modes. Chicanes can be placed as needed to narrow the width of the street, and a traffic circle is shown to reduce speeds. The intersection of Monroe and Campbell Street is also realigned by placement of curb extensions to create a better defined intersection with clearly defined pedestrian crossings and access. At Campbell Street, the greenway shifts southeast and continues along Campbell Street after Monroe "T's" into Campbell.

Median diverter where a neighborhood greenway intersects a major arterial



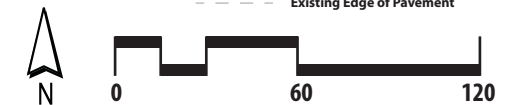
Photo: Steven Vance



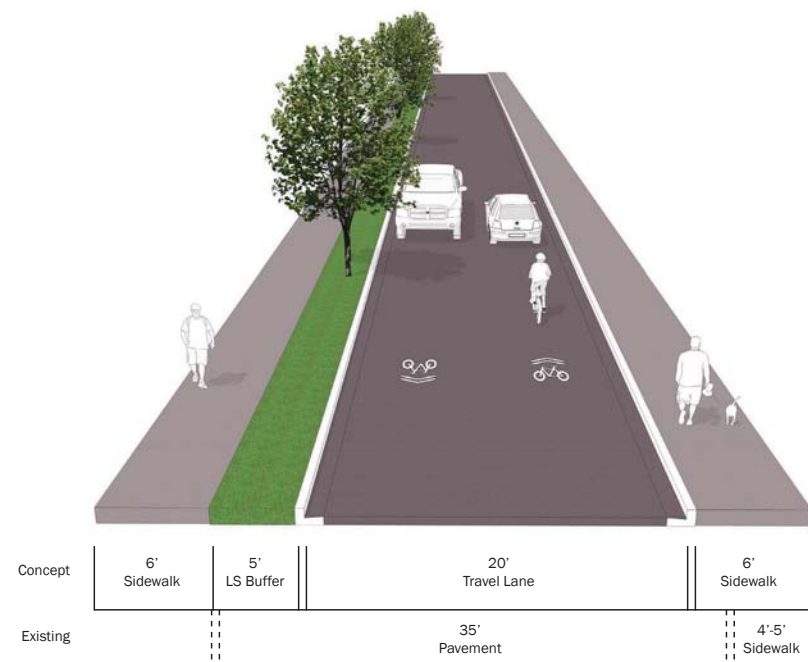
### Section B: OR 224 to Campbell Street

### Legend

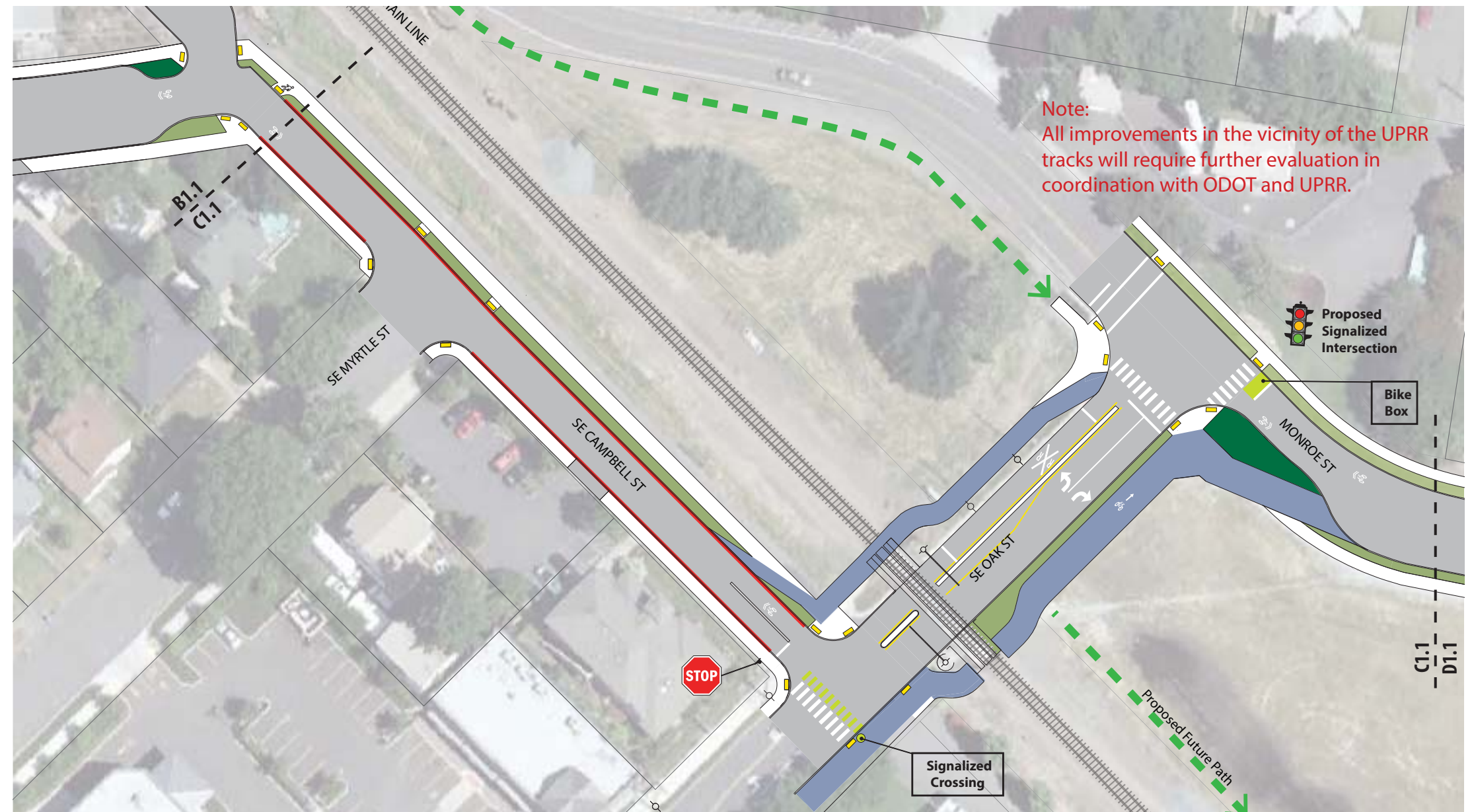
- Proposed Sidewalk
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- Existing Landscape
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- Shared Path
- Bike Sharrow
- Existing Fire Hydrant
- ADA Ramp
- Activated Signal Sign
- New No Parking
- Existing No Parking
- New Parking
- Concrete Curb
- Existing Edge of Pavement







Section C: SE Monroe Street to SE Oak Street



### Section C – Campbell Street to Railroad Avenue/Oak Street

Here the neighborhood greenway continues along Campbell Street to the southeast. A new sidewalk and planting strip is shown along the east side of Campbell Street directly adjacent to the UPRR tracks, and on-street parking would be prohibited between Monroe Street and Oak Street. Crossing improvements at the intersection of Campbell and Oak Streets include new signage and some form of signalization to help bicycles and pedestrians cross Oak Street. While a pedestrian-activated rapid flash beacon or hybrid beacon may be suitable here, the intersection's proximity to the UPRR crossing could require a full signal if mandated by ODOT's Rail Division. Coordination with UPRR and ODOT Rail will be necessary.

In addition to a marked high-visibility crosswalk for pedestrians, green "crossbike" pavement markings help guide bicycle riders across Oak Street.

Oak Street in this section is a heavily trafficked roadway, with volumes approaching 8,000 vehicles per day at the UPRR crossing. The roadway width is constrained in this section and the concept design shows expanding the current sidewalks on Oak Street to multi-use path standards to allow bicycle riders and pedestrians to safely cross the rail tracks separately from heavy traffic.

At the railroad crossing, the 12-15 foot wide sidepaths are designed for one-way bicycle traffic: riders heading west cross on the north side of the tracks while those heading east cross on the south side. Pedestrians can use either sidepath in both directions and continue on existing sidewalks after crossing the tracks.

The concept design shows a new signal at the T-intersection of Oak Street/Railroad Avenue and Monroe Street to create safer conditions

for pedestrians and bicycle riders. Currently, traffic heading east on Oak Street is not stop controlled and is able to turn left or right without stopping, which makes for difficult and dangerous pedestrian and bicycle crossings. A stop treatment is needed (either a four-way stop or a signal that can be timed in conjunction with the train crossing signal); this will require coordination with UPRR and ODOT Rail. New high-visibility crosswalks are installed at this intersection, and a large curb extension at the southeast corner of the intersection reduces turning speeds and shortens the crossing distance for pedestrians. This feature also incorporates bioretention basins to improve stormwater management. For westbound cyclists on Monroe Street, a new bicycle box would allow riders to filter to the front of the intersection and give them a head start once the light turns green.

The *Moving Forward Milwaukie* plan includes a proposed multi-use path on the east side of the tracks (shown in the concept plan as a dashed green line). Further discussions are needed between the City of Milwaukie and ODOT Rail to finalize the location of this path crossing.



# Washington Street Bicycle Route

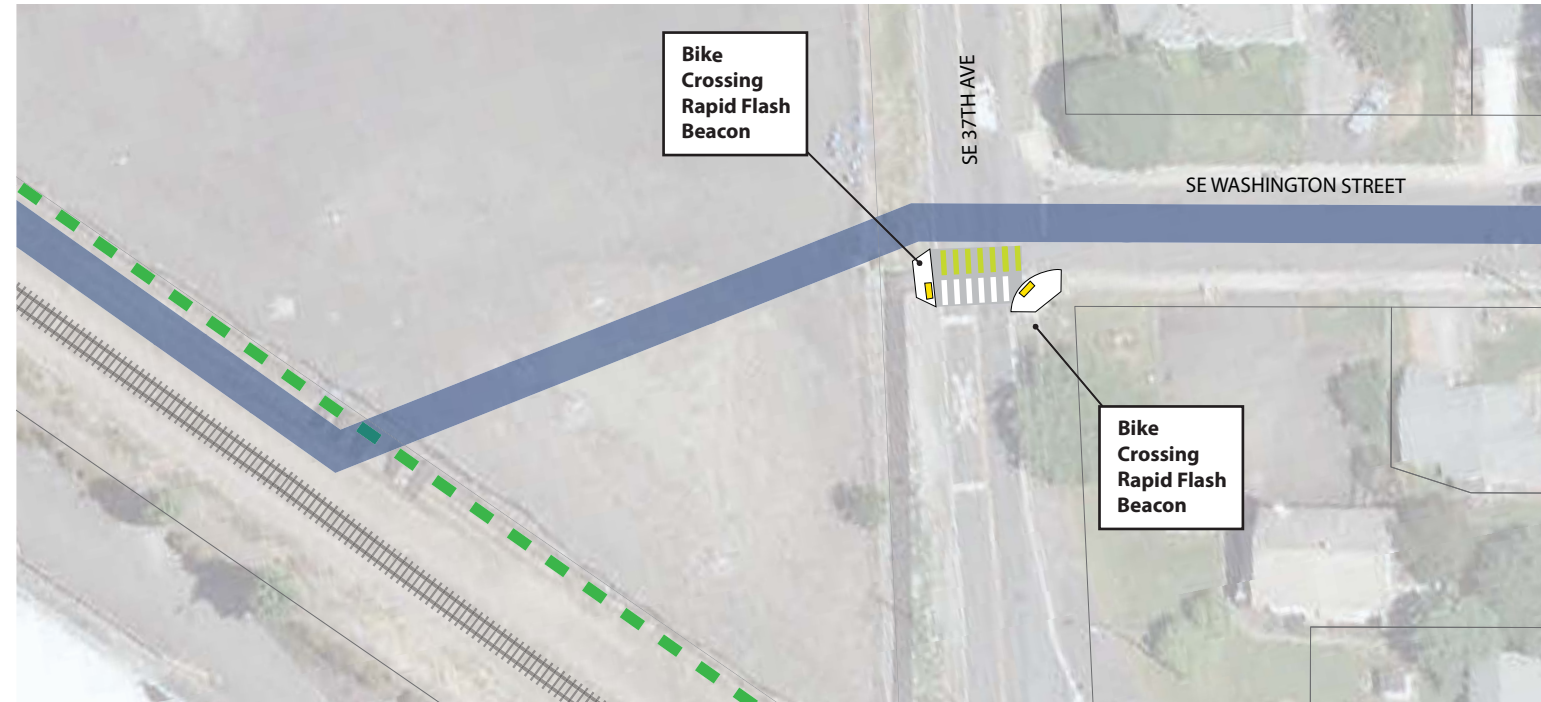
The Washington Street bicycle route came about as a result of community input late in the planning process, so was not included as part of the original concept design.

In this route (represented here on the map below), an off-street path paralleling the railroad tracks through the undeveloped McFarland site connects Oak Street to Washington Street at 37th. Bicyclists would follow this route onto Washington Street, a low-speed and low-volume street that parallels Monroe. They would then return to Monroe Street on Garrett Drive or Home Avenue. A diverter is placed on Monroe Street at 42nd Avenue to deter cut-through auto traffic on Monroe between 42nd and Linwood. Through traffic would shift to Harrison Street/King Road via 37th or 42nd Avenue.

A flashing beacon at 37th and Washington would allow for safe pedestrian and bicycle crossing. Sharrows and signage would mark the route on Washington and Garrett or Home, but major changes or improvements are not anticipated on these streets. Further design – and public input – will be needed to ensure that the route does not encourage additional motor vehicle traffic to use the route to bypass Monroe Street.

This plan provides an overview of the Washington Street bicycle route, but does not provide detailed conceptual design of the section between Oak Street and Garrett Drive or Home Avenue.

Crossing at 37th Avenue



Diverter at 42nd Avenue and Monroe



Washington Street Bicycle Route Map



This figure is for route illustration purposes only. Additional design will be needed to identify traffic control and greenway design elements



### Washington Street Bicycle Route, Section C – Campbell Street to Railroad Avenue/Oak Street

Section C includes a new shared-use path that would be constructed along the UPRR line through the 7-acre McFarland property slated for new residential or mixed use development. The Monroe-Washington Street alignment would improve the crossing where Campbell Street intersects Oak Street, either on the north or south side of the existing train crossing. Details of the exact configuration will require coordination between the City, ODOT Rail, and UPRR in future engineering phases.

### Washington Street Bicycle Route, Section D – Railroad Avenue/Oak Street to 42nd Avenue

Continuing from Section C, the proposed new path travels through the McFarland site and then connects with Washington Street at 37th Avenue. This new crossing includes high-visibility crosswalks, new signage and a pedestrian-activated rapid flash beacon. While vehicle counts have not been conducted on Washington Street, it is generally a low-volume local neighborhood street requiring minimal improvements to serve as a shared-space bikeway. Wayfinding signage and sharrows are needed, and stop signs at 40th Avenue should be turned to give Washington Street traffic the right-of-way, as is often done to facilitate bicycle travel on neighborhood greenways. In addition, the current two-way stop at 42nd Avenue should be converted to an all-way stop to enhance bicycle and pedestrian safety at the intersection.

In this alignment, Monroe Street between Oak Street and 42nd Avenue includes widened sidewalks, rebuilt curb ramps and some traffic calming and stormwater improvements. The existing eastbound uphill bicycle lane is preserved to protect cyclists who choose to stay on Monroe instead of taking the less stressful but longer route on Washington Street. Heading westbound, more sharrows are added to aid downhill cyclists.

### Washington Street Bicycle Route, Section E – 42nd Avenue to Linwood Avenue

The Washington Street bicycle route alignment continues east past 42nd Avenue and rejoins the Monroe Street corridor using either Garrett Drive or Home Avenue via Ada Lane. Both of these routes are suitably low-volume, but there are two slight advantages to using Home Avenue: first, the street already intersects Monroe Street at four-way stop which is safer for bicycle riders using the Monroe-Washington alignment. Second, Home Avenue more directly serves the playground at Homewood Park. If Garrett Drive is ultimately chosen as part of the Monroe-Washington alignment, an all-way stop is recommended to increase the safety of users transitioning from Garrett Drive to Monroe Street.

Photo: Thatcher Imboden



Example of a right-in/right out diverter



Washington Street is a local residential street with relatively low traffic and speeds

### What if an Off-Street Path Through the McFarland Site Cannot be Secured?

The McFarland site is a 7.2-acre set of two privately-owned parcels in central Milwaukie, bounded by the UPRR tracks, Oak Street, Monroe Street and 37th Avenue. The larger parcel to the west was formerly contaminated, but recent mitigation has brought the site to state Department of Environmental Quality standards for a vacant taxlot; it is unknown if additional mitigation will be required to permit development at the site. The second, smaller parcel to the east is a brownfield site and still in environmental remediation. A new shared-use path has been proposed as part of the draft *Central Milwaukie Land Use and Transportation Plan* to connect the planned 29th Avenue greenway with a new on- or off-street bicycle facility along Railroad Avenue.

An off-street path along the UPRR tracks through the site is a critical component of the Washington Street bicycle route. Without it, there is no low-stress bicycle route between Oak Street and Home Avenue. Success of this route depends on the City of Milwaukie’s ability to secure path right-of-way for the path through the McFarland site early in greenway project implementation.



A path would run parallel to the railroad tracks through the redeveloped McFarland site

The path will be included in the *Moving Milwaukie Forward* plan; the City of Milwaukie is encouraged to ensure its construction through development agreements. If this right-of-way cannot be established quickly, several options could be pursued to create safe, attractive bicycling conditions on Monroe Street between Oak Street and 42nd Avenue, where a median diverter will be located. These options include (in order of priority):

#### 1) Connect to Washington Street using bicycle lanes

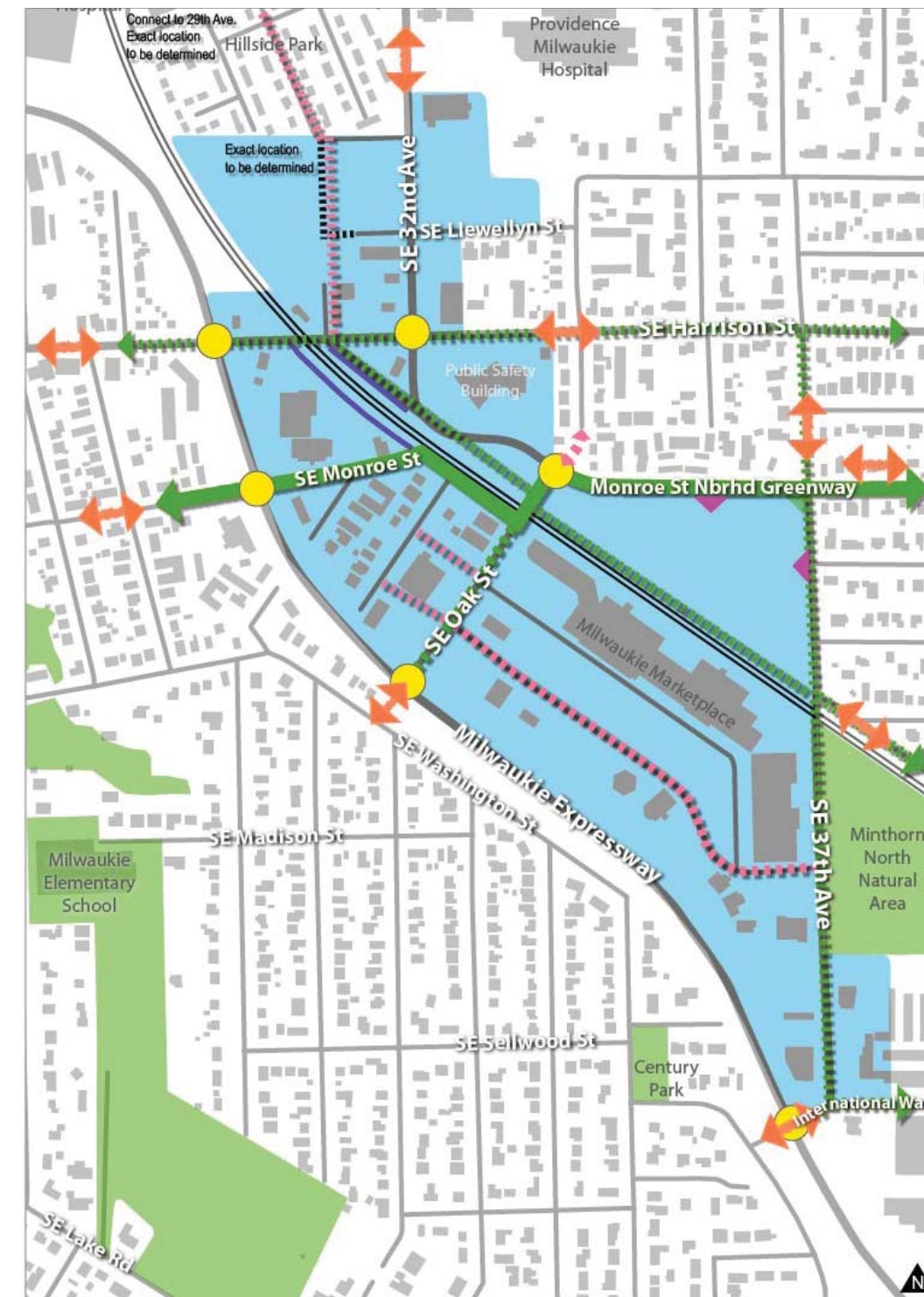
This option would install bicycle lanes on Monroe, Oak, and 37th Avenue to connect bicycle riders with the proposed Washington Street greenway. This would create more of a “bikeway” route that includes short stretches of bicycle lanes connecting low-stress neighborhood greenway sections on either side. This design is not well-suited for families and less experienced cyclists, but would represent an improvement over conditions today.

#### 2) Implement the neighborhood greenway concept design on Monroe Street from Oak Street to Garrett Drive or Home Avenue

If the Washington Street bicycle route is not built, it will be important to provide protection for less confident bicyclists on Monroe Street. One way to do this is the original greenway design, which includes treatments like chicanes and curb extensions as well as a diverter at 37th Avenue instead of 42nd Avenue (though not favored by project stakeholders).

#### 3) Create a Monroe Street “bikeway”; remove on-street parking between Oak and 42nd

In an effort to create the most direct route while improving safety and comfort for vulnerable road users, this option would remove parking on the north side of Monroe Street between Oak Street and 42nd Street and install a 6-foot, buffered bicycle lane in both directions on Monroe Street. Because current speeds and volumes are not suitable for an on-street greenway, these enhancements would provide extra space or a physical barrier between automobiles and bicycle riders.



Proposed bicycle network as shown in the *Central Milwaukie Land Use and Transportation Plan*





### Section E – 42nd Avenue to Linwood Avenue

In order to provide a safe place to walk and better define the street, the concept design includes a 7-foot permeable pavement walking path on the north side of Monroe Street. This path is buffered from the roadway by a landscape strip, chicanes and dedicated on-street parking designation where appropriate. The layout formalizes on-street parking somewhat, compared to the existing ad-hoc condition along the gravel shoulder. The south side of Monroe Street contains periodic chicanes as well as curb extensions at intersections. These features include stormwater drainage to help reduce the likelihood of flooding.

Where the roadway curves at 52nd Avenue, new speed cushions<sup>1</sup> are shown to slow vehicle speeds while still accommodating emergency vehicle access. (It may be necessary to adjust the curvature of the roadway to accommodate these safety improvements right-of-way impacts.) The northwest corner of this intersection is currently within public right-of-way and is a suitable location for a new park or other similar public gathering space.

Early in the concept design development process, the project team considered a full urban build-out of Monroe Street with sidewalks, curbs, and drainage on both sides of the street. This would be an extremely high cost approach, and was not well-supported by the PAC or the public. It would change the rural, forested character of Monroe Street and have significant impacts on existing landscaping and vegetation.

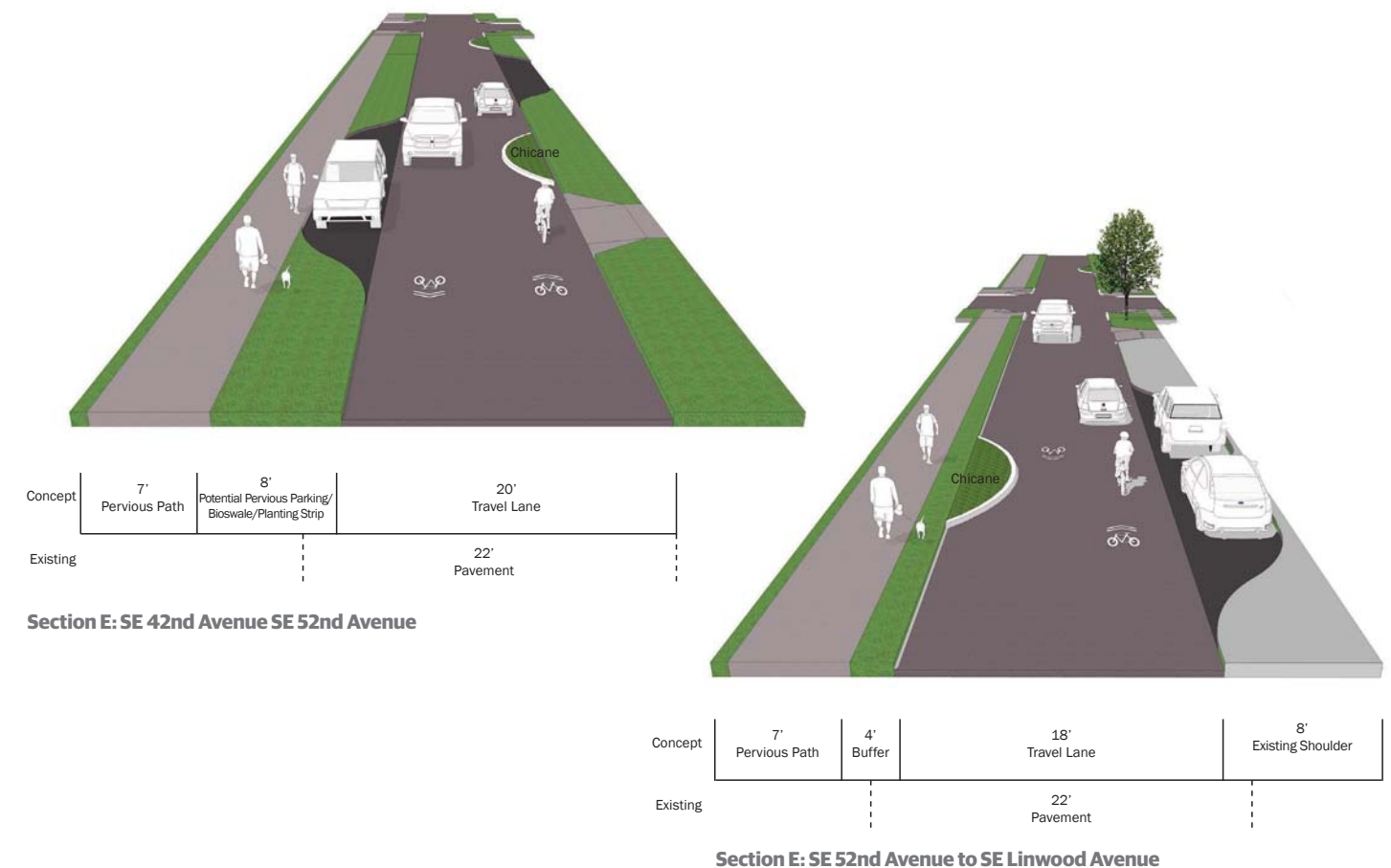
As a more cost-effective measure, the concept design proposes new curbs in limited locations only. These include 47th Avenue/Garrett Drive, Home Avenue, and 55th Avenue. Traffic circles are shown at these locations, along with rebuilt intersection corners that include ADA-compliant curb ramps that incorporate stormwater management

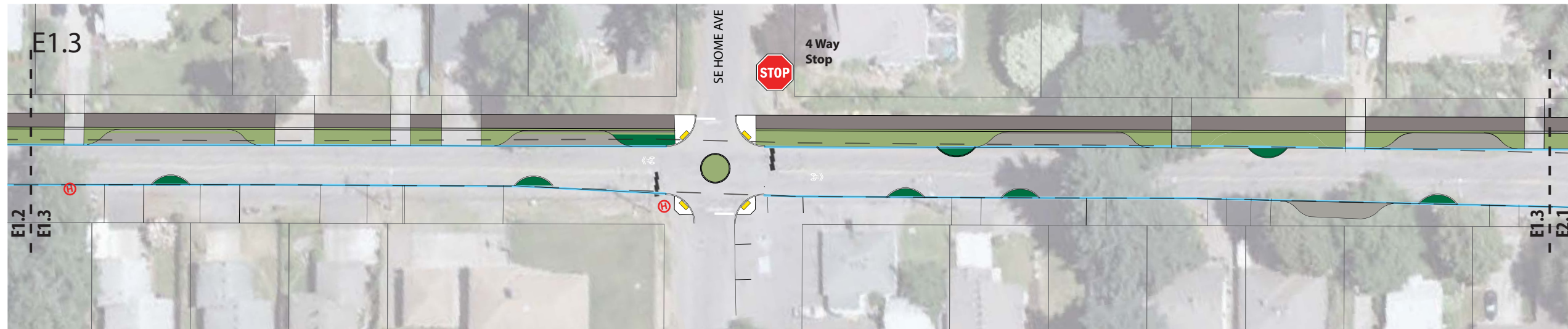
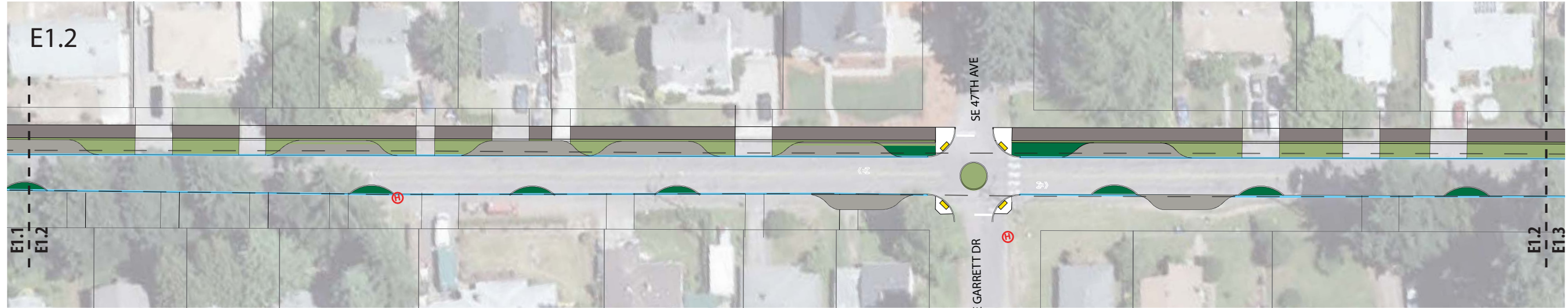
features. New curbs are especially important at the intersection with Home Avenue to better define access points into the convenience store parking lot at the southeast corner and clearly delineate between public and private right-of-way. A raised crosswalk at Wichita Park enhances safe access to the park from the pedestrian path on the north side of the street.

The Monroe Street right-of-way is 40 feet wide through most of this section. The concept design does not require any property acquisition for the new pedestrian path; however, several private properties have fences, gardens or other fixtures that may be impacted by path construction. All proposed concept design elements are within the public right of way.

Several improvements are shown for the Linwood Avenue intersection. A large curb extension with bioretention features is located on the southwest corner to decrease the curb radius and encourage slower turning. This also reduces the length of the crosswalk across Linwood Avenue. A median diverter and refuge island allows for right-in/right-out motor vehicle access onto Monroe Street while preventing through travel across Linwood, except for bicycles and pedestrians. Motorists are prevented from turning left onto Linwood Avenue, to discourage cut-through traffic from using Monroe to access the Linwood/King intersection. Left turns would be prohibited from Linwood Avenue to Monroe Street in either direction. The refuge islands, along with improved crosswalks, curb extensions, and a pedestrian-activated hybrid beacon, will greatly improve crossing safety at this intersection.

<sup>1</sup> Speed cushions are speed bumps with wheel cutouts for emergency and other large vehicles to pass unaffected.



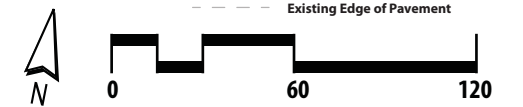




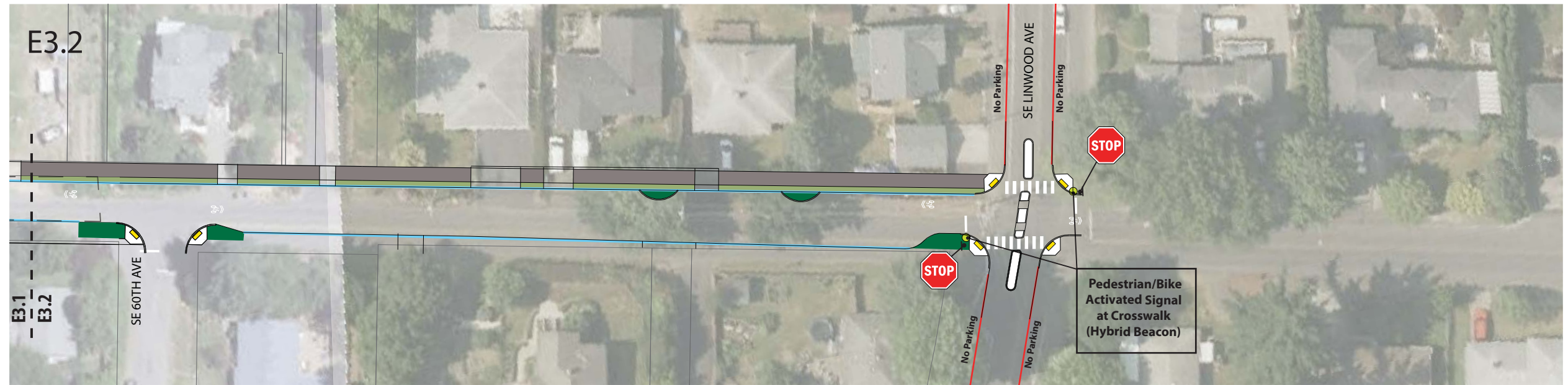


**Legend**



















- Proposed Sidewalk
- Proposed Pervious Asphalt Walk
- Proposed Pervious Pavement
- Existing Landscape
- New Landscape Strip
- Potential BioRetention Area
- Curbed Chicane
- Shared Path
- Bike Sharrow
- Existing Fire Hydrant
- ADA Ramp
- Activated Signal Sign
- New No Parking
- Existing No Parking
- New Parking
- Concrete Curb
- Flush Curb
- Existing Edge of Pavement

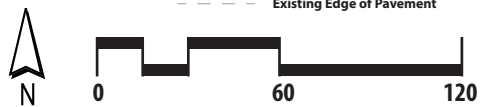






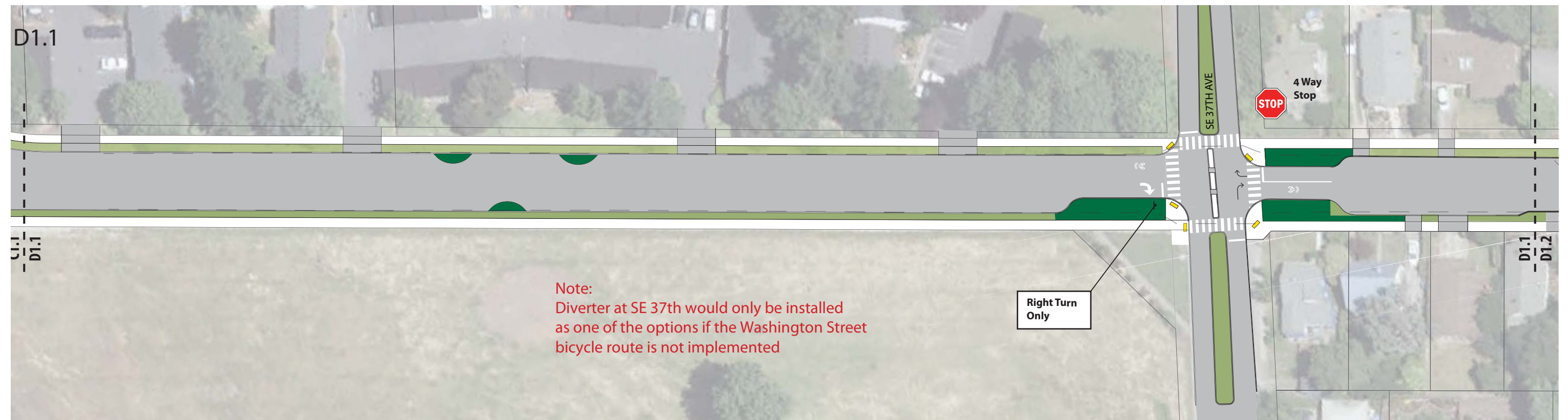
**Legend**

-  Proposed Sidewalk
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-  Existing No Parking
-  New Parking
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-  Existing Edge of Pavement





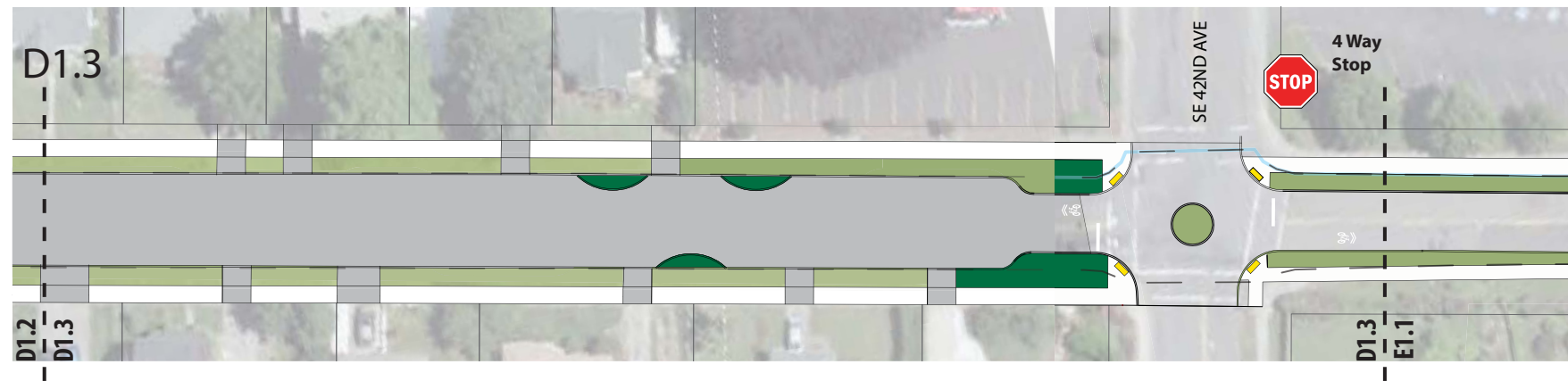
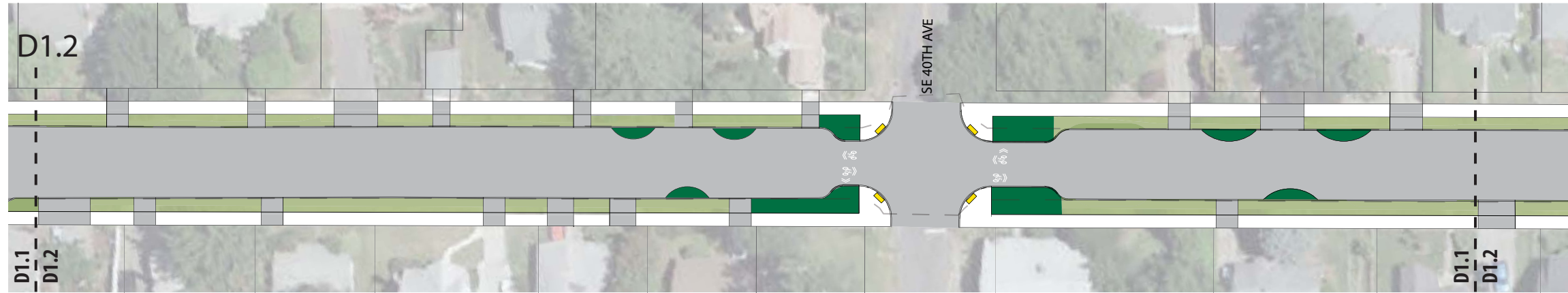
## Neighborhood Greenway Improvements on Monroe Street Only (Option #2 if McFarland site path cannot be secured)



This section of the concept design shows neighborhood greenway treatments on Monroe Street between Oak Street and 42nd Avenue, with a diverter at 37th Avenue. This is one of the three options described on Page 20 for consideration if the Washington Street bicycle route is not implemented.

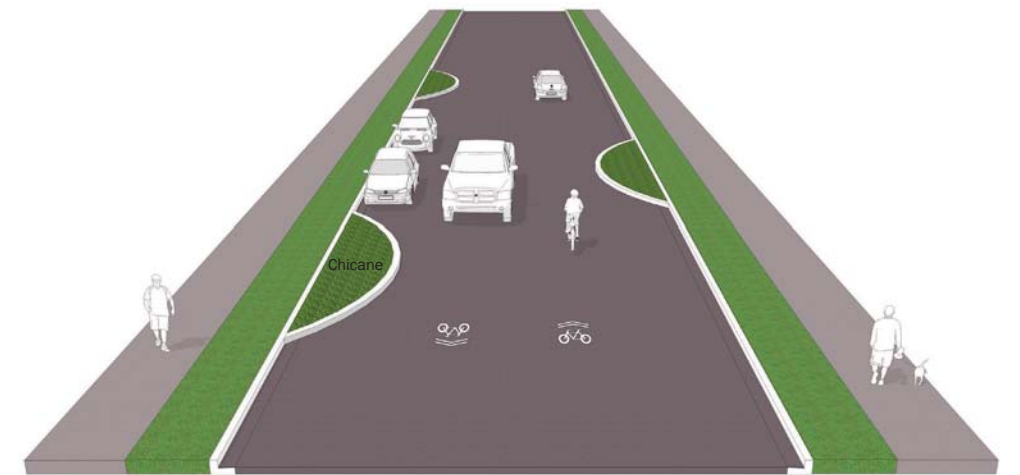
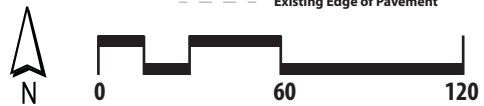
Even if the Washington Street bicycle route is put in place, the sidewalk widening and replacement (including ADA ramps) shown in the concept design for this section will be implemented as important pedestrian improvements for the neighborhood greenway project.





**Legend**

- Proposed Sidewalk
- Proposed Pervious Asphalt Walk
- Proposed Pervious Pavement
- Existing Landscape
- New Landscape Strip
- Potential BioRetention Area
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- Concrete Curb
- Existing Edge of Pavement



Concept	6' Sidewalk	4'-5' LS Buffer	38' Pavement	3' LS Buffer	6' Sidewalk
Existing	4'-5' Sidewalk	6' LS Buffer	38' Pavement	3' LS Buffer	4'-6' Sidewalk

Section D: SE Oak Street to SE 37th Avenue



## Connection To The Trolley Trail

As noted earlier in this report, the original Monroe Street Greenway proposed in the 2007 TSP begins at 21st Avenue, two blocks to the east of OR 99E and the Trolley Trail. Construction of the trail in the intervening years, however, has created a need to better connect the trail to Monroe Street. While this connection was not scoped as part of the Monroe Street Neighborhood Greenway concept design, it will be important to link the neighborhood greenway with a variety of regional connections via the Trolley Trail and future path along SE 17th Avenue.

Today, pedestrian access from the Trolley Trail to Monroe Street is relatively comfortable and straightforward – but in light of expectations for increased pedestrian and bicycle traffic on this facility, it is recommended that the existing sidewalk on the westside of 99E be upgraded in the future to multi-use path standards.

In addition, current bicycle access between the trail and Monroe Street today does not meet best practices for bicycle intersection design, and is not intuitive for less experienced riders. To improve the intersection for bicycle and pedestrian comfort and safety, the curb radius at the intersection of Monroe and OR 99E should be narrowed to reduce crossing distances and lower turning speeds. The stop bar at the east leg of the intersection could be pulled back 10 feet and a bicycle box installed, with restrictions placed on right turns on red. The western approach would benefit from new curb ramps designed specifically for bicycle traffic. This would help reduce conflicts with pedestrians at the existing entry ramps.

For signal upgrades, a leading pedestrian interval of 5 seconds would give pedestrians and bicyclists a head start through the intersection. Alternatively, bicycle signal heads could be installed in both directions, and an exclusive 10-second green phase could be given to east-west bicycle movement, while all other signals are red. Either improvement would help reduce conflicts with motorists turning at the intersection.

Finally, wayfinding signage and sharrows on the two-block stretch of Monroe through downtown would create a stronger connection between the trolley trail and the neighborhood greenway.



*Trolley Trail*



*Riverfront Park and Trolley Trail*



## SUMMARY OF TRAFFIC IMPACTS

Early in 2015, the project team completed a traffic impact analysis to evaluate the effects of the concept design on the surrounding roadway network. The study was designed to better understand the impacts of four proposed partial closure diverters. The analysis looked at several scenarios for a diverter at 37th Avenue and for a diverter at 42nd Avenue. Impacts were analyzed for 2015 (where appropriate) and for the 2035 forecast year. Complete results of the traffic impact analysis are attached as Appendix B.

### Summary of Impacts to OR 224

In general, the traffic impact analysis showed that the Monroe Street Neighborhood Greenway concept design would not result in significant adverse impact on the state highway system. In particular, traffic diversion installed at the OR 224/Monroe Street intersection is not expected to cause additional congestion over what is already expected at the nearby Oak Street and Harrison Street intersections for the year 2035. This is due to the overall lack of demand at the Monroe Street intersection. In fact, the project would improve operational efficiency on OR 224 by reducing the number of access points and increasing green signal time for mainline traffic. The additional components of the concept plan, including the other proposed diversion locations, would not impact traffic on OR 224.

### Summary of Impacts to the Local Roadway Network

With respect to the local street network, analysis showed that most traffic impacts on the local roadway network will likely be observed on Harrison Street/ King Road, which is the parallel arterial route 2-4 blocks north of Monroe Street. This roadway already experiences daily peak hour congestion, and is slated for improvements in the TSP. Traffic conditions at the all-way stop intersection at Harrison Street and 42nd Avenue are expected to worsen by 2035 whether or not the Monroe Street Neighborhood Greenway project is implemented, leading to greater congestion and longer queuing times. Both alignments would impact that intersection, with a diverter at 37th Avenue showing a greater impact than one at 42nd Avenue.

The concept design is not anticipated to cause a major increase in traffic on north-south streets such as Home Avenue, Stanley Avenue and Linwood Avenue, although both the Monroe-only alignment and the Washington Street bicycle route are likely to result in a slight increase in volume on neighborhood streets such as Jackson Street as local traffic bypasses diversion at 37th Avenue or 42nd Avenue to reach destinations on Monroe Street. However, the analysis shows most through traffic using Harrison Street or Railroad Avenue based on the higher capacity and direct nature of those routes.

As a result of the traffic analysis (in addition to community and PAC feedback), the project team recommends implementation of the Washington Street bicycle route, with diversion at 42nd Avenue instead of 37th Avenue, to minimize impacts to the local system. Among other traffic system modernization improvements, a new signal should be installed at the Harrison Street/42nd Avenue intersection, as proposed in the Milwaukie TSP, to solve long-standing delay, queuing and safety issues. Improvements will also need to be made to the intersection and signal at King Road and Linwood Avenue. Whether diversion is implemented at 37th or 42nd, the analysis shows that the diverter at Linwood Avenue is important to keep cut-through traffic from returning back to Monroe Street to access Linwood and points further east. Without the Linwood diverter, Stanley and Home could see traffic increases as drivers seeking to cross Linwood weave through the neighborhood to return to Monroe east of 42nd.

In addition to traffic impact analysis recommendations, further study and coordination with ODOT Rail is recommended for potential signalization at the Oak Street/Monroe Street/Railroad Avenue intersection and the nearby Oak Street/Campbell Street intersection. Due to the location of the nearby rail crossing, installing coordinated signals would improve crossing safety for bicycles and pedestrians and likely minimize the risk of vehicles at either intersection queuing over the tracks, compared to all-way stop control at the T-intersection.



# COST ESTIMATES AND POTENTIAL FUNDING SOURCES

## Concept-level Cost Estimates

Planning level costs for implementing the Monroe Street Neighborhood Greenway Concept Design are described in the table on this page. Total estimated costs include a 30% contingency to account for project unknowns at this early stage of design.

## Possible Funding Sources

A range of potential funding sources are available for implementation of the Monroe Street Neighborhood Greenway Concept Plan project. Greenway components range from relatively inexpensive treatments (paint and signage) to much larger investments such as sidewalk improvements, new or upgraded traffic signals, and a permeable-pavement, landscaped walking path. The approach to project implementation and funding should be strategic and opportunistic, matching specific project elements to appropriate funding sources, including (but not necessarily limited to) the following:

### 2015-2018 STIP Enhance

ODOT's Statewide Transportation Enhancement Improvement Program (STIP) Enhance program funds projects that enhance, expand or improve the transportation system. State and local agencies can apply to this competitive funding process for projects that are both on and off the ODOT highway system. The Oregon Transportation Commission selects projects based on local Area Commission on Transportation (ACT) recommendations.

### Connect Oregon V

This statewide source of funding for bicycle and pedestrian projects is a lottery-funded initiative that ODOT uses to provide grants and loans for air, rail, marine, transit, bicycle and pedestrian infrastructure. Funding is allocated based on a competitive application process.

### ODOT Quick Fix Program

This ODOT-administered program could be an appropriate funding source for crossing safety improvements and signal upgrades at the OR 224/Monroe Street intersection.

### ODOT ADA Funds

Beginning in 2015, the ODOT Highway Division has funding available to improve missing or substandard ADA facilities on or adjacent to ODOT-owned roadways. This could potentially fund an upgrade of ADA ramps and crossing improvements at the OR 224/Monroe Street intersection.

### Metro MTIP/Regional Flexible Funds

Metro allocates federal Regional Flexible Funds through the Metropolitan Transportation Improvement Program (MTIP) on a four-year cycle. Funding is allocated to projects throughout the Portland Metro Region via a competitive application process.

### Local funding sources

A variety of Milwaukie-specific funding sources could support components of the Monroe Street Neighborhood Greenway, including the following:

- **City allocation of the Oregon statewide gas tax** (1% is dedicated by state law to bicycle and pedestrian improvements)
- **Developer-dedicated right-of-way** (specific to the multi-use path through the McFarland site required for the Washington Street Alternative)
- **City stormwater treatment funds** (for "green" features including chicanes, curb extensions and the landscaped, permeable-pavement walking path)
- **The City of Milwaukie's Street Surface Maintenance Program** (SSMP) was formed in 2006 with a focus on resurfacing City streets. The program is currently restricted to street maintenance and cannot be used to build new infrastructure. The City could expand the SSMP to include construction of pedestrian and bicycle infrastructure.

## Order of Magnitude Estimate

### City of Milwaukie Monroe Street Neighborhood Greenway

NO.	ITEM	UNIT	LENGTH	COST PER MILE	COST
1	Section A - SE 21st Ave to OR 224	Mi.	0.40	\$1,571,000.00	\$628,400
2	Section B - OR 224 to SE Campbell St	Mi.	0.1	\$3,965,285.71	\$555,140
3	Section C - SE Campbell St to SE Oak St	Mi.	0.1	\$4,826,923.08	\$627,500
4	Washington St Bike Route (SE Oak to Home)	Mi.	1.7	\$373,274.85	\$638,300
5	Section E - SE 42nd Ave to SE Linwood Ave	Mi.	1	\$1,666,520.00	\$1,666,520
<b>SUBTOTAL</b>					\$4,115,860

ADDITIONAL COST	SUGGESTED	PERCENTAGE	COST
Construction Surveying	1.0-2.5%	2.5%	\$102,897
Temporary Traffic Control	3.0-8.0%	3.0%	\$123,476
Mobilization	8.0-10.0%	10.0%	\$411,586
Erosion Control	0.5-2.0%	2.0%	\$82,317
Contingency	30-40%	30.0%	\$1,234,758
Escalation (per year)	0.5-2.0%	0.0%	\$0
Construction Year	Unknown		
<b>TOTAL CONSTRUCTION COST (2015 Dollars)</b>			\$6,476,740

RIGHT OF WAY COST	UNIT	QUANTITY	UNIT COST	COST
New Right of Way Acquisition	SQ FT	0		\$0
Structure(s)	Lump Sum	All		\$0
ENGINEERING COSTS	SUGGESTED	PERCENTAGE	UNIT COST	COST
Design Engineering	15.0%	15.0%		\$910,634
Construction Engineering	10.0%	10.0%		\$607,089
City Costs (Permitting, Public Involvement, Management)	7.0%	7.0%		\$424,963
<b>TOTAL ESTIMATED PROJECT COST</b>				\$8,013, 579

### Section D of Monroe-only route (in lieu of Washington Street bicycle route)

ITEM	UNIT	LENGTH	COST PER MILE	COST
Section D - SE Oak St to SE 42nd Ave	Mi.	0.4	\$2,924,000.00	\$1,169,600
<b>SUBTOTAL</b>				\$1,169,600

Note: costs do not include a connection to the Trolley Trail, which is an important element of the overall system

# IMPLEMENTATION AND PHASING

The Monroe Street Greenway Concept Plan is the first step toward creating a quiet, safe neighborhood street environment for neighbors, kids, pedestrians and bicyclists. But more than a plan is needed to make change happen. The purpose of an implementation strategy is to define the specific actions required to create Milwaukee's first neighborhood greenway. Successful implementation will involve several key components:

## Committed Ongoing City Leadership

To become a reality, the Monroe Street Neighborhood Greenway will need ongoing, committed leaders who see the plan through. These leaders include City Council, City staff, PAC members and community volunteers.

## Future Design Refinement

Prior to implementation and construction, the City of Milwaukee will conduct survey and final engineering to develop specific features in greater detail, including exact location and dimensions of individual project elements. Elements requiring additional engineering include chicanes, traffic circles, curb extensions and stormwater treatment. This work could be done for the project as a whole, or on a case-by-case basis for individual or multiple project elements.

## Phasing and Test Pilots

Table A shows an approach to phasing project components. Improvements are grouped into 1-3 year, 4-6 year and 7-10 year categories, and roughly prioritized within those categories. This is not intended to be a hard-and-fast approach to phasing - rather, it represents the project team's and PAC's best judgment about the approximate order in which project elements should be pursued and built.

As is evident in the table, the walking path in the eastern section of the project rose to the top of the priority list, followed by the shared use path across the McFarland site to provide bicycle access to the Washington Street bicycle route. Diverters and intersection improvements at Linwood, 42nd and OR 224 are also high-priority features that will have an immediate impact on traffic speeds and volumes along Monroe.

Throughout the project, there has been a difference of opinion about diversion on Monroe Street. Some residents eagerly anticipate the

change to a quieter street, while others worry that inconveniences will outweigh benefits. For this reason, it may be desirable to install temporary rather than permanent diverters at 42nd and at Linwood. These could be implemented with paint, signage, planters and "candlestick wands." Temporary installation would enable city staff to monitor traffic impacts and survey community response over a 12-month test period.

Table B on page 32 shows the same project components, organized by project section instead of by priority.

As noted in the preceding Costs section, the approach to project implementation will be opportunistic, as there is no one single source of funding likely to support the entire project. The prioritization reflected in these tables is intended to be a guide, but not to limit or preclude funding opportunities even if they arise out of sequence.

**TABLE A: Monroe Street Neighborhood Greenway Recommended Implementation Program - Prioritized by Improvement**

	Action	Section	Timing	Estimated Cost	Notes
<b>Phase 1 (0-3 Years)</b>	North side walking path with porous pavement, parking and landscaping	Section E 42nd to Linwood	0-3 years	\$485k	There is no safe place for pedestrians to walk in the eastern section of Monroe - and both the PAC and the public have repeatedly identified this as a high priority
	Shared-use path through McFarland site - Monroe/Oak/Railroad to 37th (Washington Street Bicycle Route)	Section D Railroad/Oak to 42nd	0-3 years	\$85K	Success of the Washington Street Bicycle Route hinges on this path, so it is a critical early element of the project
	Median diverter and refuge islands (Monroe @ Linwood)	Section E 42nd to Linwood	0-3 years	\$25k	This is a pivotal element of the entire Monroe Street Neighborhood Greenway project, as it discourages cut-through traffic and sets the conditions in place to create a lower speed - and especially a lower volume - street
	Hybrid beacon, new crosswalks, curb extensions, signage (Monroe @ Linwood)	Section E 42nd to Linwood	0-3 years	\$260k	The Linwood intersection is difficult and dangerous for all modes, and has been identified by the PAC and the public as one of the project's highest priorities for improvement
	Median diverter (Monroe @ 42nd)	Section D Railroad/Oak to 42nd	0-3 years	\$25k	This is a pivotal element of Monroe Street Neighborhood Greenway project, as it protects the section east of 42nd from cut-through traffic and sets the conditions in place to create a lower speed, especially a lower volume street
	Diverter, semi-diverter and median refuge islands @ OR 224	Section B OR 224 to Campbell	0-3 years	\$40k	This is a pivotal element of the entire Monroe Street Neighborhood Greenway project, as it discourages cut-through traffic and sets the conditions in place to create a lower speed - and especially a lower volume - street
	Curb Extensions	Section B OR 224 to Campbell	0-3 years	\$235k	These will improve safety and visibility for all modes, as well as treating stormwater, at OR 224, Penzance and Campbell
	Eliminate centerline (except between Oak and 42nd if Washington Street Bicycle Route is implemented)	Corridor-Wide	Opportunistic as sections are implemented	\$10k	This can happen immediately in sections A and B. Other sections should receive at least some treatment to reduce speed and volume before the centerline is removed
	Sharrows	Corridor-Wide	0-3 years	\$15k	Can be installed immediately once diverters are in place; low-cost element to establish greenway
	Speed cushions - curve at 52nd Avenue	Section E 42nd to Linwood	0-3 years	\$15k	These are a key element of speed control at 52nd Avenue, where visibility is poor. They are low-cost and easy to implement
Flashing beacon @ Washington/37th	Section D Railroad/Oak to 42nd	0-3 years	\$150k	This is important for bicyclists to cross 37th Avenue safely from the McFarland site path onto Washington Street	



	Action	Section	Timing	Estimated Cost	Notes
<b>Phase 1 (0-3 Years)</b>	ADA curb ramps	Corridor-Wide	0-3 years	\$235k	Will need to decide whether to pursue funding for multiple or all curb ramps at one time, or install opportunistically as project elements are built
	Signal improvements, crosswalks, signage (Oak @ Campbell)	Section C Campbell to Railroad/Oak	0-3 years	\$150k	This is a key element of improving the safety of the UPRR crossing for both bicyclists and pedestrians – and establishing Monroe Street as a continuous multimodal east/west connection
	On-street greenway treatment on Monroe from Oak/ Railroad to 42nd (Monroe Greenway route if no Washington Street Bicycle Route)	Section D Railroad/Oak to 42nd	0-3 years	\$440k	If a path through the McFarland site is not feasible, greenway treatments would still be needed on Monroe. If the path is built, the diverter at 37th is not needed, since safe and attractive bicycle access would be provided on Washington
	Consider changing Monroe Street classification and lowering posted speed limit	Corridor-Wide	Immediate	N/A	Change in classification will likely depend on level to which volumes can be reduced
<b>Phase 2 (4-6 Years)</b>	Curb extensions with stormwater treatment in Section E	Section E 42nd to Linwood	4-6 years	\$400k	These help treat stormwater and improve pedestrian visibility at intersections throughout Section E
	Widen/improve sidewalks on south side of Campbell	Section C Campbell to Railroad/Oak	4-6 years	\$30k	Pedestrian conditions in this area are fairly safe, but inadequate (3 feet wide with no ADA treatment). This is an important element of improving the UPRR crossing, but not as time-critical as some other features
	Sidewalk on north side of Campbell (Monroe/Campbell to Oak/Campbell)	Section C Campbell to Railroad/Oak	4-6 years	\$55k	Pedestrian conditions in this area are fairly safe, though not attractive. This is an important element of improving the UPRR crossing, but not as time-critical as some other features
	Shared-use path on Oak (1-way or 2-way) (@ UPRR Crossing)	Section C Campbell to Railroad/Oak	4-6 years	\$15k	Pedestrian conditions in this area are fairly safe, though not attractive. This is an important element of improving the UPRR crossing, but not as time-critical as some other features
	Bicycle detection/actuation (Monroe @ OR 224)	Section B OR 224 to Campbell	4-6 years	\$110k	This is an important bicycle improvement, but can be installed once the crossing improvements are in place and more bicyclists are using the crossing
	Chicanes with stormwater treatment	Section E 42nd to Linwood	4-6 years	\$300k	These will help lower speeds between 42nd and Linwood on Monroe. While the diverter at 42nd is even more important, stormwater management is an important issue in this section
	Widen/improve sidewalks	Section B OR 224 to Campbell	4-6 years	\$125k	Pedestrian conditions in this section are safe, but not attractive. This could be deferred if other items are prioritized
	Widen/improve sidewalks in Section A	Section A 21st to OR 224	4-6 years	\$300k	While sidewalks do exist in this section, they are narrow and in poor condition. But this item could be deferred if other improvements are prioritized
	Widen/improve sidewalks	Section D Oak to 42nd	4-6 years	\$390k	Pedestrian conditions in this section are safe, but not attractive. This could be deferred if other items are prioritized
	Wayfinding signage	Corridor-Wide	4-6 years	\$10k	Should be coordinated with key early greenway improvements (i.e. diverters and McFarland site path) to ensure safe and accurate guidance
	Curb extensions with stormwater treatment in Section A	Section A 21st to OR 224	4-6 years	\$185k	These are important greenway elements that improve pedestrian conditions, and could be prioritized higher if there is a desire for pedestrian-specific/stormwater treatments in this section
	Washington Street bicycle improvements – signage, markings, stop signs	Washington Street	4-6 years	\$5k	Improvements to make Washington Street function more effectively as a bicycle route
	Pedestrian Improvements on Monroe (in addition to Washington Bicycle Route)	Section D Oak to 42nd	4-6 years	\$390k	Pedestrian conditions in this area are fairly safe, but inadequate
Traffic signal @Oak/Monroe/Railroad (critical if McFarland path does not happen)	Section C Campbell to Railroad/Oak	4-6 years	\$250k	This is an important bicycle safety element of the Monroe-only route (if the Washington Street Bicycle Route is not implemented)	
<b>Phase 3 (7-10 Years)</b>	Traffic islands in Section E	Section E 42nd to Linwood	7-10 years	\$80k	These will help lower speeds between 42nd and Linwood on Monroe, and offer needed stormwater treatment
	Widen/improve sidewalks in Section E	Section E 42nd to Linwood	7-10 years	\$80k	While sidewalks do exist in this section, they are narrow.
	Chicanes with stormwater treatment in Section A	Section A 21st to OR 224	7-10 years	\$130k	This is one of the lower-speed, lower-volume sections so chicanes, while desirable, are not as critical to create a shared travel environment
	Traffic islands in Section B	Section B OR 224 to Campbell	7-10 years	\$20k	This is one of the lower-speed, lower-volume sections so traffic islands, while important, are not as critical to create a shared travel environment
	Chicanes with stormwater treatment in Section B	Section B OR 224 to Campbell	7-10 years	\$10k	This is one of the lower-speed, lower-volume sections so chicanes, while desirable, are not as critical to create a shared travel environment

**TABLE B: Monroe Street Neighborhood Greenway Recommended Implementation Program - by Section**

	Action	Timing	Estimated Cost
<b>Corridor-Wide</b>	Sharrows	0-3 years	\$15k
	Wayfinding signage	4-6 years	\$10k
	Eliminate centerline (except between Oak and 42nd if Washington Street Bicycle Route is implemented)	Opportunistic as sections are implemented	\$10k
	ADA curb ramps	0-3 years	\$235k
	Consider changing Monroe Street classification and lowering posted speed limit	Immediate	N/A
<b>Section A 21st Avenue to OR 224</b>	Chicanes with stormwater treatment	7-10 years	\$130k
	Widen/improve sidewalks	4-6 years	\$300k
	Curb extensions with stormwater treatment	4-6 years	\$185k
<b>Section B OR 224 to Monroe/ Campbell Street</b>	Diverter, semi-diverter and median refuge islands @ OR 224)	0-3 years	\$40k
	Curb Extensions	0-3 years	\$235k
	Bicycle detection/actuation (Monroe @ OR 224)	4-6 years	\$110k
	Widen/improve sidewalks	4-6 years	\$125k
	Traffic islands	7-10 years	\$20k
	Chicanes with stormwater treatment	7-10 years	\$10k
<b>Section C Monroe/Campbell Street to Railroad Avenue/Oak Street</b>	Sidewalk on north side of Campbell (Monroe/Campbell to Oak/Campbell)	4-6 years	\$55k
	Shared-use path on Oak (1-way or 2-way) (@ UPRR Crossing)	4-6 years	\$15k
	Signal improvements, crosswalks, signage (Oak @ Campbell)	0-3 years	\$150k
	Widen/improve sidewalks on south side of Campbell	4-6 years	\$30k
	Traffic signal @Oak/Monroe/Railroad (critical if McFarland path does not happen)	4-6 years	\$250k
<b>Section D Railroad Avenue/Oak Street to 42nd Avenue</b>	Shared-use path through McFarland site - Monroe/Oak/Railroad to 37th (Washington Street Bicycle Route)	0-3 years	\$85
	On-street greenway treatment on Monroe from Oak/Railroad to 42nd (Monroe Greenway route - if no Washington Street Bicycle Route)	0-3 years	\$440k
	Median diverter (Monroe @ 42nd)	0-3 years	\$25k
	Flashing beacon @ Washington/37th	0-3 years	\$150k
	Washington Street bicycle improvements - signage, markings, stop signs	4-6 years	\$5K
	Pedestrian Improvements on Monroe (in addition to Washington Street Bicycle Route)	4-6 years	\$390k
<b>Section E 42nd Avenue to Linwood Avenue</b>	North side walking path with porous pavement, parking and landscaping	0-3 years	\$485k
	Traffic islands	7-10 years	\$80k
	Curb Extensions	4-6 years	\$400k
	Widen/improve sidewalks	4-6 years	\$80k
	Chicanes with stormwater treatment	7-10 years	\$300k
	Speed cushions - curve at 52nd Avenue	0-3 years	\$15k
	Hybrid beacon, new crosswalks, curb extensions, signage (Monroe @ Linwood)	0-3 years	\$260k
	Median diverter and refuge islands (Monroe @ Linwood)	0-3 years	\$25



## APPENDICES

Appendix A - Needs, Opportunities and Constraints memo

Appendix B - Traffic Analysis Memo

Appendix C - Evaluation Matrix

Appendix D - Future ODOT Coordination Needs

Appendix E - Plan Development—Public Comment Summary