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MEMORANDUM

Date: March 6, 2019 Project #: 21418

To: Glen Bolen, Otak

From: Nick Gross and Susan Wright, PE

Project: Keizer Revitalization Plan

Subject: Multimodal Transportation Assessment

MULTIMODAL TRANSPORTATION ASSESSMENT

A multimodal transportation assessment was conducted for the year 2040 based on existing and currently planned facilities identified in the City's 2014 Transportation System Plan (TSP). The purpose of the multimodal transportation assessment is to identify segments of River Road as well as parallel, alternative routes that could be enhanced to create a low stress, more comfortable, north-south parallel connection(s) to River Road; most notably for bicyclists. A Qualitative Multimodal Assessment was conducted per the Oregon Department of Transportation (ODOT) Analysis Procedures Manual (APM) for pedestrian, bicycle, and transit facilities along River Road. A detailed Bicycle Level of Traffic Stress (BLTS) analysis was conducted along River Road as well as the adjacent existing and currently planned bicycle facilities identified in the 2014 TSP to identify parallel, alternative routes for bicyclists.

Qualitative Multimodal Assessment

The ODOT APM provides a methodology for evaluating bicycle, pedestrian, and transit facilities within urban and rural environments called Qualitative Multimodal Assessment (QMA). As applied by ODOT, this methodology uses four types context-based subjective ratings of *Excellent, Good, Fair, and Poor.* The QMA is based on outside travel lane width, bicycle lane/shoulder width, presence of buffers (landscaped or other), sidewalk/path presence, lighting, travel lanes and speed of motorized traffic.

The qualitative multimodal assessment was conducted for River Road and separated into two segments based on the varying character and facilities provided. These segments include:

- Segment 1: River Road – Northern Study Area Limits to Chemawa Road
- Segment 2: River Road – Chemawa Road to Southern Study Area Limits

Segment 1: River Road Northern Study Area Limits to Chemawa Road

Within Segment 1, River Road has a curb-to-curb cross section width of approximately 70-feet consisting of four 12-foot travel lanes and a 12-foot two-way center turn lane. Continuous five-foot bike lanes are provided on both sides of the roadway and are positioned on the inside of the right-turn lanes at intersection approaches where appropriate. Bike lanes are appropriately striped with bicycle stencils placed approximately 750-feet apart or at the far side of the intersection where bike lanes begin.

Sidewalks are provided on both sides of River Road and are continuous throughout Segment 1. Sidewalk conditions appear to be in fair-to-good condition and free from any impediments such as fire hydrants, utility poles, and mail boxes. Pedestrian ramps at the majority of intersections do not appear to meet American's with Disabilities Act (ADA) compliance based on ramp grades, ramp lips, and lack of tactile warning pads. Several pedestrian ramps appear to have been recently upgraded to include pedestrian push buttons, ADA compliant ramps, and tactile warning pads. These locations include:

- *River Road/Wheatland Road (western intersection corners)*
- *River Road/Lockhaven Drive*
- *River Road/Claggett Street (western intersection corners)*
- *River Road/Chemawa Road (southern intersection corners)*

Transit service in Keizer is provided by Cherriots. Along River Road, Cherriots operates Route 9: Cherry / River Road with seven stops within Segment 1 as well as Route 19: Broadway/River Road. The transit stops are located at the following intersections:

- River Road/Northrup Court
- River Road/Hidden Creek
- River Road/Manzanita Street
- River Road/Lockhaven Drive
- River Road/Keizer Creekside Shopping
- River Road/Claggett Street
- River Road/Chemawa Road

River Road/Northup Court Transit Stop

The majority of the transit stops are recognizable by a Bus Stop sign; however, in many instances, the sign lacks visibility and may be obstructed by vegetation making it difficult to find for persons unfamiliar with the Cherriots designated bus stops. No designated bus stops are provided along River Road forcing buses to pull into the bike lane; when available, to board and alight passengers from the vehicle.

Segment 2: Chemawa Road to Southern Study Area Limits

Within Segment 2, River Road has a curb-to-curb width of approximately 61-feet consisting of two 13-foot travel lanes, two 11.5-foot travel lanes, and one 12-foot two-way center turn lane. No bike lanes are provided within Segment 2. Sidewalks are provided along both sides of the roadway and are separated by landscaping stripes within certain segments. Landscaping strips can decrease the level of stress experienced by a person walking along a roadway by provided additional buffering space between the vehicular lane and sidewalk. Sidewalk conditions appear to be in fair-to-good condition and free from any impediments such as fire hydrants, utility poles, and mail boxes. Similar to Segment 1, the majority of intersection do not appear to meet ADA compliance due to the lack of tactile warning pads, non-compliant ramp grades, and ramp lips[1]. The following pedestrian ramps appear to meet ADA compliance[2]:

- *River Road/Dearborn Avenue (southwest corner)*
- *River Road/Linda Avenue*
- *River Road/Evans Avenue*
- *River Road/Maine Avenue (southeast corner)*
- *River Road/Juedes Avenue (southwest corner)*
- *River Road/Sunset Avenue (western corners)*
- *River Road/Hollyhock Place (western corners)*

Several transit stops are located within Segment 2, and are located at the following locations:

- *River Road/Dearborn Avenue*
- *River Road/Cummings Lane*
- *River Road/Manbrin Drive*
- *River Road/Sunset Avenue*
- *River Road/Homewood Court*
- *River Road/Bever Drive*
- *River Road/Apple Blossom Avenue*

The results of the qualitative multimodal analysis for Segment 1 and Segment 2 of River Road are illustrated in Table 1. A detailed analysis of bicycle facilities along River Road as well as parallel routes is included in the following section.

Table 1: River Road (Segment 1 and 2) Qualitative Multimodal Assessment

Segment	Pedestrian	Bicycle	Transit
Segment 1: River Road Northern Study Area Limits to Chemawa Road	Fair	Fair	Fair
Segment 2: Chemawa Road to Southern Study Area Limits	Fair	Poor	Fair

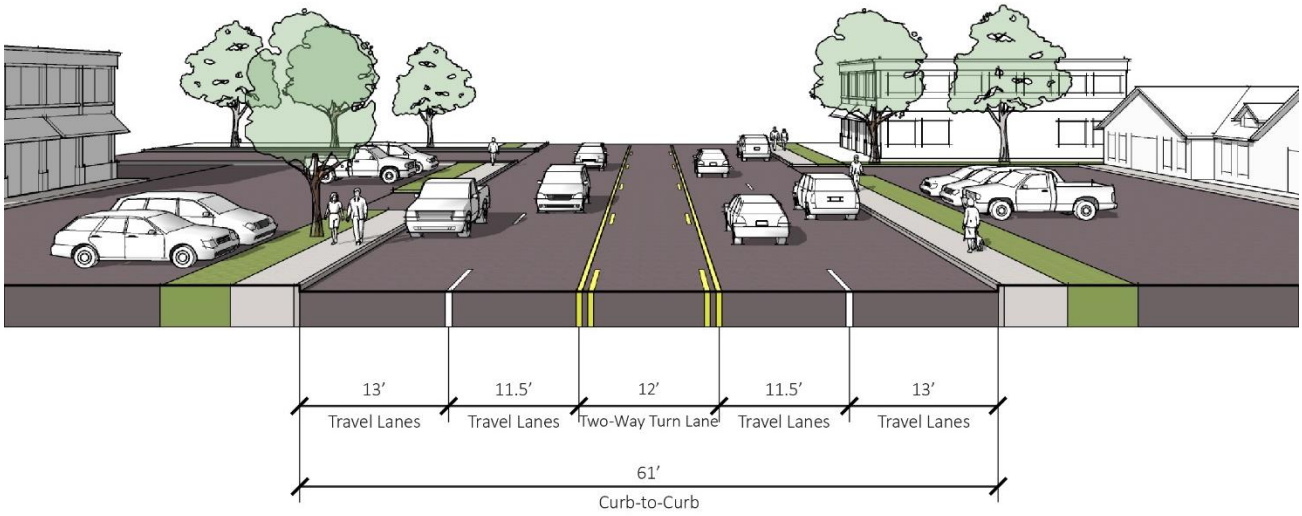
[1] An inspection should be conducted following the methodologies developed by ODOT to determine the functional condition of the existing pedestrian ramps.

[2] All pedestrian ramps on River Road south of Chemawa Road are planned to be upgraded to ensure ADA compliance in the summer of 2019.

Chemawa Road to Southern Study Area Limits – Cross Section Alternatives

As shown in Table 1, Segment 2: Chemawa Road to Southern Study Area Limits ranked "poor" for the bicycle QMA assessment. This is mainly due to the lack of bicycle facilities provided within the curb-to-curb cross section. North of Chemawa Road (Segment 1), River Road has an increased curb-to-curb width of 10-feet compared to the segment of River Road south of Chemawa Road. The increased 10-feet allows for 5-foot bicycle lanes in both directions. In order to accommodate people biking on River Road between Chemawa Road to Southern Study Area Limits (Segment 2), several ***conceptual*** cross section alternatives were developed and are illustrated below:

Exhibit 1: Existing River Road (Chemawa Road to Southern Study Area Limits)



As described previously and as illustrated in Exhibit 1, the existing curb-to-curb cross section width of River Road is approximately 61-feet consisting of two 13-foot travel lanes, two 11.5-foot travel lanes and one 12-foot two-way center turn lane.

Exhibit 2: River Road On-Street Bike Lanes (Chemawa Road to Southern Study Area Limits)

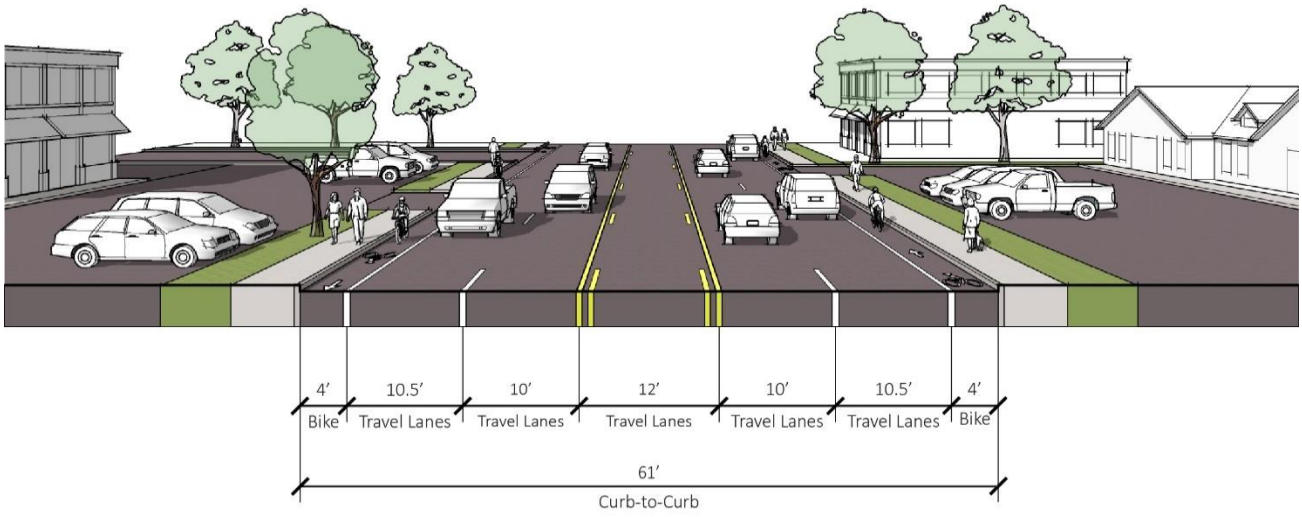


Exhibit 2 illustrates an alternative which provides on street bicycle lanes without moving the curb(s). This alternative requires the outside travel lanes to be reduced from 13-feet to approximately 10.5-feet and the inside travel lanes from 11.5 feet to approximately 10-feet while maintaining a 12-foot two-way center turn lane with four-foot bike lanes. Although this alternative accommodates bicyclists on-street, it is not preferred based on the level of traffic stress (described in detail in the following section). The city's Transportation System Plan (TSP) states, "standard bike lane widths are six feet; although five feet may be approved on a case by case basis." Providing bike lanes less than five-feet is not suitable for the majority of users and therefore, may not be utilized to their full extent possible.

Exhibit 3: River Road Multi-Use Path (Chemawa Road to Southern Study Area Limits)

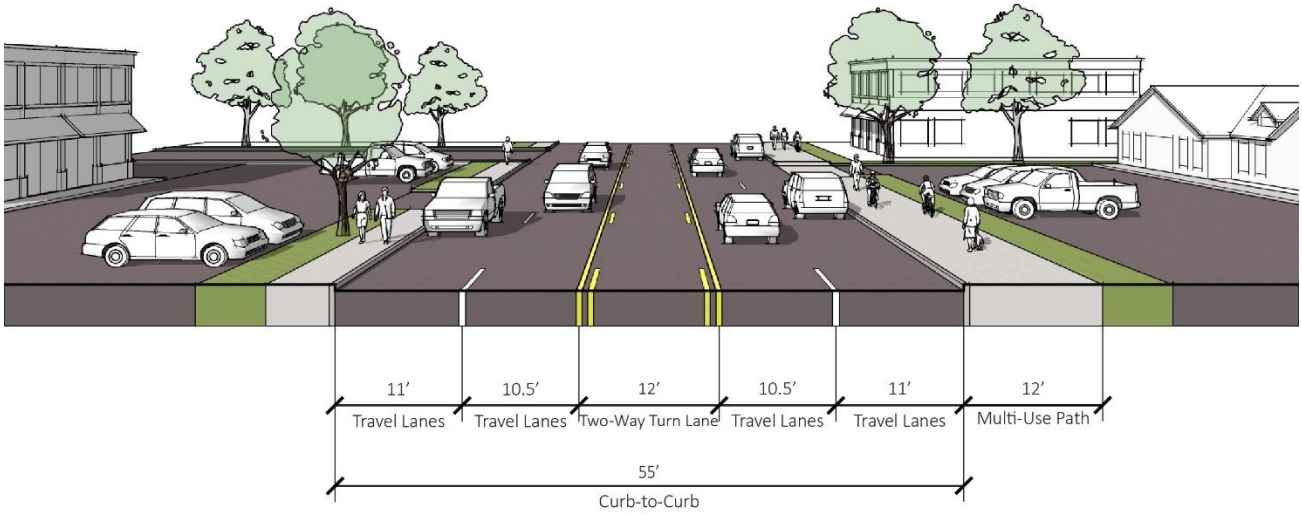


Exhibit 3 illustrates an alternative that provides a physically separated multi-use path on the east side of the River Road. This alternative requires the outside vehicular lanes to be reduced from 13-feet to approximately 11-feet and the inside travel lanes from 11.5-feet to approximately 10.5-feet ; however, it maintains the two-way center turn lane. The multi-use path alternative would provide sufficient separation between the travel lane and the non-motorized space to accommodate users of all skill levels, ages, and abilities.

Access Consolidation through Management

Through input received during the public involvement process, the multi-use path alternative was identified as the preferred alternative; however, a concern was raised regarding right-turning vehicles conflicting with path users at driveway access points. From an operational perspective, access management measures limit the number of redundant access points along roadways. This enhances roadway capacity, improves safety, and benefits circulation.

Exhibit 4 and Exhibit 5 illustrate how driveway consolidation, shared access, and internal driveways can reduce the number of conflict points between path users and right-turning vehicles.

Exhibit 4: Existing Driveway Access

Exhibit 5: Driveway Consolidation and Shared Access

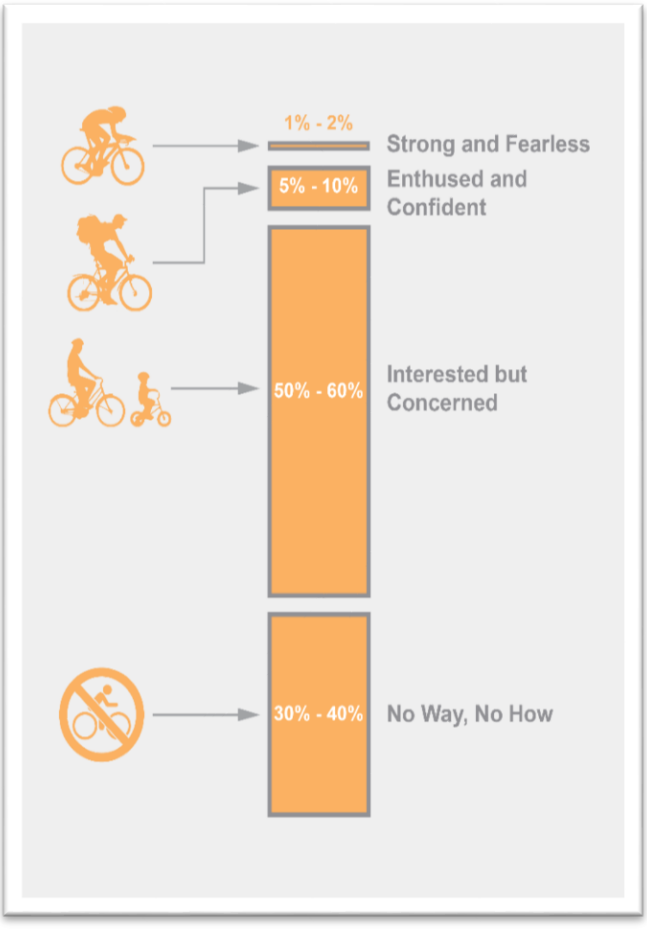
Driveway consolidation and shared access management are strategies that may be implemented in the near-term but are likely to occur over time through redevelopment. Given the near for near-term bicycle accommodations along River Road and the curb-to-curb cross section constraints, the following section of this memorandum explores opportunities to provide low-stress parallel bicycling routes to River Road. These shared lane facilities or "neighborhood greenways" require minimal infrastructure based on the low speeds and volumes of the residential streets. The objective of a neighborhood greenway is to reduce vehicular speeds, provide safer bicycling and pedestrian connections, and guide people on the route to help them get to where they are going.

Bicycle Level of Traffic Stress Analysis

The ODOT APM provides a methodology for evaluating bicycle facilities within urban and rural environments called Bicycle Level of Traffic Stress (BLTS). As applied by ODOT, this methodology classifies four levels of traffic stress that a bicyclist can experience on the roadway, ranging from BLTS 1 (little traffic stress) to BLTS 4 (high traffic stress). A road segment that is rated BLTS 1 generally has low traffic volumes and travel speeds and is suitable for all cyclists, including children. A road segment that is rated BLTS 4 generally has high traffic volumes and travel speeds and is perceived as unsafe by most adults. Per the APM, BLTS 2 is considered a reasonable target for bicycle facilities due to its acceptability with the majority of people.

The BLTS score is determined based on the speed of the roadway, the number of travel lanes per direction, the presence and width of an on-street bike lane and/or adjacent parking lane, and several other factors such as the presence of a centerline. Figure 1 illustrates the results of the BLTS analysis for River Road and the adjacent parallel routes identified in the Keizer TSP. Table 2 summarizes the detailed results of the BLTS analysis. As shown in Figure 1, there 7 segments rated BLTS 3 and 10 segments rated BLTS 4 within the adjacent parallel routes identified in the Keizer TSP.

Four Types of Bicyclists



The tendencies of the general population to choose the bicycle as a mode of transportation can be broken into four overall groups. The smallest group, "Strong and Fearless" represents people who will bicyclist in any conditions, independent from the facility present. The second group, the "Enthused and Confident" represents advance cyclists who are condition on the majority of roads but will avoid stressful corridors with high volumes and high speeds of motor vehicles when possible. The third group, the "Interested but Concerned" represents the largest portion of the population and would ride if roadway conditions were perceived to be safe; the majority of the time, this group will not choose to bicycle as a mode of transportation. The fourth group, "No Way, No How" simply will not bicycle under any circumstances. Based on the BLTS analysis, solutions will target the "Interested but Concerned" group of people to create the largest opportunity to increase bicycling as a mode of transportation in Keizer.

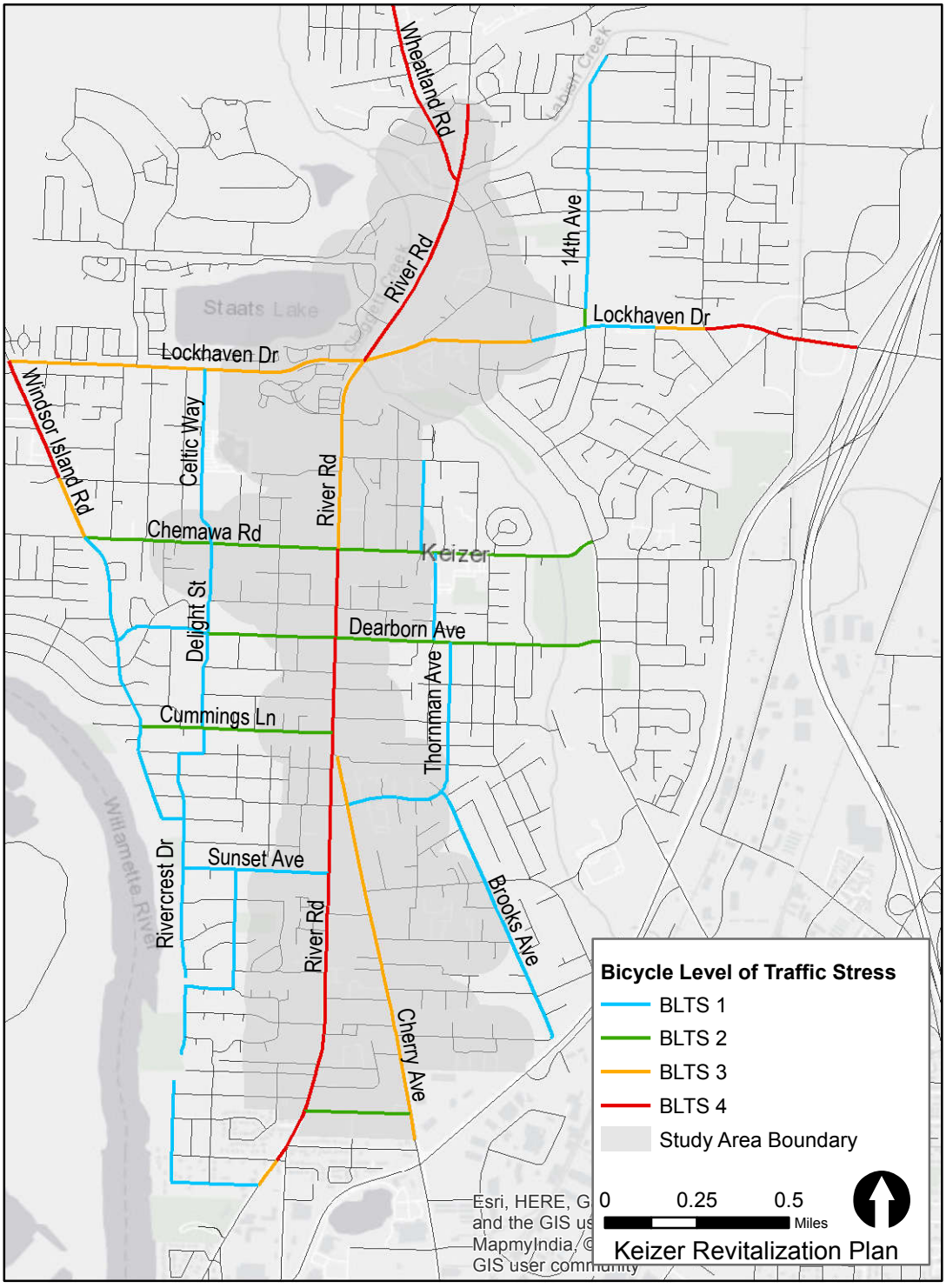

Wheatland Rd
River Rd
14th Ave
Staats Lake
Lockhaven Dr
Lockhaven Dr
Windsor Island Rd
Celtic Way
River Rd
Chemawa Rd
Keizer
Delight St
Dearborn Ave
Thornman Ave
Cummings Ln
Willamette River
Rivercrest Dr
Sunset Ave
River Rd
Brooks Ave
Cherry Ave
Bicycle Level of Traffic Stress
BLTS 1
BLTS 2
BLTS 3
BLTS 4
Study Area Boundary
0
0.25
0.5
Miles
Keizer Revitalization Plan

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Table 2: BLTS Analysis Results

Street	From	To	Side	Facility Type	LTS Criteria					Bicycle LTS
					Speed (MPH)	Lanes per Direction	Bike Lane Width (feet)	Parking	Frequent Blockage	
River Road										
River Road	Northern City Limits	Meadowridge Street	Both	Bike Lane	40	1	≤ 5.5'	No	No	4
	Meadowridge Street	Wheatland Road	Both	Bike Lane	40	1	5.5' – 7'	No	No	4
	Wheatland Road	Lockhaven Drive	Both	Bike Lane	40	2	5.5' – 7'	No	No	4
	Lockhaven Drive	Chemawa Road	Both	Bike Lanes	35	2	5.5' – 7'	No	No	3
	Chemawa Road	Manbrin Drive	Both	Mixed Traffic	35	2	N/A	No	No	4
	Manbrin Drive	Southern City Limits	Both	Mixed Traffic	35	2	N/A	No	No	4
Adjacent On-Street Bicycle Facilities in Identified in 2014 TSP										
Wheatland Road	Northern City Limits	Cater Drive	Both	Bike Lane	40	1	5.5' – 7'	No	No	4
	Cater Drive	Shannon Court	Both	Bike Lane	40[2]	1	5.5' – 7'	No	No	4
	Shannon Court	River Road	Both	Bike Lane	40	1	5.5' – 7'	No	No	4
Lockhaven Drive	Windsor Island Road	River Road	Both	Bike Lane	35	1	5.5' – 7'	No	No	3
	River Road	Crestwood Court	Both	Bike Lane	35	1	5.5' – 7'	No	No	3
	Crestwood Court	Klicitat Drive	Both	Bike Lane	20	1	5.5' – 7'	No	No	1
	Klicitat Drive	McLeod Lane	Both	Bike Lane	35	1	5.5' – 7'	No	No	3
	McLeod Lane	Eastern City Limits	Both	Bike Lane	35	2	5.5' – 7'	No	No	4
Chemawa Road	Windsor Island Road	River Road	Both	Bike Lane	30	1	≤ 5.5'	No	No	2
	River Road	Verda Lane	Both	Bike Lane	30	1	≤ 5.5'	No	No	2
Dearborn Avenue	Shoreline Drive	Delight Street	Both	Mixed Traffic[1]	20	1	N/A	No	No	1
	Delight Street	River Road	Both	Bike Lane	25	1	≤ 5.5'	No	No	2
	River Road	Verda Lane	Both	Bike Lane	25	1	≤ 5.5'	No	No	2
Cummings Lane	Shoreline Drive	River Road	Both	Bike Lane	25[2]	1	≤ 5.5'	No	No	2
Cherry Avenue	Greenwood Drive	Manbrin Drive	Both	Bike Lane	35	1	≤ 5.5'	No	No	3
	Manbrin Drive	Plymouth Drive	Both	Bike Lane	35	1	≤ 5.5'	No	No	3
Plymouth Drive	River Road	Cherry Avenue	Both	Bike Lane	25	1	≤ 5.5'	No	No	2
Clear Lake Road	Wheatland Road	River Road	Both	Mixed Traffic[1]	40	1	N/A	Yes	No	4
Oneil Road	Clear Lake Road	River Road	Both	Mixed Traffic[1]	20	1	N/A	Yes	No	1
Bair Road	Broken Top Avenue	Oneil Road	Both	Mixed Traffic[1]	20	1	N/A	Yes	No	1

Park Meadow Drive	Wheatland Road	River Road	Both	Mixed Traffic[1]	20	1	N/A	Yes	No	1
Windsor Island	Lockhaven Drive	Orchard Street	Both	Mixed Traffic	35	1	N/A	No	No	4
	Orchard Street	Chemawa Road	Both	Mixed Traffic	30	1	N/A	No	No	3
Shoreline Drive	Chemawa Road	Wayne Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Rivercrest Drive	Menlo Drive	Wayne Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
	Wayne Drive	Southern City Limits	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Adjacent On-Street Bike Route Alternatives Identified in 2014 TSP										
14th Avenue	Rock Ledge Drive	Harmony Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
	Harmony Drive	Lockhaven Drive	Both	Mixed Traffic	25	1	N/A	Yes	No	2
Celtic Way	Lockhaven Drive	Chemawa Road	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
	Chemawa Road	Cummings Lane	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Sunset Avenue	Rivercrest Drive	River Road	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
5th Avenue	Sunset Avenue	Fall Creek Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Fall Creek Drive	Rivercrest Drive	5th Avenue	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Thorman Avenue	Dearborn Avenue	Brooks Avenue	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Manbrin Drive	Cherry Avenue	Brooks Avenue	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Brooks Avenue	Thorman Avenue	Candlewood Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Delight Street	Chemawa Road	Menlo Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Menlo Drive	Delight Street	Rivercrest Drive	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
Bailey Road	Dearborn Avenue	Chemawa Road	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1
8th Avenue	Chemawa Road	Claggett Street	Both	Mixed Traffic[1]	25	1	N/A	Yes	No	1

[1] Unmarked Centerline
[2] School Zone: Posted Speed Limit is 20 mph
Shaded cells segments that do not meet the LTS 2 target.

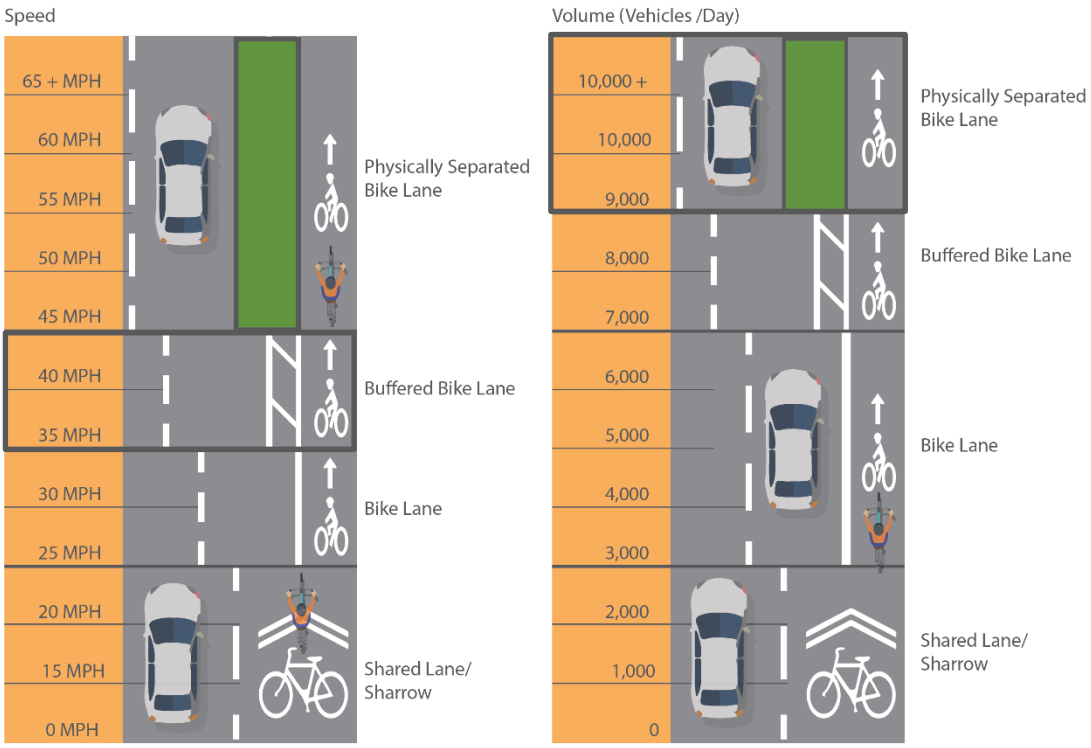
River Road Low Stress Alternatives

As illustrated in Figure 1, the entire length of River Road within the study area is rated BLTS 3 or above. This is mainly due to the lack of bicycle facilities along River Road in addition to the posted speed limit and number of travel lanes where bicycle facilities are present. The following alternatives would achieve an acceptable BLTS rating (BLTS 2) rating for River Road if implemented.

- Maintain the posted speed limit and install a ≥ 7-foot buffered bike lane in both directions along River Road
- Maintain the posted speed limit and install a physically separated multi-use path on one side of the roadway

As shown in Exhibit 3, the installation of ≥ 7-foot buffered bike lanes would require the removal of the two-way center turn lane. Based on the feasibility of this alternative and the existing functional classification standards set by the 2014 Keizer TSP for an Arterial roadway, a physically separated multiuse path facility would achieve an acceptable BLTS rating while maintaining the curb-to-curb cross section character of River Road. Exhibit 5 illustrates the bicycle facility selection appropriate to achieve an acceptable BLTS rating based on vehicular speed and volume.

Exhibit 4: Bicycle Facility Selection – Speed and Volume (Vehicles/Day)



Low Stress Parallel Bicycle Routes

Based on the existing curb-to-curb constraints as well as the functional classification set for River Road, adjacent parallel bicycle routes were identified utilizing the Keizer 2014 TSP Bicycle Route Network Projects (Figure 5.6) as the starting point. It should be noted that the most bicyclists choose trip paths that are only 10% longer than the shorter higher-stress routes. For example, a 10% target represents a half-mile of extra travel or acceptable out-of-direction travel on a five-mile trip. Given the length of River Road (four-miles) within the study area boundary, parallel routes were generally identified within 0.4 miles of River Road.

Parallel Routes West of River Road

An opportunity exists to provide a relatively direct north-south low stress parallel bicycle route via Celtic Way, Delight Street, Menlo Drive, and Rivercrest Drive. This parallel route has a rating of BLTS 1 and is suitable for bicyclists of all ages, abilities, and skillsets. The Salem-Keizer School District has jurisdiction over Celtic Way and is responsible for operations and maintenance of the corridor between Lockhaven Drive and Chemawa Road. Coordination between the City of Keizer and the Salem-Keizer School District should be conducted to ensure approval of signing and striping associated with the recommended parallel route treatments.

Parallel Routes East of River Road

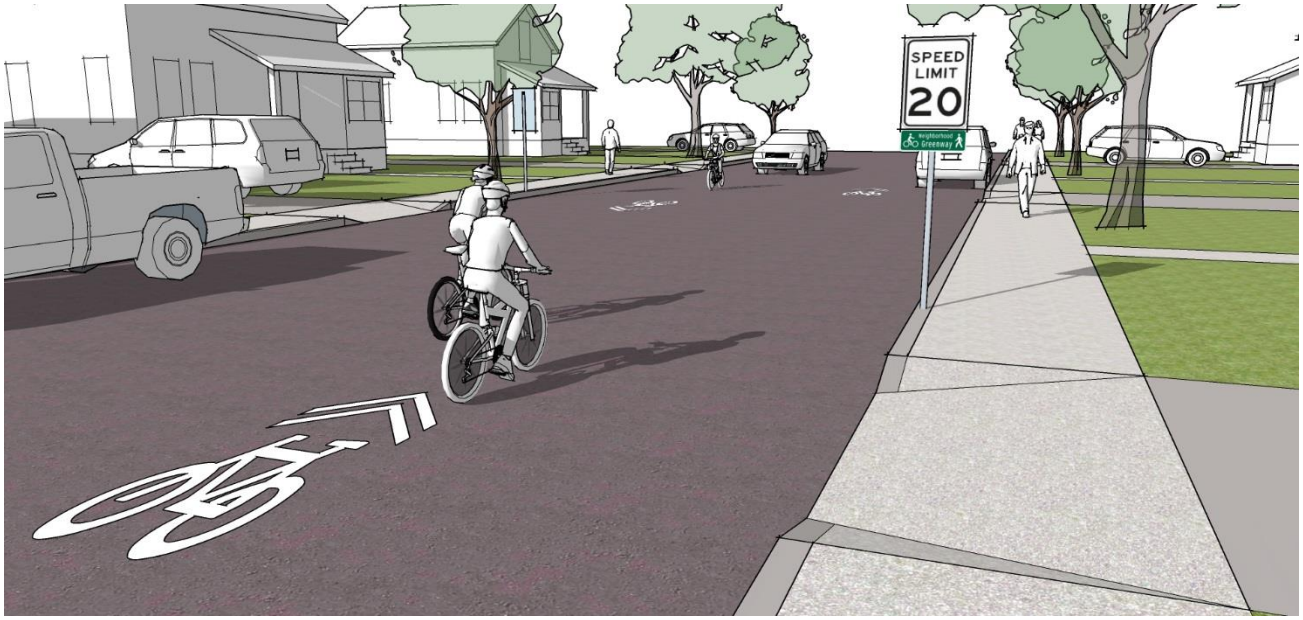
An opportunity exists to provide a parallel low stress bicycle route via Brooks Avenue, Thorman Avenue, Lawless Street, Clark Avenue, and Bailey Road. This parallel route is less direct in comparison to the parallel route west of River Road and requires two-stage turning maneuvers at Dearborn Avenue from Bailey Road to Thorman Avenue and at Chemawa Road from 8th Avenue to Bailey Road.

The following section provides guidance on traffic calming measures suitable for parallel routes, or “neighborhood greenway” facilities to help reduce vehicular speeds and neighborhood cut-through traffic while providing wayfinding signage to ensure bicyclists remain on designated low-stress parallel bicycle routes.

Neighborhood Greenway Treatments

Neighborhood greenways are residential streets designed to prioritize the movement of people walking and biking by taking advantage of the low speed and low volume vehicular traffic. Typical best practice for neighborhood greenways is a posted speed limit of 20 miles per hour (mph) or less, with an average daily average traffic (ADT) of approximately 1,000 cars; not to exceed 2,000 cars per day.

Exhibit 5 Shoreline Drive Neighborhood Greenway Concept



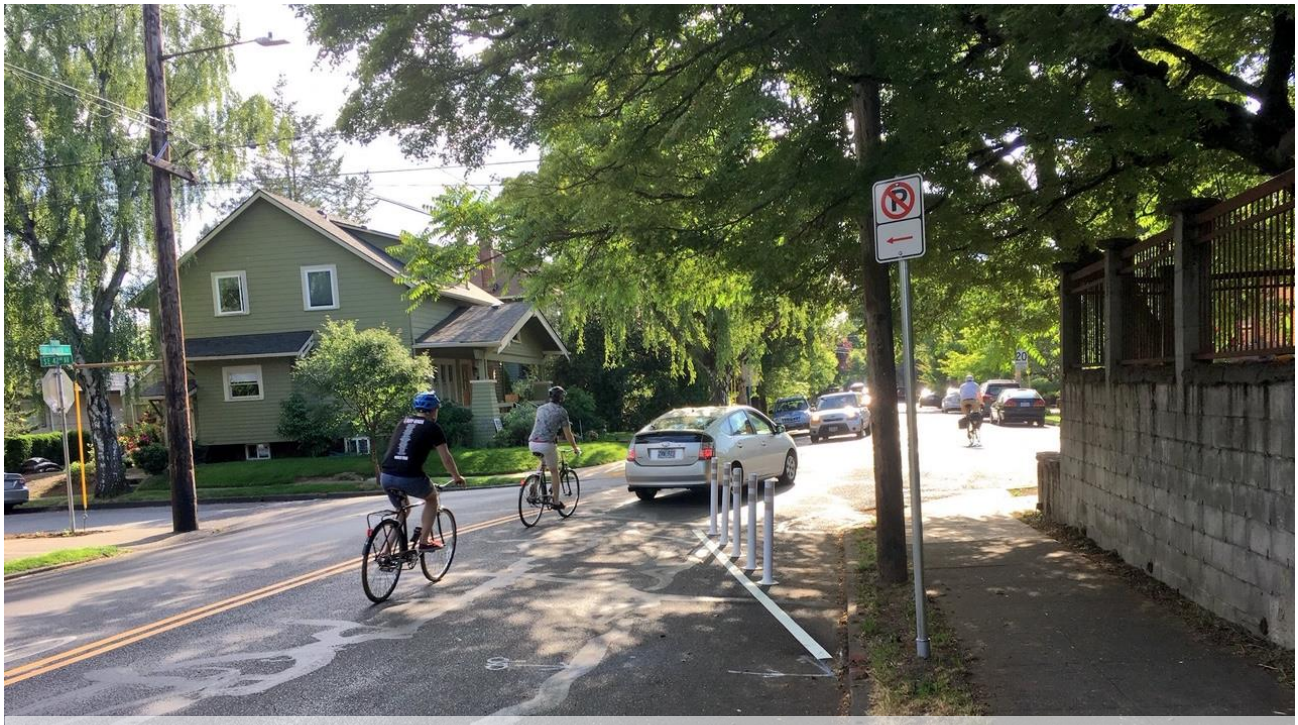
Wayfinding

City's like Portland, Eugene, and Corvallis are creating citywide networks of safe, traffic calmed streets where people on foot and on bike are given priority. These neighborhood greenways help improve the health, sustainability, and livability of cities. Neighborhood greenways are typically signed with a low posted speed limit (25 mph or less) and a neighborhood greenway sign alerting motorists and others traveling the roadway where they are. As navigation for people biking, shared lane markings or "sharrows" are striped to highlight the presence of bikes and remind everyone to share the road safely. Sharrows can also serve as wayfinding resources by angling the chevron arrows above the bicycle stencil to provide turn-by-turn navigation to remain on the neighborhood greenway.

Sharrow can serve as directional wayfinding navigation

Traffic Calming

Traffic calming features can help reduce vehicular speeds, restrict or reduce turning conflicts, and create roadway environments that are comfortable for all users and abilities. The following section provides an overview of several traffic calming features that could be implanted along the identified parallel routes west and east of River Road.



Flex-post serve as a traffic calming feature by temporarily reducing the vehicular lane width and restricting right-turn conflicts with bicyclists

Speed Humps

Speed humps are a common traffic calming treatment along many neighborhood greenways due to their ability to reduce vehicular speeds. Speed humps are typically spaced approximately 550-feet apart and striped with a chevron marking to indicate grade change for approaching vehicles. To mitigate the impacts on emergency vehicles, speed humps can provide cut-out sections to allow for emergency vehicles to navigate through the speed hump rather than over the top reducing the vehicular impact.

Traffic Diverters

Traffic diverters can reduce or restrict vehicular activity through the installation of medians and flex-posts spaced with sufficient widths to allow for a bicyclists to navigate while limiting the vehicular equivalent maneuver. Flex-posts can reduce the speed at which vehicles are able to execute turning movements while reducing speeds and calming traffic at intersection approaches.