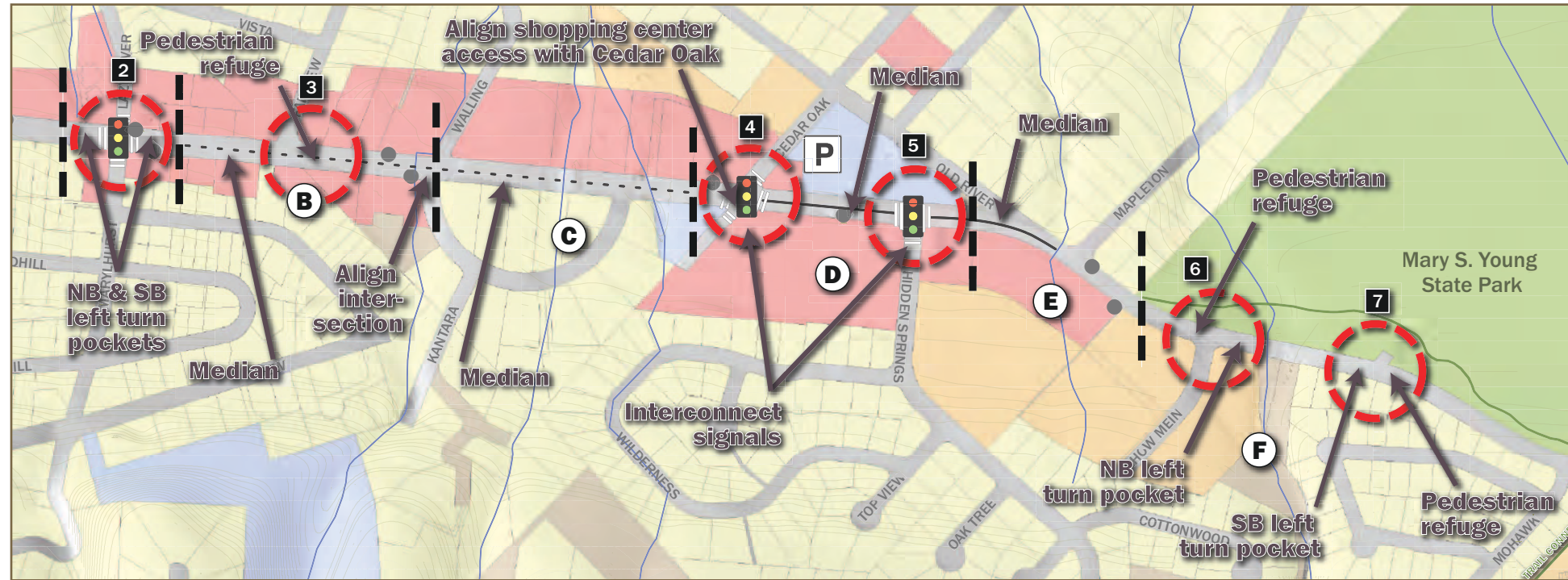


# West Linn OR 43 Conceptual Design Plan



Final Report

January 4, 2008

# ACKNOWLEDGMENTS

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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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# I. PROJECT PURPOSE AND BACKGROUND

## Project Purpose

Oregon Highway 43 (OR 43) is a high-volume, Oregon Department of Transportation (ODOT) - operated district highway which runs through the eastern edge of the City of West Linn. The highway functions as a regional commuter route, carrying a significant volume of traffic from the West Linn and Oregon City into Portland. OR 43 (locally referred to as Willamette Drive) also functions as an important local route within the West Linn. The road is classified as a Major Arterial / Principal Route within the City of West Linn's Transportation System's Plan [TSP].

Significant growth within the region and the increase in automobile traffic associated with that growth has put a strain on the roadway. The public perception within the City of West Linn is that the road's capacity has not kept up with its demand. The roadway consists of mainly two travel lanes, and lacks left turn bays in many locations. Additionally, due in large part to its role as a significant regional commuter route, OR 43 is currently designed to address the needs of automobile traffic, often to the detriment of alternative, non-motorized modes of transportation such as bicycles and pedestrians. As it currently exists, the roadway contains only intermittent or substandard sidewalks and bike facilities, inadequate pedestrian crossings, and a general lack of urban quality streetscape features.



Existing conditions along OR 43

## Project Objectives

The purpose of this project was to develop a multi-modal Conceptual Design Plan for OR 43 that adequately accommodates bicycles, pedestrians, automobiles, and trucks. The final conceptual design strikes a balance between enhancing multi-modal opportunities, accommodating regional needs, providing an arterial street function, and supporting adjacent land uses within the City of West Linn. To meet these charges, the project considered roadway features such as pedestrian crossings, street trees, landscaping, transit stops, and lighting to better support the needs of all roadway users (as well as adjacent land uses). The stated objectives of the project were to:

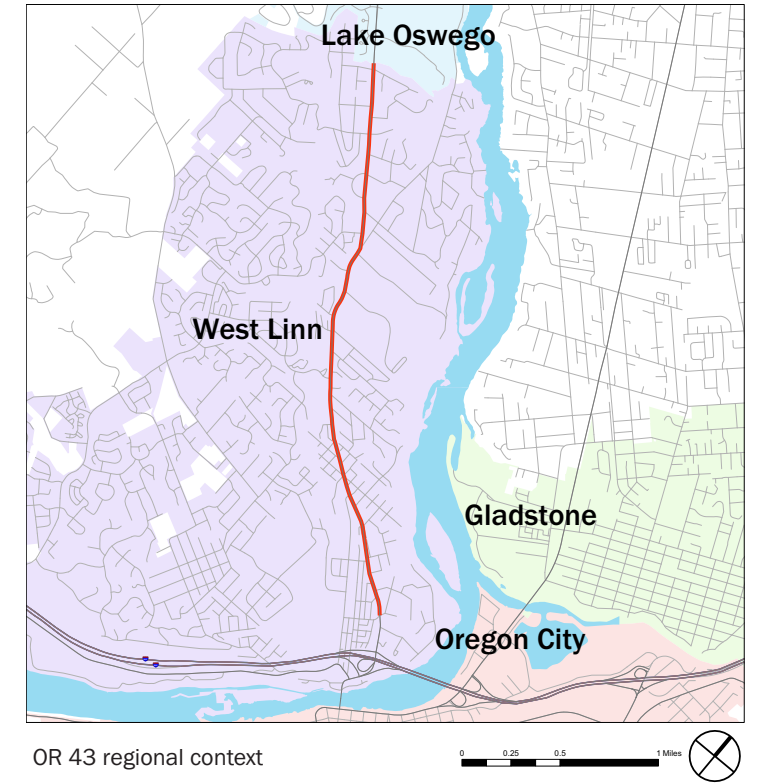
- Develop conceptual plans for a design treatment along OR 43 in the project area to better accommodate multi-modal circulation along and across the street and to support adjacent land use and redevelopment.
- Include designs for bicycle and pedestrian facilities on local arterial and collector streets (to the depth of one parcel on either side of OR 43) that provide safe, adequate connections to bicycle and pedestrian facilities on the highway.
- Involve the public in designing the OR 43 streetscape.
- Create a corridor that will encourage the use of alternative



transportation modes and reduce reliance on the automobile.

- Improve the aesthetic environment, the pedestrian environment, pedestrian crossing opportunities, and pedestrian-transit connections along OR 43.
- Manage vehicular access to properties abutting OR 43 while promoting bicycle and pedestrian access.
- Incorporate stormwater management practices in the streetscape design.
- Ensure consistency with adopted plans, policies and standards, including the *Oregon Highway Plan*, the *Oregon Highway Design Manual*, the *Regional Transportation Plan*, and the *West Linn Comprehensive Plan*.
- Identify planning-level cost estimates and likely funding sources to construct the Final Conceptual Streetscape Design.

The plan responds to project objectives and community input to strike a balance between addressing traffic congestion and the needs of alternative modes with the desire to minimize the need for additional right-of-way. All design elements are conceptual and all dimensions and locations are approximate, based on available map data. Future survey work, and analysis as well as final detail



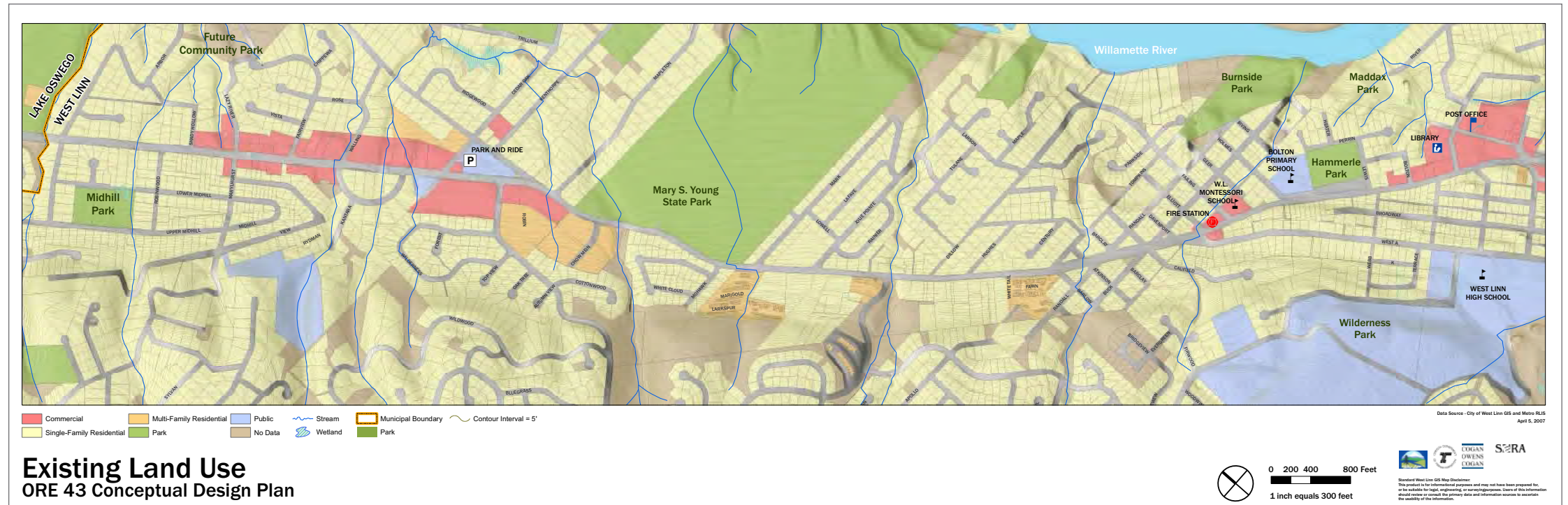
OR 43 regional context



drawings and engineering will be necessary to determine the final roadway and right-of-way alignment. This conceptual plan has identified, within each of the proposed improvements for each segment of roadway, the potential need for additional right-of-way. Public input and effects on private property, particularly with respect to right-of-way, has and will continue to be a critical element of the design process

**The Study Area**

The project study area spans approximately 2.8 miles along the OR 43 corridor within the City of West Linn, from the Lake Oswego / West Linn municipal boundary at the northern end, to the OR 43 / Hood Street intersection to the south. For much of its route, the highway passes through lower-density, single-family residential areas. However, it also traverses two major commercial nodes: the Robinwood Neighborhood commercial area to the north, and the Bolton Neighborhood commercial node to the south. Additionally, OR 43 borders Mary S. Young State Park, a large regional park which holds recreational and sporting events, and serves as a significant destination point throughout the week. It also passes by Hammerle Park and Bolton Primary School, two significant community facilities.



# I. PROJECT PURPOSE AND BACKGROUND

## The Planning Process

The project began with the planning team identifying, describing, and documenting existing conditions along the corridor. This included identifying plans and policies that affect the OR 43 corridor, analyzing transportation and adjacent land uses, and photographing and mapping existing physical and design features along the roadway. Basemaps were compiled describing existing land use, zoning, comprehensive plan designations, transit facilities, nearby historic structures, and environmental conditions such as slope, streams, and wetlands. Additionally, the planning team inventoried existing right-of-way dimensions along the corridor, examined intersection configurations (including crosswalks, bike lane width, sidewalk width), and catalogued missing sidewalk and bike lane segments.

The initial background and research phase of the project also included extensive research on multi-modal street examples across the state and the country. The planning team compiled educational materials illustrating multi-modal street designs and features pertinent to OR 43 to explain how those features affect both transportation and land use, and how they might be applied to OR 43 in particular. Additionally, the planning team also collected examples of "green street" design, and examined green streets as a tool for addressing stormwater management concerns along the corridor. The results of this research can be found in the Appendix.

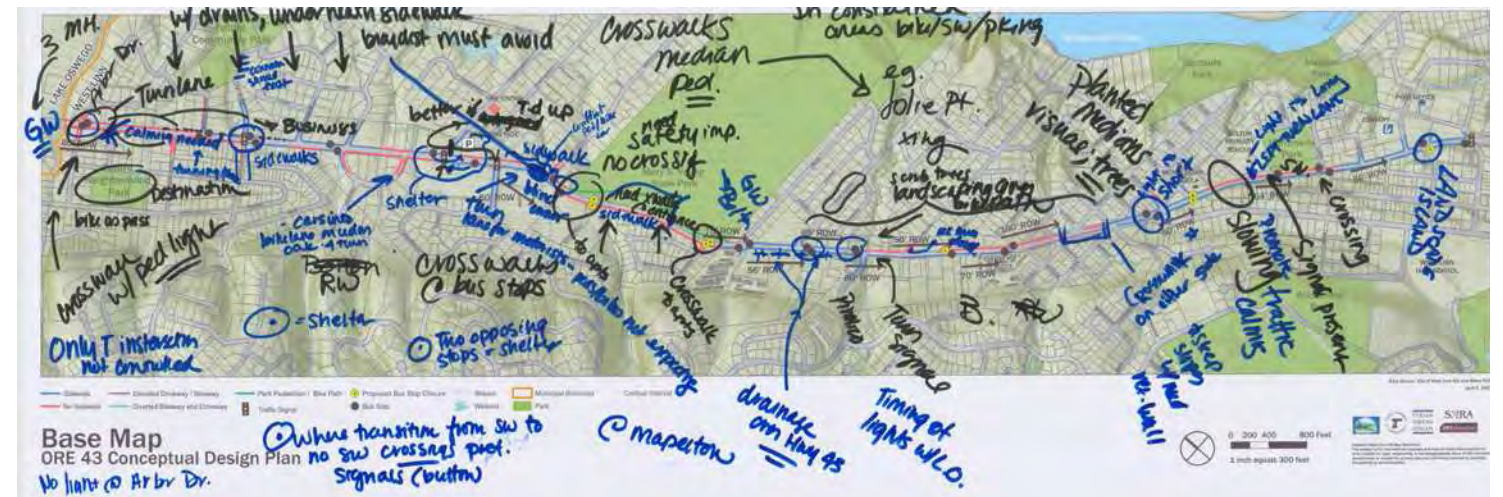
The consultants prepared three technical memoranda as part of the planning process. The first analyzed existing traffic mobility conditions, gathering base traffic volume data for the project area, and calculating projected 20-year traffic conditions. Specific level-of-service deficiencies were identified in both current and future conditions. Technical Memo #2 identified the various opportunities and constraints within the corridor, based on the existing conditions analysis and base mapping. It also discussed the City's community development guidelines in terms of their implications on future streetscape design. The final technical memo analyzed current and future traffic conditions along the corridor in terms of the final proposed conceptual design, evaluating its impact on traffic mobility over the next 20 years. Copies of Tech Memo's 1 & 2 can be found in the Appendix. Tech Memo #3 is contained within section IV of this report.

In order to ensure that the project was adequately coordinated with agency stakeholders and affected local jurisdictions, a Technical Advisory Committee (TAC) was formed. The TAC reviewed draft

materials prior to public presentation, ensuring that products were consistent with applicable policies and standards. The TAC also provided suggestions and recommendations to enhance products and meet project objectives. The TAC included representatives from the City of West Linn, ODOT, Metro, and TriMet. Representatives from the Robinwood and Bolton Neighborhood Associations also participated in these meetings.

In order to ensure that the planning process was responsive to the opinions and concerns of stakeholders and community members to the greatest extent possible, two public workshops were held. During the first public workshop, the planning team presented the existing conditions analysis and multi-modal and green street examples to the public and solicited their opinions regarding needed improvements along OR 43. Small groups convened around maps of the corridor, identifying and prioritizing desired improvements. The final result of the workshop were descriptions of the public's priorities for the corridor, which the design team used to develop the final conceptual design.

The project team then used this information to develop a draft proposed conceptual design, and after deliberation and comment from the Technical Advisory Committee, presented it to the public in a second workshop for public and feedback. Community members were encouraged to interact directly with the proposed design, identifying issues directly on plan maps. The planning team then consolidated these comments, and amended the proposed conceptual design based on this feedback. The final proposed conceptual design presented in this report is the result of this process.



Community members participated in two public workshops

**Existing Conditions**

As previously discussed, the initial phase of the project involved identifying and analyzing existing conditions along the corridor, assembling photographs, and constructing base maps illustrating those conditions. What follows is a discussion of those existing conditions along OR 43 that informed and shaped the final conceptual design.

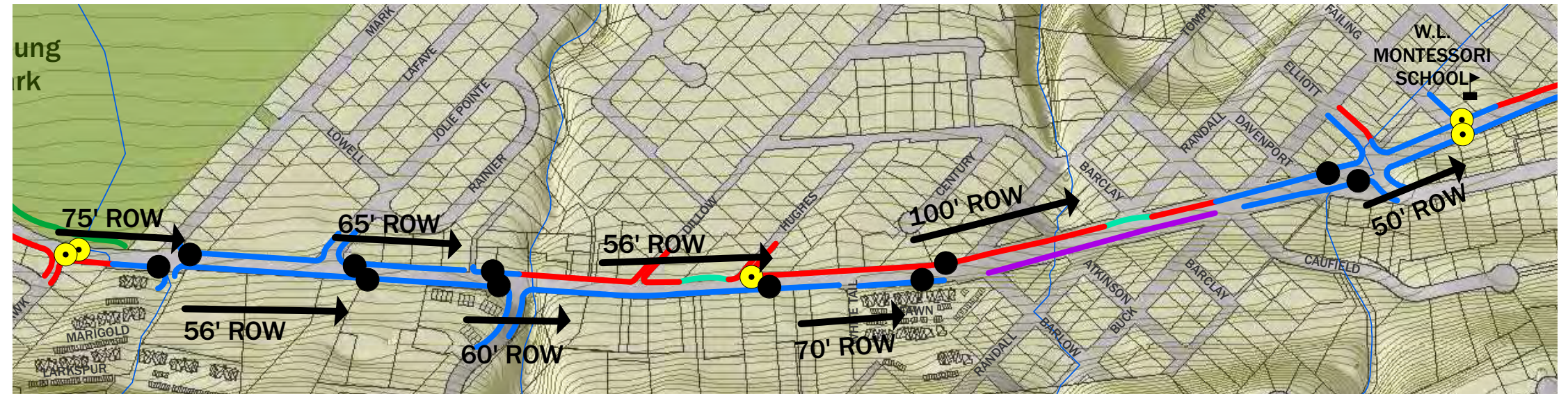
**Varying Right-of-Way**

The amount of right-of-way available along the OR 43 corridor varies significantly within the study area. At its widest, the right-of-way measures approximately 100 feet across, but is only 50 feet at its most narrow. This tremendous variation in available right-of-way widths necessarily meant that several site-specific streetscape design cross sections had to be devised; no one, consistent cross section could readily be applied to the entire corridor. The variation in right-of-way also constrained streetscape design options in certain areas, as limited right-of-way within certain segments required close examination of the various trade-offs implicit in allocating right-of-way (ROW). For example, while on-street parking facilities are often provided along commercial nodes, doing so necessarily precludes allocating that limited right-of-way to other, perhaps more pressing needs, such as sidewalks.

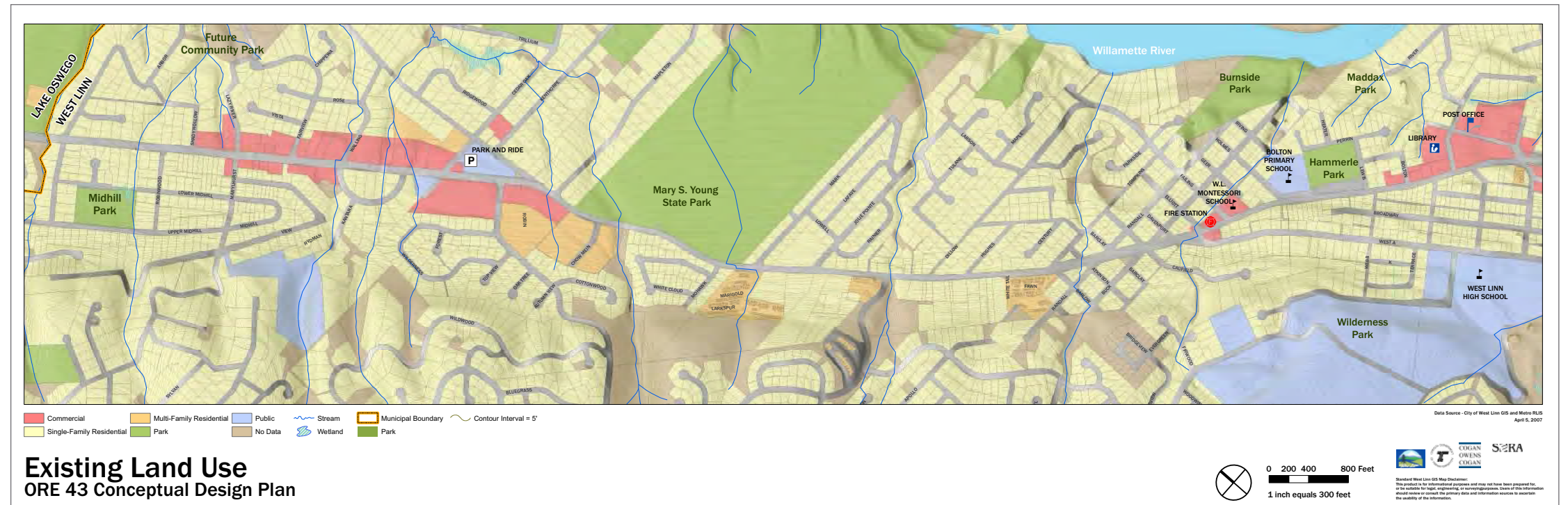
**Varying Land Use**

The OR 43 corridor passes through areas with distinctly different land uses. The northernmost section of the corridor is less-intensely developed, with residential homes (primarily single family). There are two higher-density, commercial nodes along the corridor - one within the Robinwood neighborhood, and the other within the Bolton neighborhood. Between these two commercial areas lies Mary S. Young State Park - a significant community and regional asset - as well as a mix of single-family and multi-family residential uses.

This continuous shift in land uses and character along the corridor suggests a need to customize the streetscape in differing ways to meet the unique demands of various uses and densities. For example, higher-density commercial nodes suggest a need for wider sidewalks and access management features. There is also an opportunity to better connect these commercial areas to nearby residences, many of which are not served by sidewalks currently. Less foot traffic in predominantly residential areas may allow for narrower sidewalks.



Varying right-of-way widths along the corridor



Varying land use conditions along the corridor

# I. PROJECT PURPOSE AND BACKGROUND

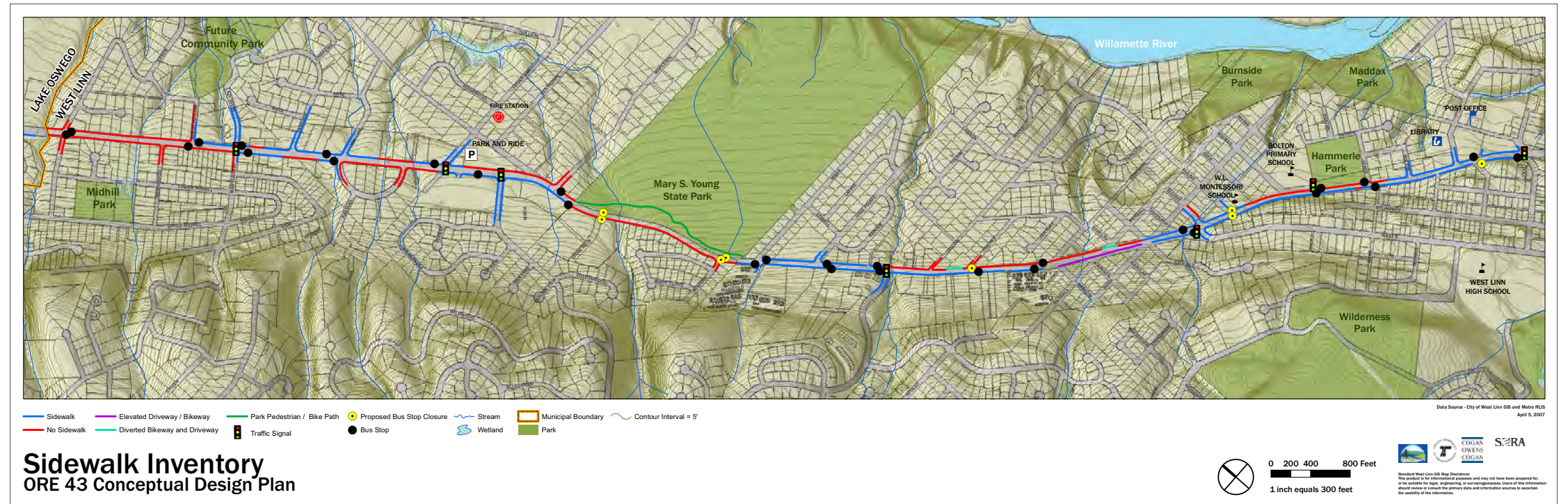
## Inadequate Pedestrian Environment

As the map at right illustrates, sidewalks along OR 43 are sporadic in many areas, and are altogether absent in others. Sidewalks may exist on one side of the street but not the other, and in the residential areas to the north, they are lacking on both sides of the street. The Robinwood commercial area provides sidewalks on both sides of the street, but these sidewalks are fragmented, often leaving a pedestrian with no option but to walk on the roadway.

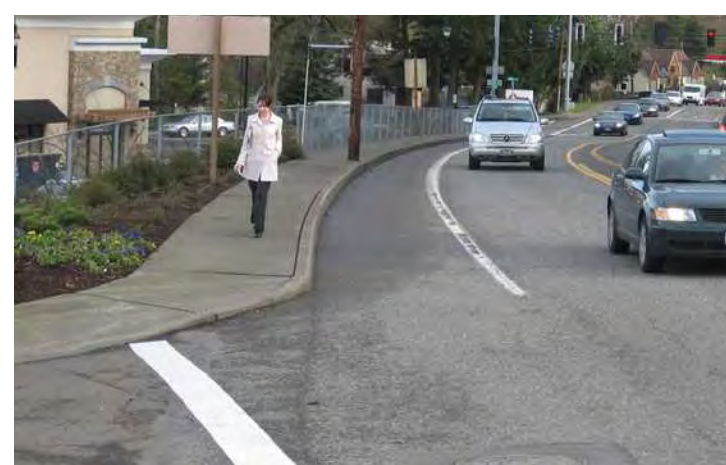
Where sidewalks do exist, they are often narrow (sometimes only 3' to 4' wide), making it difficult for two people to walk side by side. Sidewalks occasionally contain obstacles such as telephone or light poles, rendering them impassable to citizens in wheelchairs, people on crutches, or children on bicycles who may not feel safe riding on the roadway. More common are frequent driveways - which bring pedestrians into direct conflict with motor vehicles.

Sidewalks throughout the study area are "curb-tight," meaning that in most instances there is no buffering between pedestrians and the roadway. Planting strips and/or furnishing zones in commercial areas located between the pedestrian way and the street could help not only to visually enhance the streetscape, but also to shield the pedestrian from fast-moving traffic - thereby improving the perceived safety of the sidewalk.

The existing conditions analysis also identified opportunities to improve existing pedestrian crossings by installing pedestrian refuge islands where crossing distances are excessively wide.



Existing sidewalk conditons along OR 43





**Inadequate Bike Facilities**

Bicycle travel facilities are currently provided on both sides of the highway throughout the corridor - either as striped bike lanes, shoulders, or shared bike / parking lanes. While basic facilities are provided, there are several opportunities to improve conditions for cyclists along OR 43. For example, there is an opportunity to attract more cyclists, especially those that might be intimidated by riding on a state highway that carries an average of 21,000 vehicles per day.

Where parallel on-street parking is provided, the parking zone and the bike zone intermingle, and autos often infringe upon the bike lane. In fact, in some areas, a shoulder is only wide enough for a parked car, which forces bikes out into the travel lane. Providing adequate width for bikes and, where necessary, parked cars, and laying down additional striping to further define the bike lane from the parking area, may help to limit confusion and conflict. It is also important to prevent bike lanes from being too wide. Bike lanes wider than six feet are often confused for narrow travel lanes or turn lanes, and drivers may take advantage of wide bike lanes for passing or making right turns.

Bike lanes / shoulders are often littered with debris - mostly sand and gravel - that is uncomfortable for cyclists and potentially hazardous. Regular sweeping could help improve this condition. Where bikes use the road shoulder, and where sidewalks are not present, they are forced to dodge trash and recycling containers, which are left out in this zone.

**Environmental Conditions**

The highway lies at the foot of a significant slope to the northeast, and the resulting variations in topographic conditions along the length of the corridor presents significant constraints in the middle and southern portions of the study area. Where steep slopes are present immediately adjacent to one or both sides of the highway, choices for right-of-way allocation will be quite limited.

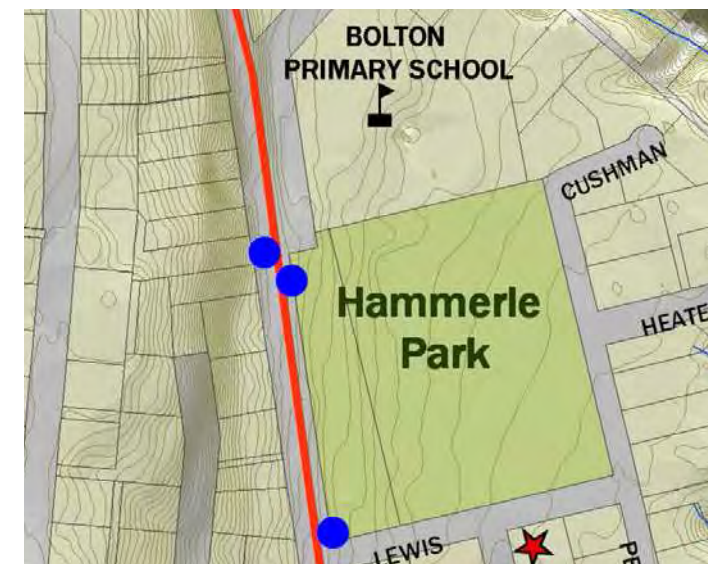
According to Metro GIS data, OR 43 crosses nine streams within the study area. It will be of great importance that these water courses be protected from polluting run-off with any modifications that are made within the highway right-of-way. In more developed areas of the corridor, stormwater run-off is currently channeled with curbs to storm drains. In less intense residential areas at the northernmost portion of the study length, stormwater is allowed



Obstructions in the bike lane and poor transitions make cycling difficult



Bicycles and parked cars compete for the same shoulder



Steep slopes adjacent to and within the right-of-way sometimes limit the ability to expand existing facilities or provide new ones



## I. PROJECT PURPOSE AND BACKGROUND

to collect in ditches at the side of the roadway, a situation which the Proposed Robinwood Neighborhood Plan calls for correcting. Given the steep slopes in portions of the study area, run-off during the rainiest times can be quite heavy. There are significant opportunities to introduce sustainable stormwater practices along OR 43, which could help to protect water quality and provide visual (green) amenities along the corridor.

### Bus Stops

TriMet operates the #35 bus line through West Linn along OR 43, with 37 bus stops. As reported in Tech Memo #1, TriMet is considering abandoning eight of these stops due to a lack of ridership. While the OR 43 corridor through West Linn contains a healthy number of residences and general commercial uses, overall density is relatively low and there are no major employment centers. Therefore transit functions primarily as a commuting option, and as a transportation option for those for whom other options are not available or desirable.

However, it must be noted that transit stops - and the connections to them - could be greatly improved along the highway. Benches are currently lacking at many bus stops, and providing such amenities could help to increase the appeal of transit. It is important to note, however, that the City of West Linn currently does not permit advertising at TriMet bus stops. Because the revenue earned from bench advertising is often used to pay for the provision of the bench itself, this policy may limit the number of benches that TriMet is able to provide within West Linn. The City should consider working with TriMet, adjacent businesses, and/or local business associations to provide and maintain benches.

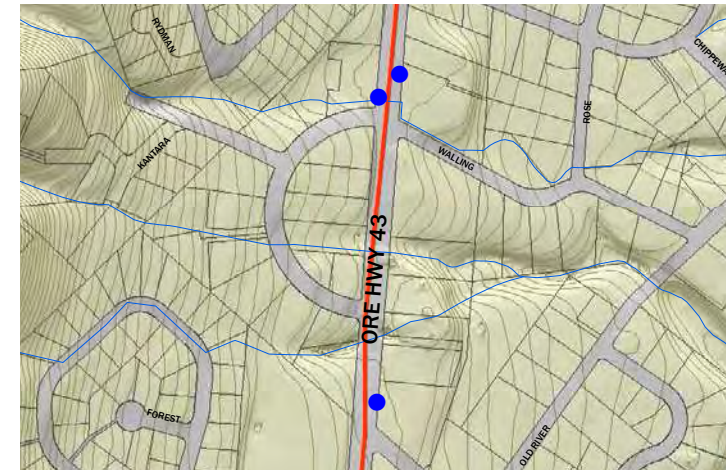
Improvements to pedestrian connections to and from bus stops may also help to bolster transit ridership. Several stops have sidewalk approaches from only a single direction, while others lack sidewalks entirely. Completing sidewalk connections to transit stops will be crucial to ensure that transit riders can make their connections safely and comfortably. Improving pedestrian connections throughout the corridor also may help to increase ridership, which may in turn introduce the possibility of reinstating closed bus stops in the future.

### Aesthetic Concerns

While pedestrian safety and access are of primary importance, aesthetic conditions also greatly influence a street's pedestrian

appeal. Trees are a defining feature of the OR 43 corridor, and the City currently maintains an ordinance aimed at preserving and protecting trees on private property. This ordinance is enforced during site development through design review. However, there may be opportunities to introduce street trees and landscaping to the streetscape itself to enhance the visual appeal of the roadway. Incorporating a planting strip between

the sidewalk and the roadway, and bringing vegetation to the streetscape could help to soften the visual impacts of the corridor. Additionally, two concrete medians currently exist within the study area. Introducing vegetation these medians could do much to improve the visual appeal of the streetscape.



Stormwater is currently directed into traditional sewer systems or drainage ditches; instituting green / sustainable stormwater management practices can help protect the various waterways that cross beneath OR 43 in West Linn



Benches are absent at many bus stops



Although West Linn is in many ways defined through its number of large trees, vegetation is often lacking within the streetscape.



Some stops have no sidewalks connecting to them whatsoever

**Traffic Mobility**

Comments gathered at both public workshops revealed that the community places great priority on improving traffic safety and mobility along the corridor. Traffic analysis conducted by the planning team revealed several traffic circulation issues that needed to be addressed throughout the course of the project. Those issues are as follows:

- Two intersections have moderate congestion during commute hours today: HWY 43 at Cedar Oak, and HWY 43 at Hidden Springs.
- Access to Bolton Primary School is constrained, with backups occurring before and after school sessions
- Many cross-streets have long waits for adequate “gaps” to make turns onto the highway
- Opportunities to cross HWY 43 on foot or by bike are currently very limited, especially south of Hidden Springs to West A.

**The Public’s Priorities**

As previously discussed, one of the first steps within the project was to organize a public workshop in order to garner input from the community and regular users of OR 43. The goal was to gather comments regarding the current failures and needed improvements along the highway, and to encourage citizens to prioritize those improvements and overall project goals in order to help guide the project team in their final design.

One result of the workshop was a list of the public’s topmost priorities for the corridor as a whole. Those priorities include:

- Work within existing right-of-way
- Maintain a single travel lane in each direction, with turn lanes where necessary
- Build continuous sidewalks & safe crossings
- Provide continuous bike facilities for all skill levels
- Improve access to transit (and improve transit stops)
- Create an inviting streetscape and unique identity for the corridor
- Use medians to beautify and facilitate traffic flow
- Maintain / improve left-turn access to/from OR 43
- Utilize innovative / green stormwater management techniques

**Table 3: Existing (2007) Weekday Peak Hour Intersection Level of Service**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marybrook Dr	A	6.3	0.39	A	9.7	0.46
Hwy 43 / Maryhurst Dr-Lazy River Way	B	16.5	0.79	B	16.3	0.80
Hwy 43 / Cedaroak Dr	C	22.9	0.90	B	10.4	0.65
Hwy 43 / Hidden Springs Rd	B	18.7	0.73	C	25.0	0.83
Hwy 43 / West A St	B	14.5	0.67	B	12.5	0.74
Hwy 43 / Hood St-McKillican St	C	21.6	0.72	C	23.6	0.76
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/E	44.3	0.00/0.35	B/F	> 50	0.03/0.37
Hwy 43 / Pimlico Dr	A/F	> 50	0.08/>1	B/F	> 50	0.16/>1
Hwy 43 / Holmes St	A/E	45.5	0.03/0.12	B/F	> 50	0.02/0.65
Hwy 43 / Lewis St	B/E	43.4	0.01/0.18	B/E	40.0	0.01/0.15

Notes: LOS = Level of Service  
 Delay = Average vehicle delay in the peak hour for entire intersection in seconds.  
 Unsignalized Intersection Operations:  
 A/A = Major street turn LOS / Minor street turn LOS  
 #/# = Major street turn v/c / Minor street turn v/c

**Table 10: 2030 Future Base Weekday Peak Hour Intersection Level of Service**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marybrook Dr	A	6.8	0.51	B	10.8	0.59
Hwy 43 / Maryhurst Dr-Lazy River Way	D	41.9	>1	D	44.7	>1
Hwy 43 / Cedaroak Dr	F	95.3	>1	B	14.8	0.88
Hwy 43 / Hidden Springs Rd	C	21.7	0.78	E	57.2	>1
Hwy 43 / West A St	C	23.8	0.88	C	25.4	0.95
Hwy 43 / Hood St-McKillican St	D	36.0	0.93	D	48.8	>1
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/F	> 50	0.00/0.98	B/F	> 50	0.05/>1
Hwy 43 / Pimlico Dr	B/F	> 50	0.12/>1	B/F	> 50	0.27/>1
Hwy 43 / Holmes St	B/F	> 50	0.06/>1	B/F	> 50	0.04/>1
Hwy 43 / Lewis St	B/F	> 50	0.02/0.49	B/F	> 50	0.02/0.47

Notes: LOS = Level of Service  
 Delay = Average vehicle delay in the peak hour for entire intersection in seconds.  
 Unsignalized Intersection Operations:  
 A/A = Major street turn LOS / Minor street turn LOS  
 #/# = Major street turn v/c / Minor street turn v/c



Existing conditions along OR 43

# II. THE PLAN: GENERAL CONCEPTS

After base conditions were analyzed and the community's priorities for the corridor established, the project team incorporated these findings into a draft, and eventually, a Final Proposed Conceptual Design for the OR 43 corridor. The final plan as presented in this document responds directly to the initial background research and opportunities and constraints identified by the project team, as well as the issues and concerns identified by the community during the public process. The following is an introduction to the general design concepts for the entire corridor. As these general plan characteristics are discussed, it is important to note that this is a conceptual plan that requires more detailed analysis and refinement, which usually happens in the process of preliminary engineering prior to a construction process. Elements proposed that affect ODOT facilities will require review and approval by the State Traffic/Roadway Engineer. This conceptual plan appears feasible to construct, however, issues that become apparent in a more detailed refinement process may lead to plan modifications, which may include changing or eliminating some design elements. Specific design issues raised by an ODOT reviewer, and the project consultant's response, are contained the Appendix.

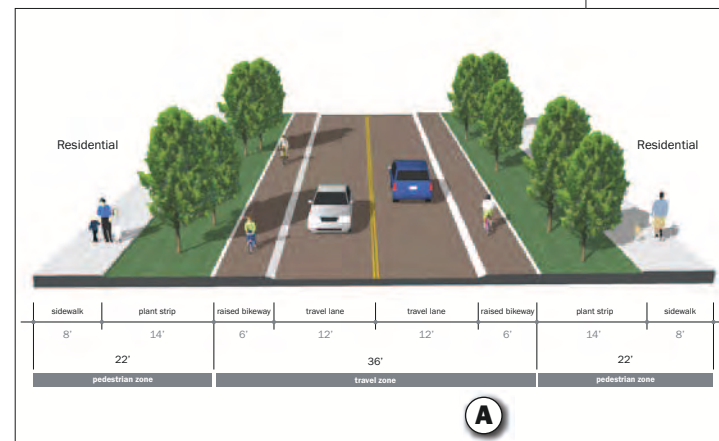
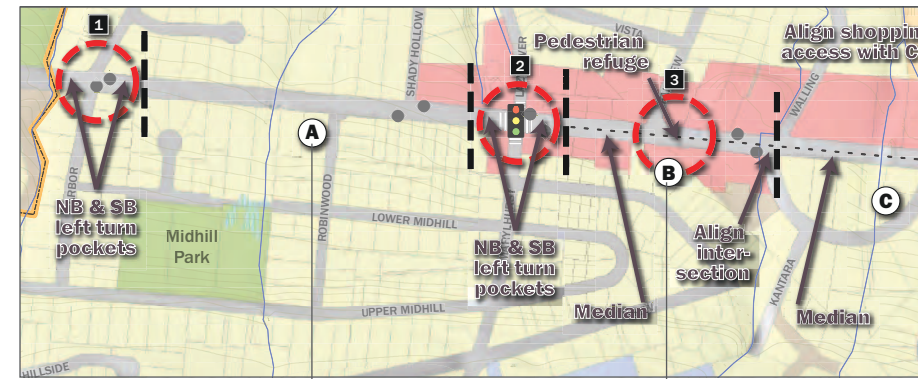
## General Plan Characteristics

One of the community's top priorities was to avoid widening the roadway. Members of the public value the local character of OR 43 as it runs through West Linn, and many felt that increasing the roadway width and/or the overall number of travel lanes would detrimentally alter the character of the roadway and the physical environment around it. Furthermore, maintaining the highway at two lanes is consistent with ODOT's facility plan for the highway

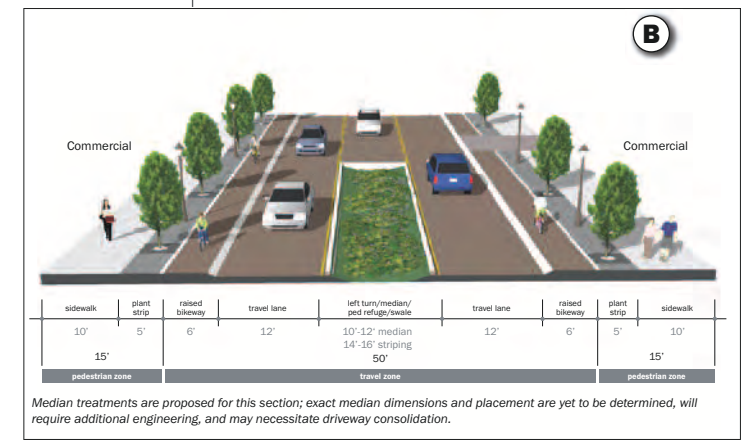
and the regional transportation plan (RTP), which recognized these community concerns as well as physical constraints against widening. For these reasons, the final design maintains the highway's current lane configuration, with one travel lane in each direction along most of the corridor and turn lanes provided at strategic locations. Issues and constraints beyond the scope of this conceptual plan may require modifications to the plan, such as shifting the centerline or modest widening of the cross-section. This will be determined at a more specific design level, such as during preliminary engineering.

The project team also designed the final concept within the highway's existing right-of-way. Public comments clearly articulated the community's desire to avoid "taking" additional right-of-way to the greatest extent possible. Accordingly, the project team set about designing roadway cross-sections that would fit within the available right-of-way throughout the study area. Because of the great variation of right-of-way widths along the corridor discussed above, this meant that several unique cross-sections had to be devised in order to respond to variable conditions. In all, the final design includes 15 different cross-sections over the approximate 2.8 mile span of the study area.

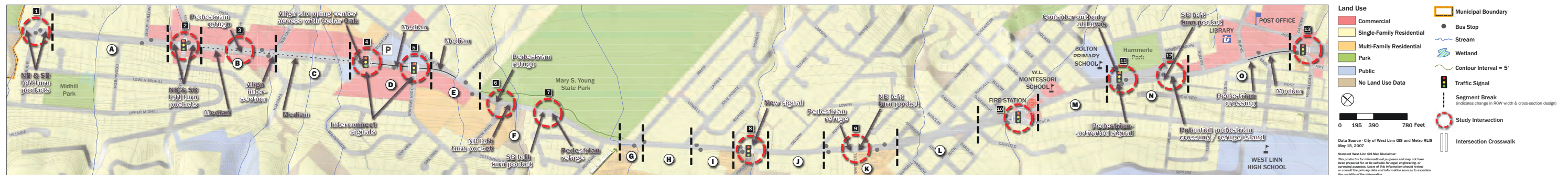
Another influence on cross-section design was the variation in land use along the corridor. It is important that streetscape designs respond adequately to the land use characteristics around them. As previously discussed, streetscapes in commercial areas typically provide wider sidewalks and may need to provide a greater number of pedestrian crossings to accommodate larger volumes of pedestrian traffic. Landscaping and lighting may also vary between commercial and residential segments. The cross-sections



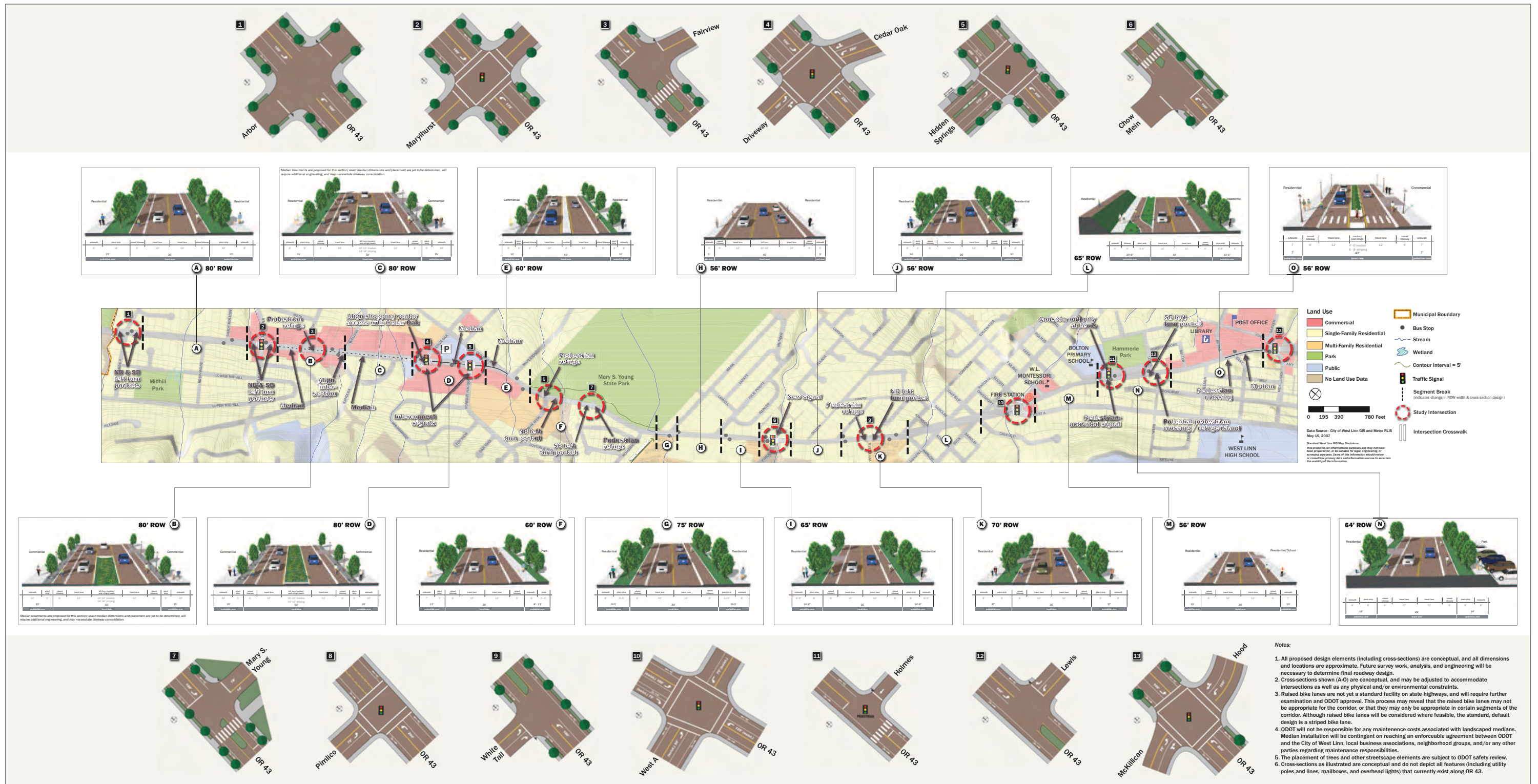
A typical cross-section designed for residential areas



A typical cross-section designed for commercial areas



The final concept plan



Proposed Conceptual Design  
ORE 43 Conceptual Design Plan

## II. THE PLAN: GENERAL CONCEPTS

in the Final Proposed Concept Design for OR 43 were designed to respond to adjacent commercial and residential land uses within the corridor as well as public uses such as parks and schools. Attributes of the Final Proposed Conceptual Design follow.

### Pedestrian Improvements

OR 43 is currently designed to address the needs of automobile drivers, often to the detriment of other users. One of the primary charges of the project was to re-design OR 43 into a truly multi-modal corridor. Accordingly, the Final Proposed Concept Design significantly improves the pedestrian environment. Pedestrian improvements along the study area are as follows.

#### Continuous, High-Quality Sidewalks

One of the foremost priorities for the project and the public was to provide continuous, high-quality sidewalks throughout the entire length of the corridor, and the final design accomplishes this. Furthermore, existing sidewalks have been widened where possible, especially within commercial nodes.

In addition to providing continuous pedestrian facilities, the overall quality and safety of those facilities has been improved. Where right-of-way allows, existing curb-tight sidewalks have been replaced with sidewalks that are set back from the roadway, separated by planting strips between the sidewalk and the road itself. These planting strips effectively separate the pedestrian from moving traffic and provide a physical buffer, increasing actual and perceived safety along the sidewalk in addition to beautifying the streetscape.

#### Improved Pedestrian Crossings

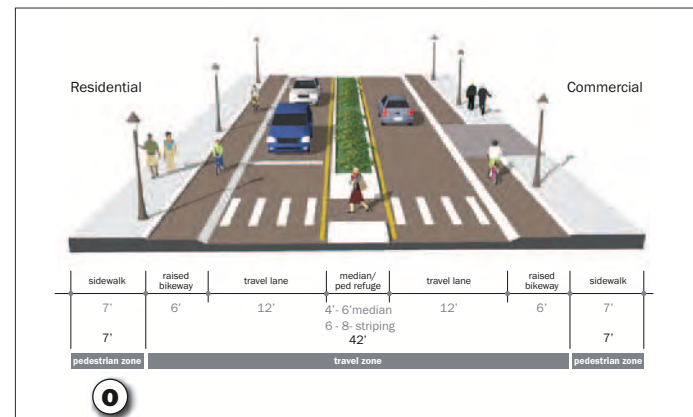
The final concept design both improves existing pedestrian crossings, and introduces new opportunities for safe crossings along the corridor.

Existing crossings are maintained within the plan. To ensure that safety is maintained and improved, marked pedestrian crosswalks will continue to be provided at all signalized intersections. In addition to clear striping, the possibility of “count-down” pedestrian timers at intersections has been discussed during the planning process. These timers visually display and count down the amount of time a pedestrian has to safely cross the street before the signal changes. Although not formally included as part of the Final Proposed Conceptual Design, these timers can be a real amenity

to pedestrians and may significantly increase real and/or perceived safety. For these reasons, the City may consider installing these in the future.

In addition to improvements to existing intersection crossings, the concept plan recommends several new pedestrian crossings. These crossings typically are proposed at unsignalized “T” intersections, and are strategically located near activity centers, commercial areas, and high-density residential developments. These new crossings include pedestrian refuge islands, which allow the pedestrian to cross safely at unsignalized intersections by providing a safe stopping point in the middle of the roadway, thereby permitting the pedestrian to cross one direction of traffic at a time. In addition to increasing the overall number of opportunities to safely cross the street, pedestrian refuge islands also create opportunities to introduce vegetation to the streetscape, provided that vegetation is kept low enough to ensure that motorists can see pedestrians within it.

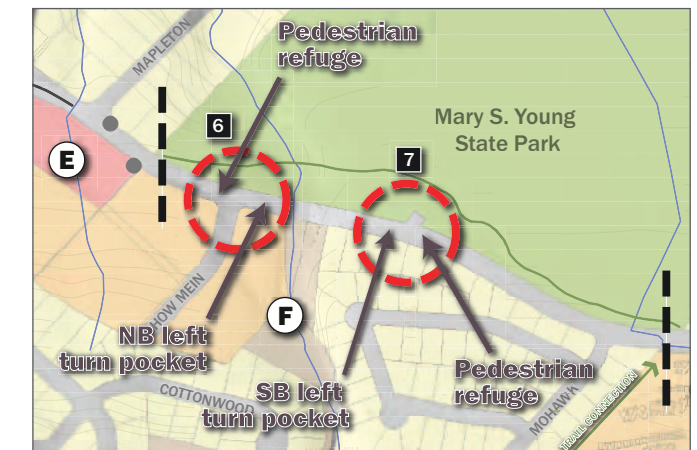
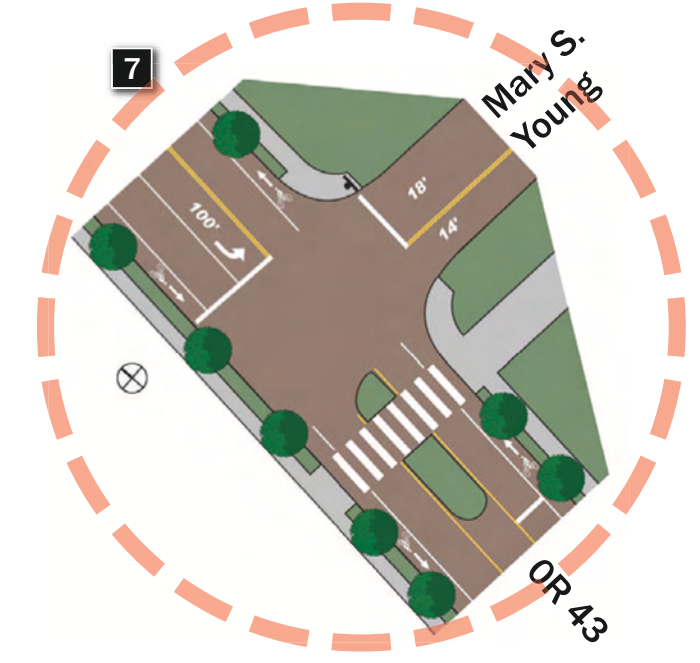
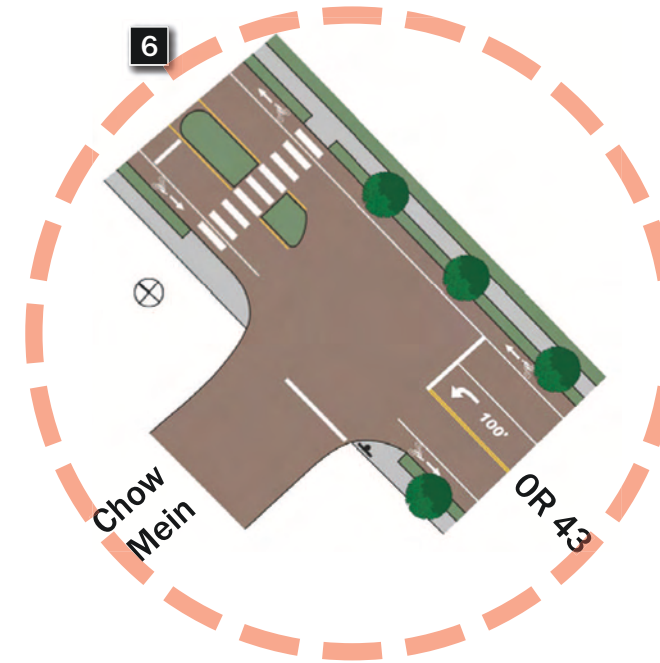
ODOT requires a crosswalk study, approved by the state traffic engineer, for all marked crosswalks at unsignalized locations, to ensure that the new crossing would provide real safety benefits rather than a false sense of security. The criteria for establishing marked crosswalks on State highways such as OR 43 can be found in Section 6.6 of the ODOT Traffic Manual available on ODOT’s website.



Cross-section employing a pedestrian refuge



Pedestrian refuge and median crossing examples



Examples of recommended new pedestrian crossings

**Bike Improvements**

Bicycle facilities as they currently exist along OR 43 often create dangerous conditions for bicyclists. Although bike lanes are provided throughout, they often share space with the emergency shoulder and/or on-street parking, creating a confusing, ambiguous space which often causes conflict between parking and turning cars and bikes. Furthermore, bike lanes along OR 43 are often cluttered with debris, including trash receptacles, which can create dangerous obstacles for bicyclists.

During the public process, many community members voiced their support for separating bicycle facilities from vehicular traffic in order to increase bicycle safety along the corridor. Community members initially supported designing a bike facility that was set behind a planting strip, and aligned directly adjacent to the sidewalk. However, the large number of residential and commercial driveways and intersections precluded this type of design, as right-turning vehicles would be unable to make visual contact with bicyclists that are set back from the roadway.

Despite these difficulties, the planning team sought to integrate this preference for a safer bike facility within the final design, and has done so by introducing a grade-separated bike facility to the final concept plan. Rather than separating modes with a striping or landscaping, the raised bike path separates the bike lane vertically, raising it approximately six inches above the roadway. Users therefore feel a greater sense of separation from traffic than in conventional, painted bike lanes. These facilities may include a mountable, rolled curb, which allows cars to make right turns into driveways while increasing driver awareness of bicyclists. As the raised bike lane approaches intersections, it is dropped and becomes level with the roadway.

Although these facilities may improve overall safety for bicyclists, there are some complications that need to be considered. There are typically greater construction costs associated with raised bike lanes, as travel lanes and bike lanes must be paved separately, and a narrow paving machine may be required for paving the bike lane. Additionally, although raising the bike lane does help to keep dirt and debris out of the bike lane, street sweepers may have difficulty cleaning the facility. However, these additional costs may be largely mitigated through maintenance savings, as raised bike facilities typically receive less wear and tear, accumulate less debris overall, and require less frequent re-striping.

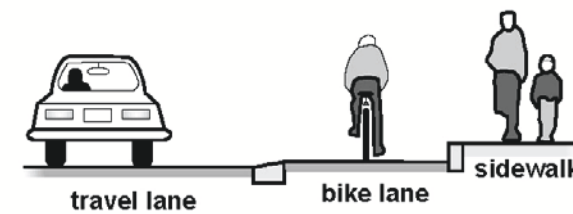
Another complication to consider, however, is that raising the bikeway effectively eliminates the dual functionality of the existing bike lane, as its ability to serve as both a bike lane and emergency shoulder is diminished. However, although the emergency shoulder is lost with the introduction of the raised bike lane, the rolled curb allows cars to mount the bike lane to clear the roadway during emergencies.

Raised bike lanes will also in most cases prevent cars from veering into the bike lane in order to pass stopped, left-turning cars. Because the shoulder along OR 43 is currently a marked bicycle lane, cars are currently not legally permitted to pass other cars within the bike lane (though this practice is common). The curbed facility will increase bicycle safety by preventing these maneuvers.

It must be noted that, while raised bike lane facilities are described in the 1995 Oregon Bicycle and Pedestrian Plan, they are not yet a standard facility on state highways. During engineering, they will require further examination and ODOT approval. This process may reveal that the raised bike lanes may not be appropriate for the corridor, or that they may only be appropriate in certain segments

of the corridor. Although raised bike lanes will be considered where feasible, the standard, default design is a standard striped bike lane.

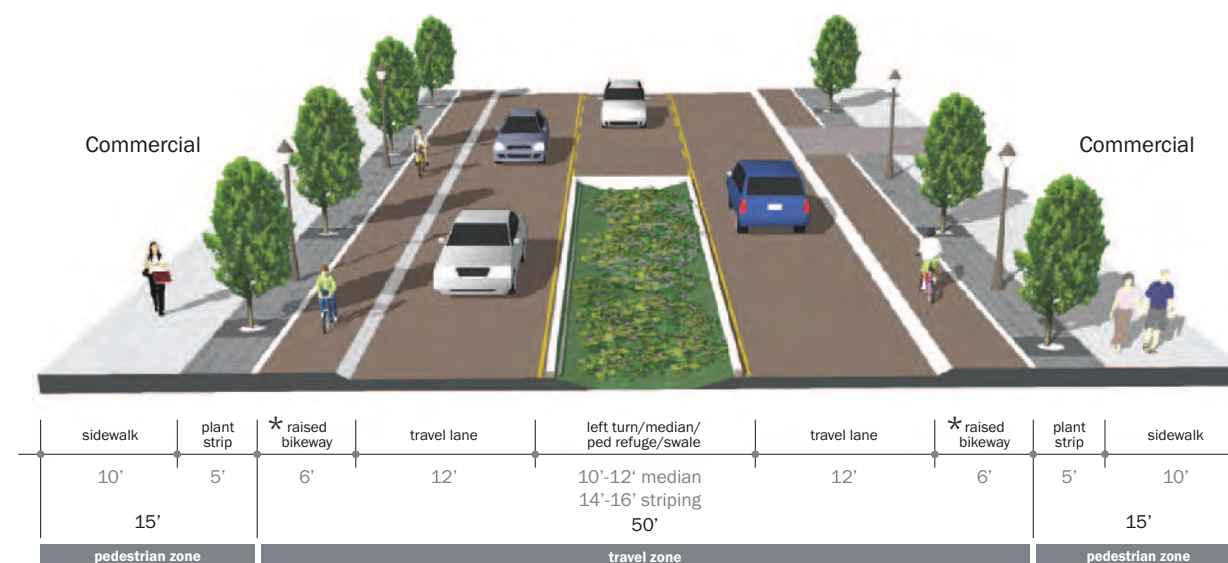
It should also be noted that TriMet has no experience with raised bike lanes and consideration would need to be given to the design of transit stops in relation to these bikeways.



A grade separated bike lane  
Source: 1995 Oregon Bicycle and Pedestrian Plan



Example of a raised bike path in Eugene, OR



Example of proposed raised bike facility



Example of raised bike lane  
Source: 1995 Oregon Bicycle and Pedestrian Plan

## II. THE PLAN: GENERAL CONCEPTS

### Transit

As previously noted, TriMet is planning to abandon eight bus stops along OR 43 in West Linn. However, as the concept plan is implemented and pedestrian access throughout the corridor improves, bus stops may be re-evaluated and/or reinstated.

The preferred method for loading and unloading bus passengers is to do so while remaining within the travel lane, as this is most efficient. However, there may be a need to provide one or two bus pullouts over the length of the corridor. These pullouts would allow buses to pullout of the roadway as they load and unload passengers, and give the bus a place to idle when dwell time is needed. Pullouts also permit cars to pass stopped, loading buses. Although they can allow for greater automobile mobility, transit operators often disfavor them, as they can find it difficult to pull back into traffic after loading.

Although it is not within the bounds of this project to identify locations for and design bus pullouts, TriMet may be open to evaluating the need for pullouts along the corridor in the future. It must be noted, however, that OR 43 is not currently a frequent bus route, and vehicular delays caused by in-flow loading are therefore not extreme in nature. Other improvements associated with this conceptual design plan may help to alleviate delays. TriMet does intend to convert this line into a frequent bus route in the next five years, however. It is anticipated that this extra service will tie in with the pedestrian and streetscape improvements proposed within this plan.

### Aesthetic Improvements

Several opportunities to introduce vegetation to the streetscape are illustrated within the final concept design. Notably, planting strips have been introduced to separate the sidewalk from the bike path and roadway. These planting strips improve perceived safety conditions for pedestrians, and the landscaping serves to visually soften the streetscape. Additionally, planting strips may help to manage stormwater by receiving downhill runoff.

It must be noted, however, that as an ODOT facility, streetscape design elements along the corridor are subject to ODOT design standards. Tree placement within the planting strip are subject to ODOT review. Current ODOT standards stipulate that trees should be a minimum of 6' from the curb (this standard applies to the tree at its maturity). Tree placement will also be reviewed in order

to ensure that visual clearance is maintained at driveways and intersections.

In addition to vegetated planting strips, street tree wells have been recommended along commercial areas to separate the sidewalk from the bikeway, and to aesthetically enhance the streetscape. These tree placements will be subject to the same ODOT review process discussed above.

Vegetated medians have also been proposed within the final concept plan, and existing medians have been enhanced with landscaping. Landscaping elements within central medians and pedestrian refuge islands will likely require ODOT review in order to ensure that chosen plant materials maintain visual clearance for drivers.

In addition to their aesthetic functions, strategically placed medians also serve to channelize traffic, thereby improving overall vehicular mobility. Managing and consolidating access, especially in commercial nodes, minimizes stopped, left-turning cars where these maneuvers can be dangerous and/or cause traffic delays. Within the final proposed design, medians are shown where they currently exist, and have been introduced where they are most needed for access management and safety purposes. In other locations (primarily within the Robinwood commercial area), medians are depicted, but their exact locations are intentionally left open. Exact median placement in this area should be determined with the participation of area business and property owners during preliminary engineering. Driveway consolidation in this area is highly encouraged.

Medians may also serve a stormwater management function. When designed as swales and constructed with slotted curbs, they allow street runoff to flow into the planters and infiltrate into the soil, rather than being channelized into storm drains. In order to serve in this capacity, however, the street would have to be re-designed, eliminating the crown which currently directs water away from the street and into gutters and ditches. Inverting the crown would permit water to flow freely into the median. It should be noted that stormwater swales, whether in the median or along the side of the roadway, are not a standard ODOT design, and would be subject to ODOT review to consider cost, safety, and maintenance issues before implementing these features.

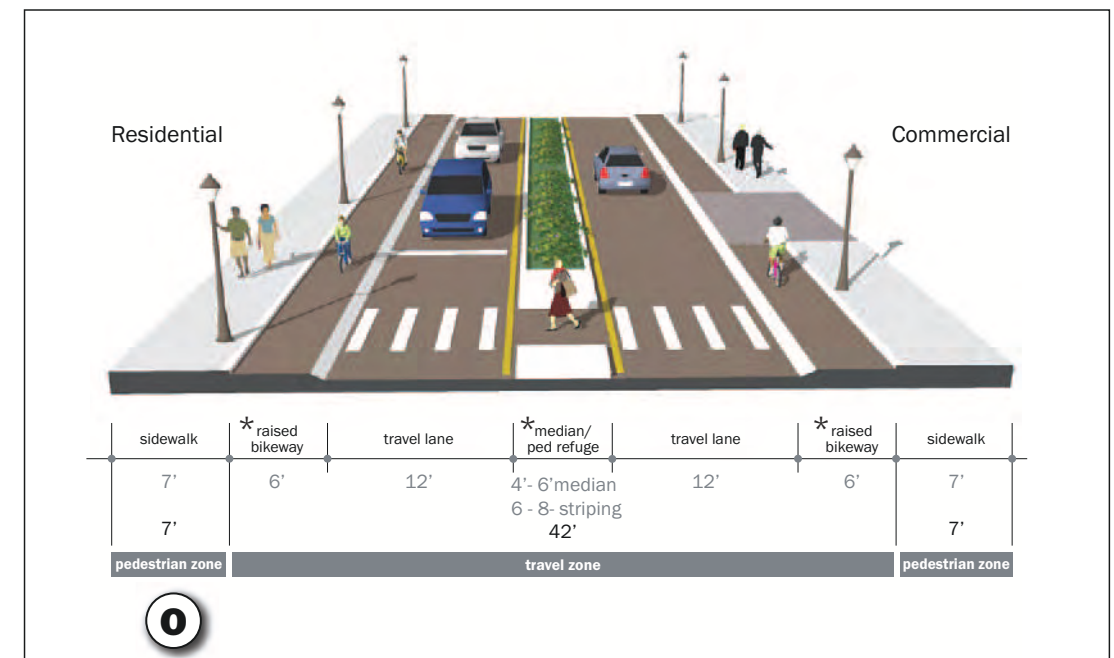
With the introduction of landscaped medians into the streetscape comes the responsibility for maintaining them. ODOT will not be responsible for any maintenance costs associated with landscaped medians. Median installation will therefore be contingent on reaching an enforceable agreement between ODOT and the City of West Linn, local business associations, neighborhood groups, and/or any other parties regarding maintenance responsibilities.



Current conditions



Examples of vegetated medians



Vegetated median proposed for OR 43

\* Raised bikeway subject to ODOT review and approval

\* Landscaping/swales subject to ODOT approval and maintenance agreement



**Traffic Mobility Improvements**

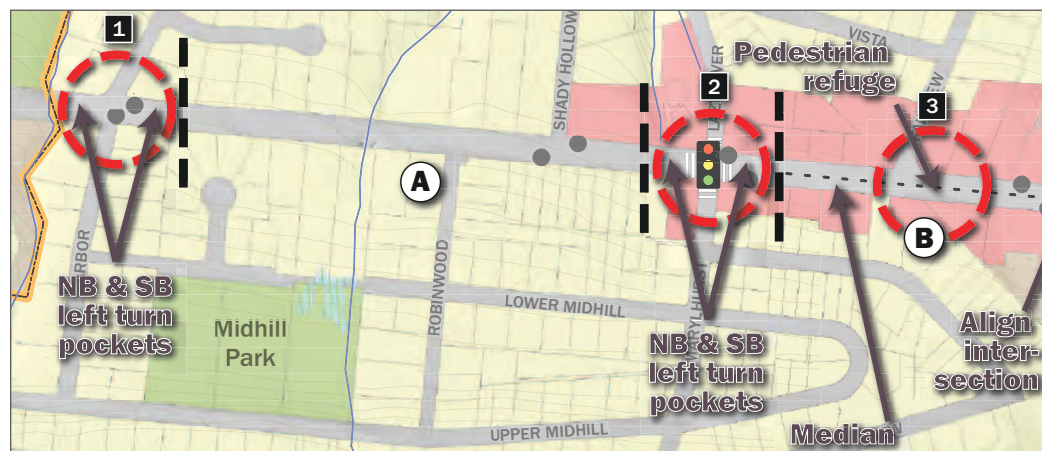
Several improvements have been made within the final plan to improve overall vehicular mobility. Notably, left turn bays have been provided at key intersections, thereby eliminating unnecessary backups where cars may stop in the roadway while waiting for “gaps” to make a left turn. New left turn bays have been provided on OR 43 at Arbor, Lazy River, Chow Mein, Mary S. Young State Park, White Tail, and Lewis.

Another major mobility improvement is recommended for the highway along the Robinwood Shopping Center. The plan includes integrating the traffic lights at Cedar Oak and Hidden Springs in order to maximize traffic flow. Additionally, the plan recommends relocating the driveway access from OR 43 into the Robinwood Shopping Center, and aligning it with Cedar Oak. This will create a true, 4-leg intersection and improve traffic flow in and out of the shopping center.

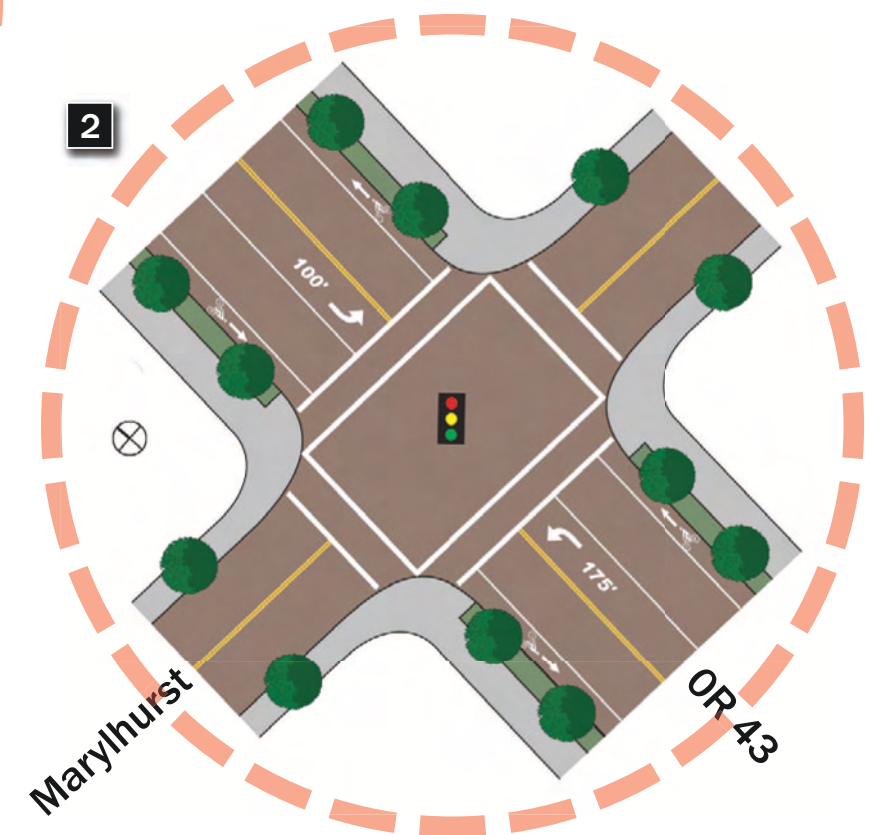
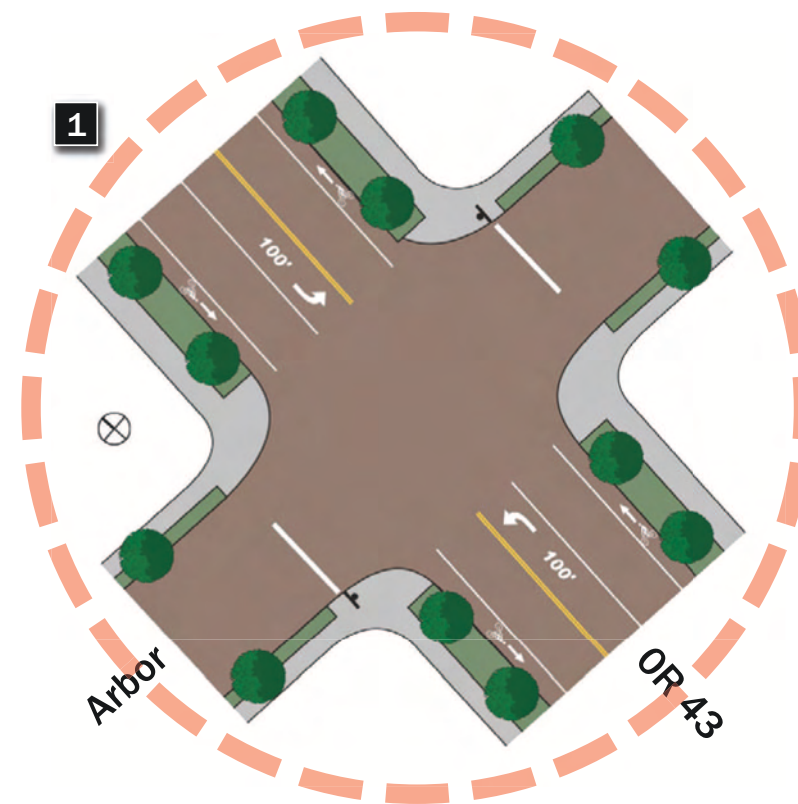
Some issues associated with this realignment will need to be addressed during preliminary engineering, however. These issues include examining the effect of the “skew” angle of Cedar Oak on the proposed improvement, as well as examining any right-of-way takes which may be associated with the improvement. Signage issues associated with proposed new right turn and right through lanes on OR 43 at Cedar Oak will also require ODOT examination.

If these issues cannot be satisfactorily resolved, status quo conditions will prevail.

Two other major mobility improvements include introducing a signal at the OR 43 / Pimlico intersection, and creating a formalized circulation plan at Bolton Primary School and Hammerle Park, in order to minimize delays during school drop-off and pick-up hours.



Proposed new turn pockets at key intersections



# III. THE PLAN: A DETAILED LOOK

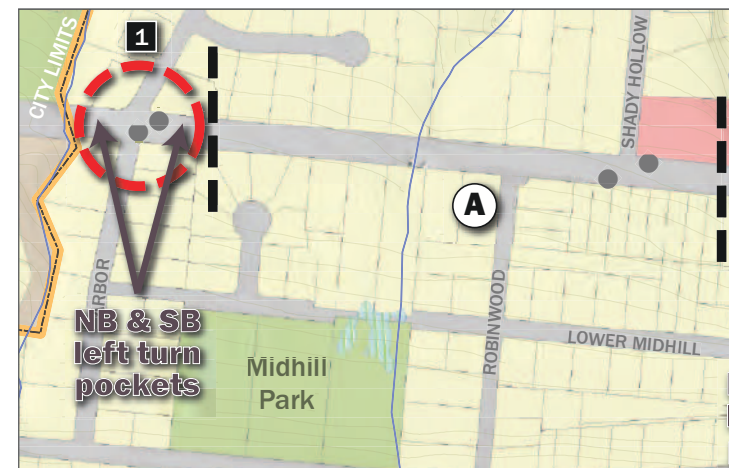
The following section discusses in greater detail the design features and recommendations contained within the Final Proposed Conceptual Design Plan for OR 43. It is organized geographically, and will examine the corridor segment by segment, from north to south.

## Segment A / Intersection 1

Segment A is an 80' cross-section surrounded by residential uses. An 8' sidewalk has been provided behind a large, 14' planting strip. Trees within the large planting strip will help to maintain the area's more residential character.

Intersection improvements include the addition of both northbound and southbound turn pockets from OR 43 onto Arbor. Wider lanes have been provided along Arbor as it approaches the intersection with OR 43. This improvement will allow right-turning cars to edge around stopped cars waiting to make a left turn movement onto OR 43.

The removal of the center turn lane on OR 43 eliminates the possibility of making a "two-phased" left turn from Arbor onto OR 43. However, safety concerns dictate that the project's priorities must lie with improving safety and mobility along the OR 43 corridor itself, rather than increasing convenience along side streets. Providing a continuous center turn lane on OR 43 to allow for left turn movements from Arbor is mutually exclusive with the much needed left turn lane from OR 43 onto Arbor. For this reason, motorists turning left from Arbor onto OR 43 are encouraged to do



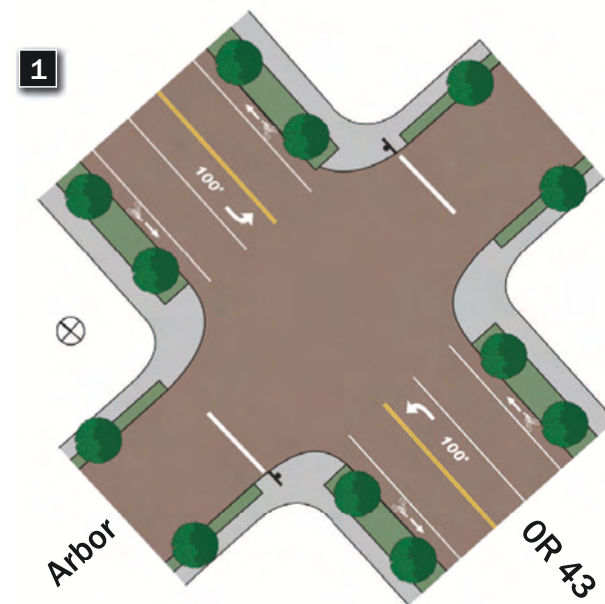
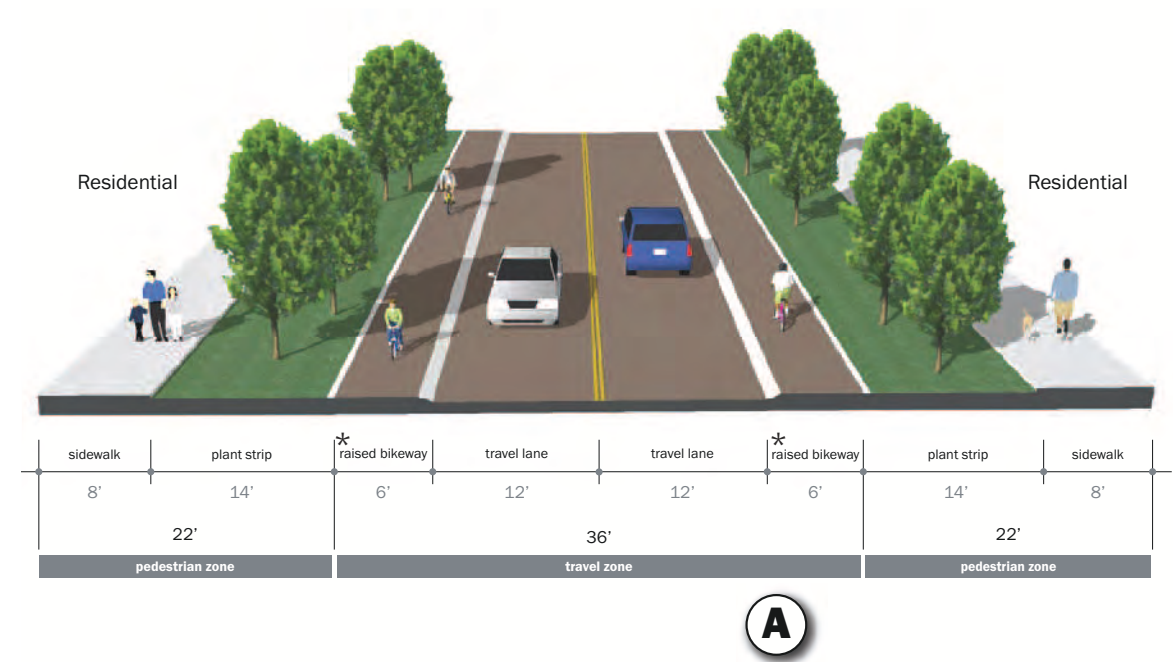
so at the nearest signalized intersection, in this case Marylhurst / Lazy River.

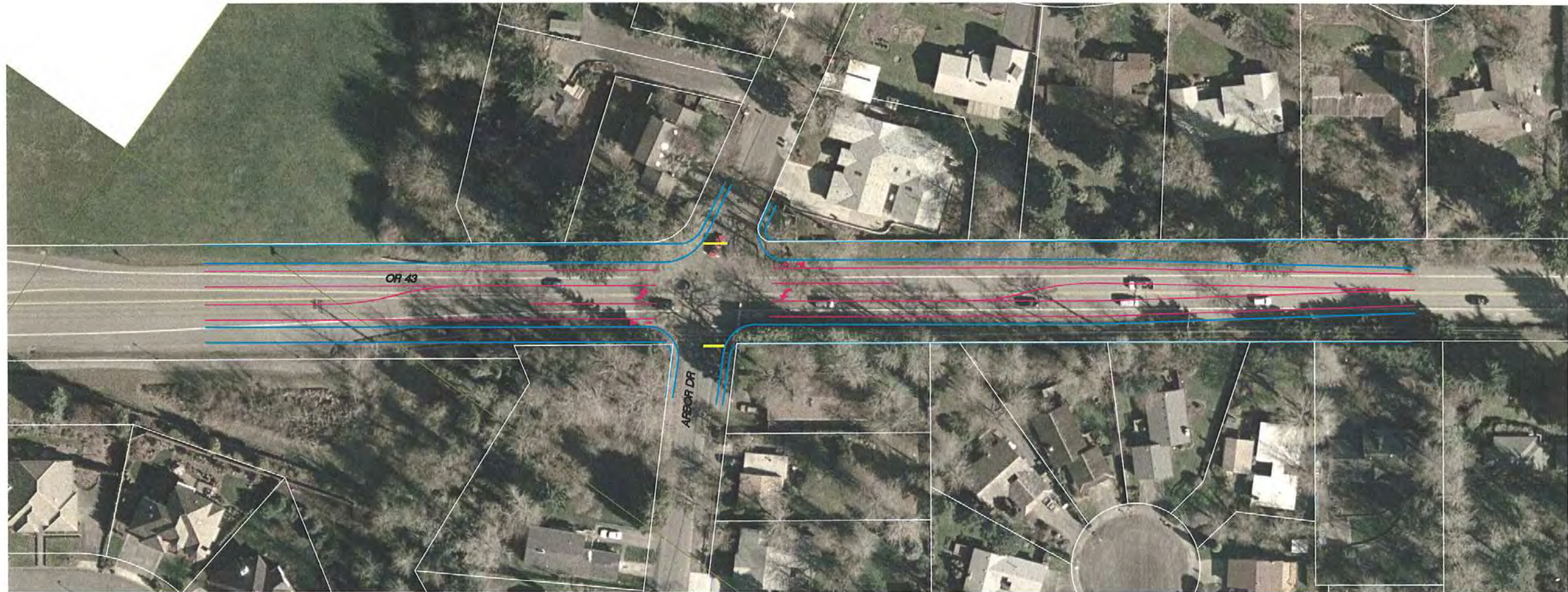
Although there was significant community demand for a marked crosswalk at Arbor, the project team determined that because Arbor is not a signalized intersection, it may not be an entirely safe place to encourage pedestrian crossings. However, planning work is currently underway to link Robinwood Park and Midhill Park with an official trail. Accordingly, a pedestrian crossing may be placed somewhere between Arbor and Marylhurst at some point in the future as the trail plan is determined and refined. If this future crossing does not occur at a signalized intersection, it should ideally be located midblock, at a "T" intersection (at the south leg of Shady Hollow, for example).

The summary of impacts related to these intersection improvements are as follows:

Arbor Drive:

- In order to accommodate northbound and southbound left turn lanes within the existing 80-foot ROW on Highway 43, the proposed cross section with 22-foot planter/sidewalk on each side would be narrowed by approximately 7 feet on each side.
- New curb returns on Arbor Drive may require some additional ROW at the corners or along Arbor Drive if final design includes new sidewalks or widening for the side street.
- No driveways on OR 43 are adjacent to the proposed turn lanes.
- Moving the northbound bus stop to the north side of Arbor Drive would also help facilitate northbound right turns onto Arbor.





### ORE 43 CONCEPTUAL DESIGN PLAN



Scale: 1"=80'

**DKS Associates**  
TRANSPORTATION SOLUTIONS

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NOTE:

ALL PROPOSED DESIGN ELEMENTS ARE CONCEPTUAL, AND ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE. FUTURE SURVEY WORK, ANALYSIS AND ENGINEERING WILL BE NECESSARY TO DETERMINE FINAL ROADWAY DESIGN.

HIGHWAY 43/ARBOR DRIVE  
JUNE 1, 2007

1/8

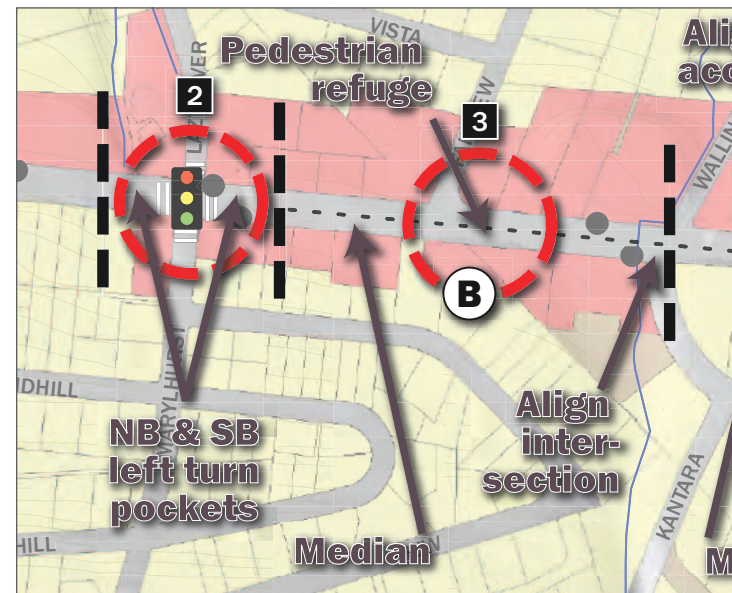
### III. THE PLAN: A DETAILED LOOK

#### Segment B / Intersections 2 & 3

Segment B is an 80' right-of-way with commercial uses on both sides of the street. Consequently, wide (10') sidewalks have been provided to account for greater pedestrian traffic. A 5' planting strip with street tree wells has also been included.

The plan illustrates that medians are desired within this segment in order to channelize traffic and manage access within the commercial node. The exact location and lengths of these medians yet to be determined, however. These median placements will be determined (at a future date, during final engineering), with the participation of local business and property owners. That decision-making process should concurrently address driveway and access consolidation. Minimizing the overall number of driveways can dramatically improve the pedestrian and bike environment as it minimizes conflict with automobiles.

Intersection improvements include the provision of northbound and southbound left turn pockets from OR 43 to Marylhurst / Lazy River.



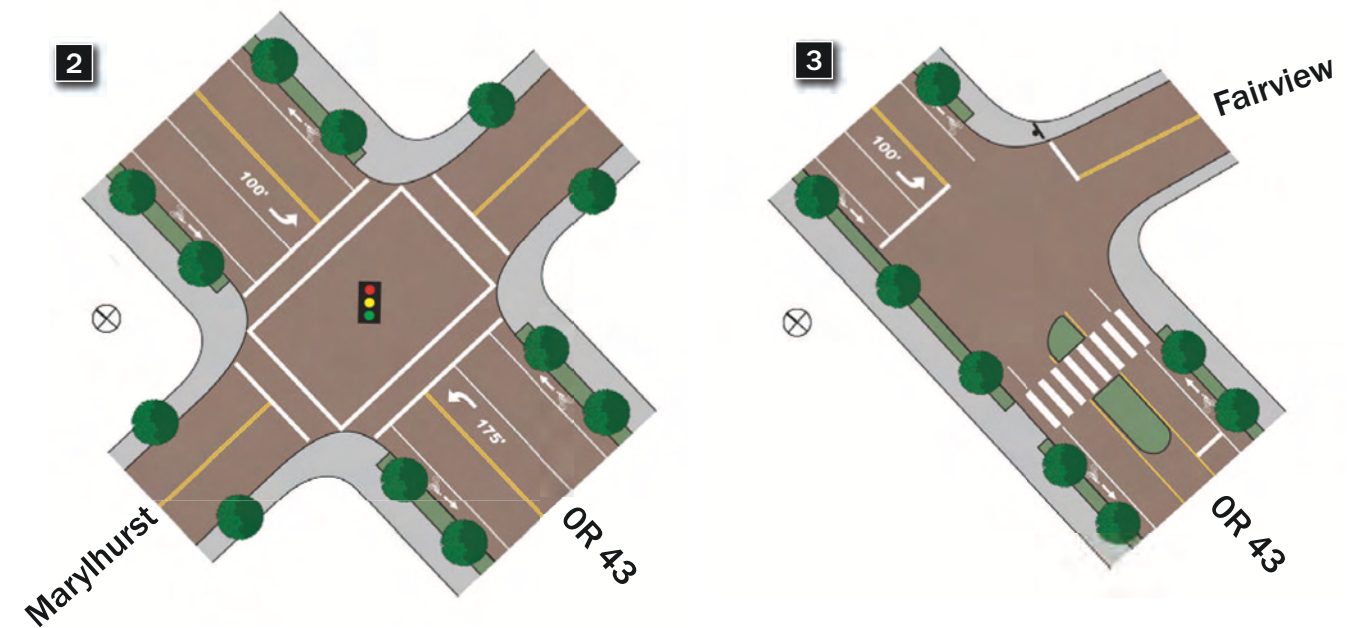
A pedestrian refuge has been provided at the southern leg of the Fairview intersection. This crossing will improve pedestrian circulation and access within the commercial node.

The summary of impacts related to the intersection improvements at Marylhurst Drive/Lazy River Way and Fairview Way are as follows:

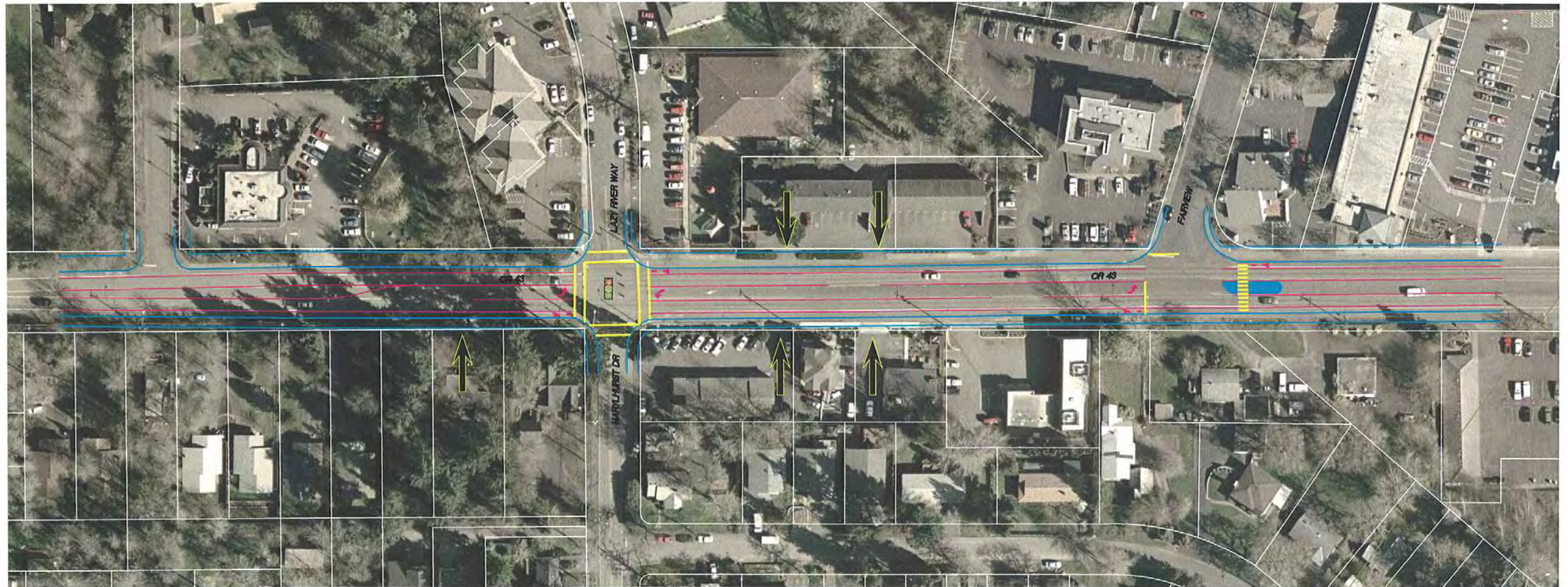
- The proposed cross section fits within the existing 80-foot ROW.
- Driveways are adjacent to the proposed turn lanes, which is the same as the existing condition. One or two locations may have the opportunity to combine driveways, but some conflicts will remain as many buildings are close to the street with one row of parking in front.



Median treatments are proposed for this section; exact median dimensions and placement are yet to be determined, will require additional engineering, and may necessitate driveway consolidation.





\* Raised bikeway subject to ODOT review and approval  
\* Landscaping/swales subject to ODOT approval and maintenance agreement



Scale: 1"=100'

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**LEGEND:**

-  TRAFFIC SIGNAL
-  DRIVEWAY IN CONFLICT WITH SIGNALIZED LEFT TURN POCKET

**ORE 43 CONCEPTUAL DESIGN PLAN**

**NOTE:**

ALL PROPOSED DESIGN ELEMENTS ARE CONCEPTUAL, AND ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE. FUTURE SURVEY WORK, ANALYSIS AND ENGINEERING WILL BE NECESSARY TO DETERMINE FINAL ROADWAY DESIGN.

**HIGHWAY 43/MARYLHURST DRIVE**  
**HIGHWAY 43/FAIRVIEW**  
 JUNE 1, 2007

### III. THE PLAN: A DETAILED LOOK

#### Segment C

Segment C is an 80' right-of-way with commercial uses on one side of the roadway and residential uses on the other. A wide (10') sidewalk and street tree wells have been provided on the commercial side of the street, while a smaller (8') sidewalk and a wide landscaped planting strip is shown on the residential side. As in Segment B, medians are shown as a tool for beautifying the streetscape and managing access, though exact locations and lengths are to be determined during final engineering with the participation of local business and property owners.

The plan recommends aligning the Walling intersection in order to improve functionality and safety.

*Median treatments are proposed for this section; exact median dimensions and placement are yet to be determined, will require additional engineering, and may necessitate driveway consolidation.*



sidewalk	plant strip	* raised bikeway	travel lane	* left turn/median/ ped refuge/swale	travel lane	* raised bikeway	plant strip	sidewalk
6'	9'	6'	12'	10'-12' median 14'-16' striping 50'	12'	6'	5'	10'
15'								15'
pedestrian zone		travel zone				pedestrian zone		

**C**



**Segment D / Intersections 4 & 5**

Segment D is generally an 80' right-of-way, with the Robinwood Shopping Center on one side, and the TriMet shared use park & ride on the other. The cross section responds to the greater amount of pedestrian traffic associated with these land uses, and provides 10' sidewalks on both sides of the street, separated from the bike path and roadway by a planting strip with tree wells. A median is planned for the entire length of Segment D. This median is not expected to negatively impact access along the segment, as the Park & Ride and the commercial use at the northwest corner of OR 43 and Cedar Oak both maintain access drives to side streets.

Furthermore, the plan recommends shifting the existing access drive to the Robinwood Shopping Center from its current midblock location to more closely align with Cedar Oak. This alignment will create a true, 4-leg intersection, and is expected to dramatically improve functionality and safety. It should be noted that the shopping center's parking lot configuration would have to change in order to accommodate this new access drive at the northern boundary of the property. Final determinations regarding specific designs for the new driveway, and the effect of driveway queuing on the existing parking lot's functionality are to be studied and determined during preliminary engineering.

As stated in the previous section, some issues associated with this realignment will need to be addressed during preliminary engineering, however. These issues include examining the effect of

the "skew" angle of Cedar Oak on the proposed improvement, as well as examining any right-of-way takes which may be associated with the improvement. Signage issues associated with proposed new right turn and right through lanes on OR 43 at Cedar Oak will also require ODOT examination. If these issues cannot be satisfactorily resolved, status quo conditions will prevail.

The current property owner has expressed a wish to maintain the existing entrance along HWY 43 as a "right-in / right-out" access drive. However, the recommended driveway realignment is recommended as a safety improvement. Therefore, any decision to keep the current driveway open will depend upon future studies analyzing the safety of maintaining this driveway. It should be noted that the current driveway location and its width negatively impact the pedestrian environment. Furthermore, TriMet has voiced a preference for closing the driveway, based on rider input, as it creates conflicts between automobiles and pedestrians, and endangers transit riders walking to and from nearby bus stops and the park and ride. These moves may also allow TriMet to adjust the current bus stops to better meet the needs of transit riders.

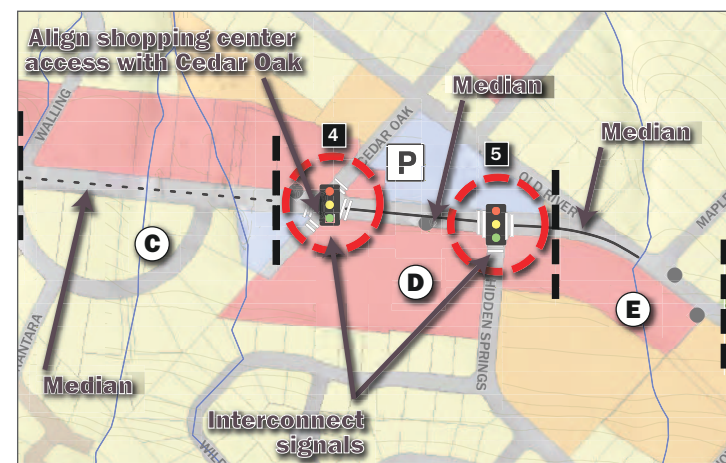
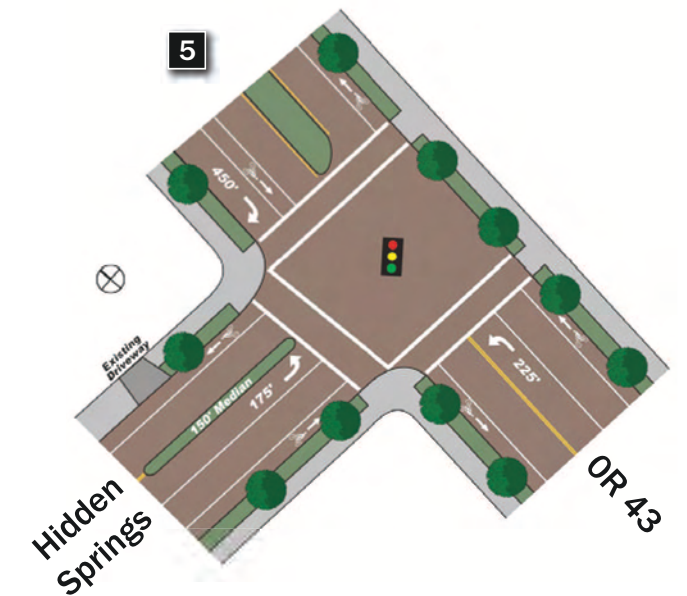
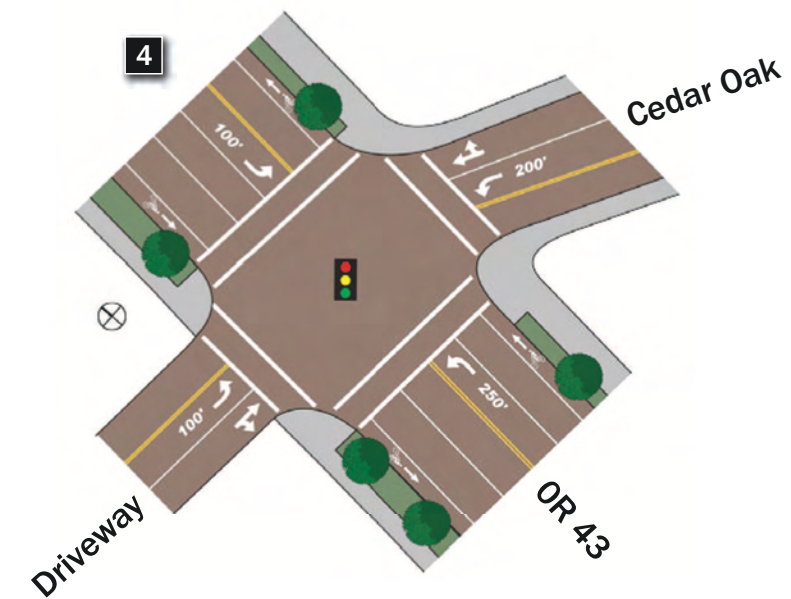
In addition to this realignment, the plan recommends installing a central median along Hidden Springs at the approach to OR 43. This median is designed to prevent left turn maneuvers from the shopping center onto Hidden Springs, and from Hidden Springs into the shopping center. The driveway's proximity to the signal

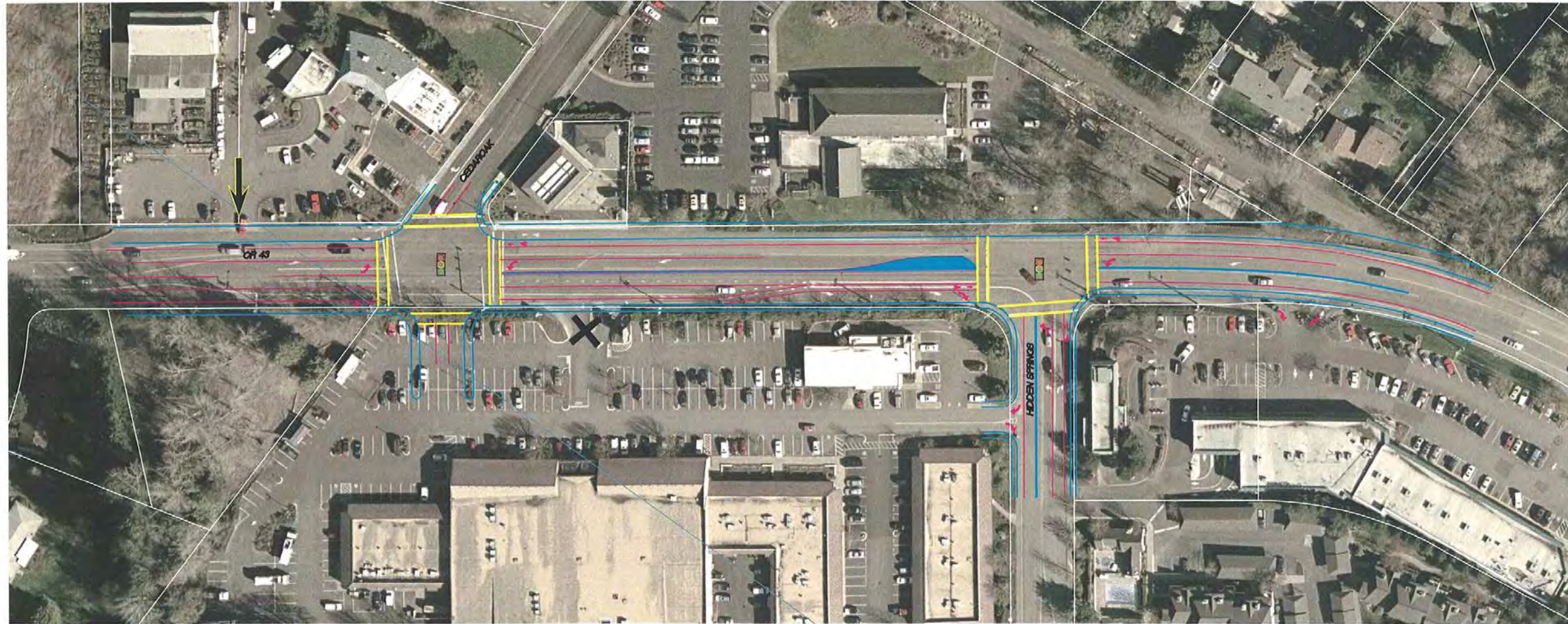
and the volume of traffic flowing through the Hidden Springs intersection makes this maneuver unsafe. The driveway will remain open as a "right-in / right-out" access point. Drivers wishing to make left turns into and out of the shopping center would be encouraged to do so at the access drive located at the rear side of the site (at the property's southern edge).

To further maximize vehicular mobility in this area, the plan recommends interconnecting the traffic signals at Cedar Oak and Hidden Springs.

The summary of impacts related to this intersection improvement at Cedar Oak Drive and Hidden Springs Road are as follows:

- Existing ROW on Highway 43 is approximately 75 to 78 feet. To accommodate turn lanes and minimize ROW takes, the proposed cross section with 15-foot planter/sidewalk on each side would be narrowed by approximately 9 feet on the west side, requiring additional ROW of 5 to 8 feet total width.
- Relocation of the existing commercial driveway between Cedar Oak and Hidden Springs will eliminate one driveway conflict. One driveway north of Cedar Oak Drive will conflict with the proposed left turn lane on Highway 43, but it is already a shared driveway and other access alternatives do not exist. One driveway south of Hidden Springs Road conflicts with the proposed turn lanes, but may be closed because it is one of three driveways that access a single parking lot. It is currently channelized as right-in, right-out.





ORE 43 CONCEPTUAL DESIGN PLAN







Scale: 1"=100'

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LEGEND:

-  TRAFFIC SIGNAL
-  DRIVEWAY IN CONFLICT WITH SIGNALIZED LEFT TURN POCKET
-  CLOSE DRIVEWAY
-  RIGHT-IN/RIGHT-OUT DRIVEWAY

NOTE:

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HIGHWAY 43/CEDAR OAK  
HIGHWAY 43/HIDDEN SPRINGS  
JUNE 1, 2007



**Segments E & F / Intersections 6 & 7**

Segment E is a 60' right-of-way with commercial and residential uses. A curbed median currently exists to prevent left turn maneuvers where the highway curves, and the plan maintains this structure, widening it to 4'.

It has been noted that an automobile/bike conflict currently exists at Mapleton and Old River as bicyclists attempt to access the Mary S. Young trail. They must temporarily travel on the "wrong" side of the road, flowing against traffic. Right-turning motorists often fail to look for bicyclists approaching from the right. Although this issue is beyond the reach of the current project, it is a safety concern, and warrants further examination.

Segment F is also a 60' right-of-way, and borders Mary S. Young State Park. Residential uses, both high and low density, are located on the opposite side of the street.

Intersection improvements include turn pockets at Chow Mein and at Mary S. Young. Additionally, the approach from Mary S. Young to OR 43 has been widened so as to allow right-turning cars to maneuver around stopped, left-turning vehicles. In addition to these mobility improvements, two pedestrian refuge islands have been added to the streetscape. The first is at the northern leg of the OR 43 / Chow Mein intersection. This crossing improves

pedestrian circulation between the high-density residential development and the park. The second pedestrian crossing is located at the entrance to Mary S. Young, providing safe passage to the park. The sidewalks and crossing improvements may warrant a re-examination of the bus stop facilities in this area.

The summary of impacts related to the intersection improvements at Chow Mein Lane and the Mary S. Young entrance are as follows:

- Existing ROW on Highway 43 is approximately 60 feet. The proposed cross section with a 12-foot planter/sidewalk on the west side and a 7-foot planter/sidewalk on the east side would require additional ROW of up to 9 feet total width. To mitigate for this, planting strips will be eliminated, and sidewalks may narrow a bit at intersections to accommodate for the needed right-of-way. It should be noted that though it is highly preferred, sidewalks along the park side of the street may be removed (only if needed) without great detriment to accommodate for intersections, as a multi-use pathway currently exists just within the park boundaries.
- There are no existing driveway conflicts with the proposed left turn lanes. However there are several undeveloped residential lots on the west side of Highway 43 that will require access when developed.



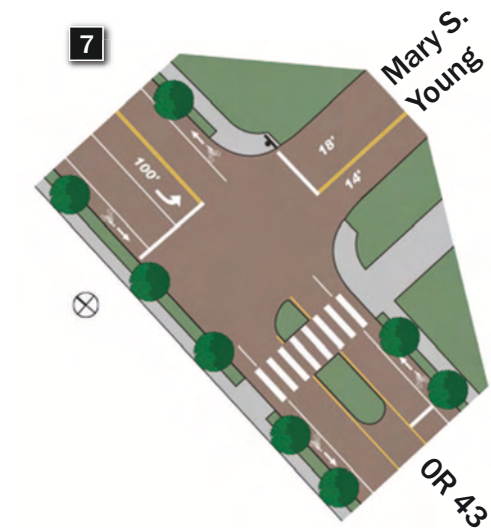
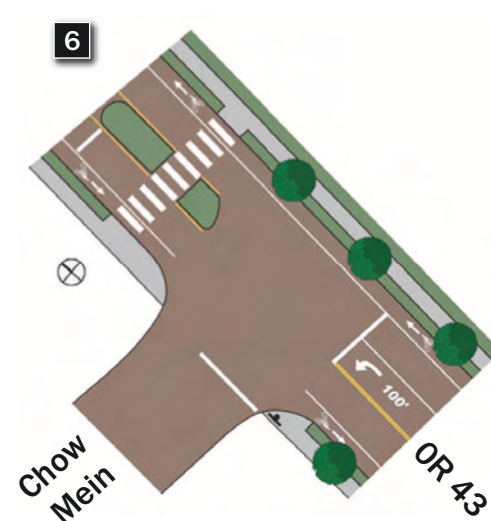
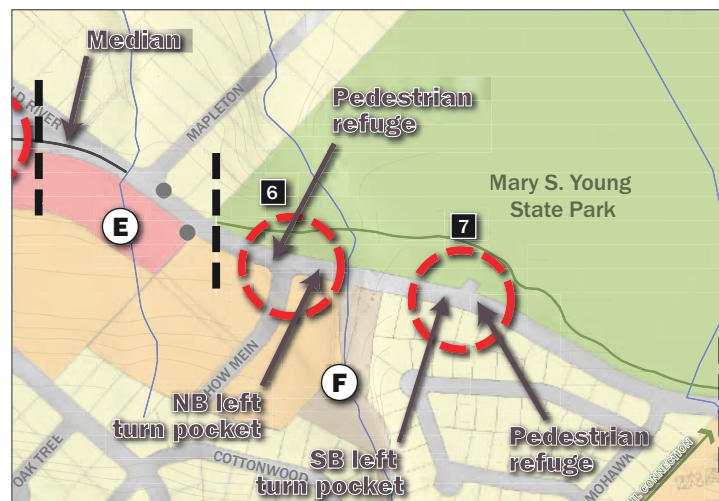
sidewalk	plant strip	* raised bikeway	travel lane	median	travel lane	* raised bikeway	plant strip	sidewalk	
6'	4'	6'	12'	4'	12'	6'	4'	6'	
10'			40'				10'		
pedestrian zone		travel zone				pedestrian zone			

**E**



sidewalk	plant strip	* raised bikeway	travel lane	travel lane	* raised bikeway	plant strip	sidewalk		
7'	5'	6'	12'	12'	6'	5'	7'		
12'			36'				12'		
pedestrian zone		travel zone				pedestrian zone			

**F**





### ORE 43 CONCEPTUAL DESIGN PLAN



Scale: 1"=80'

NOTE:

ALL PROPOSED DESIGN ELEMENTS ARE CONCEPTUAL, AND ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE. FUTURE SURVEY WORK, ANALYSIS AND ENGINEERING WILL BE NECESSARY TO DETERMINE FINAL ROADWAY DESIGN.

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HIGHWAY 43/CHOW MEIN  
HIGHWAY 43/MARY S. YOUNG  
JUNE 1, 2007

**Segments G, H & I / Intersection 8**

Segment G is a 75' right-of-way, with a high-density residential use on one side of the street, and single-family residential on the other. The cross-section includes 8' sidewalks tucked behind an 11.5' planting strip.

Segment H is a 56' right-of-way. Its limited width necessarily dictates that trade-offs be made during the design process. A center turn lane has been provided to ensure safe turning maneuvers from OR 43 onto Jolie Pointe and into the multi-family development. In order to accommodate for this turn lane, both the sidewalks and the bike lane have been narrowed to 5', and the planting strip has been eliminated.

Segment I is a 65' right-of-way surrounded by single-family uses. Because the roadway widens back out, the planting strip has been re-introduced, and the sidewalks and bike lanes widened.

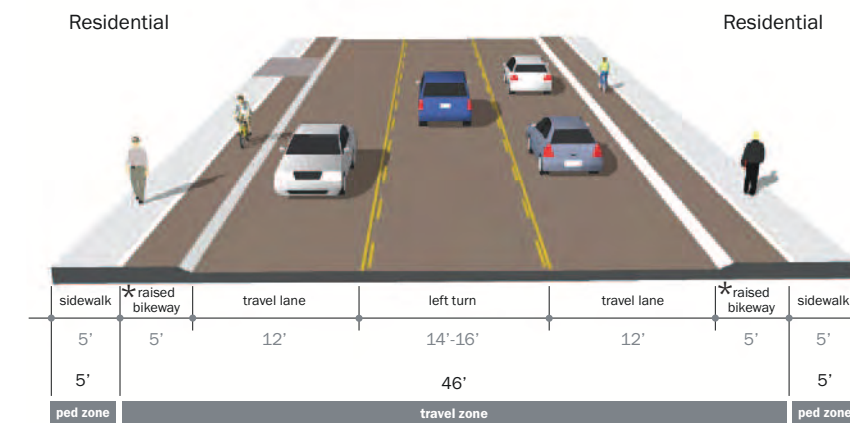
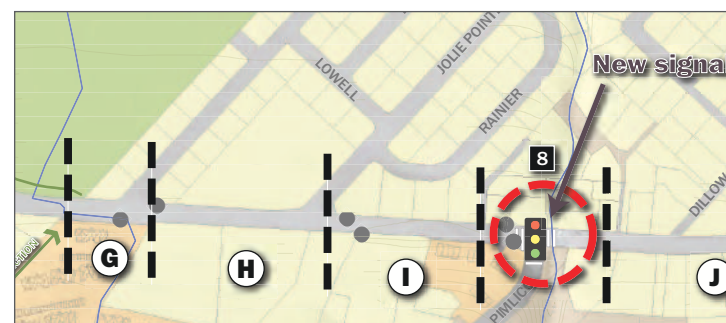
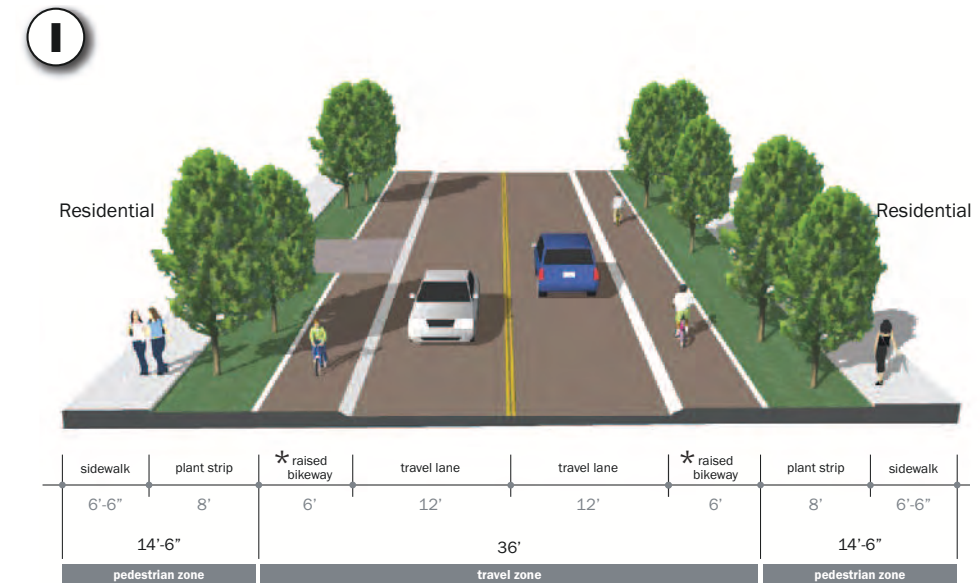
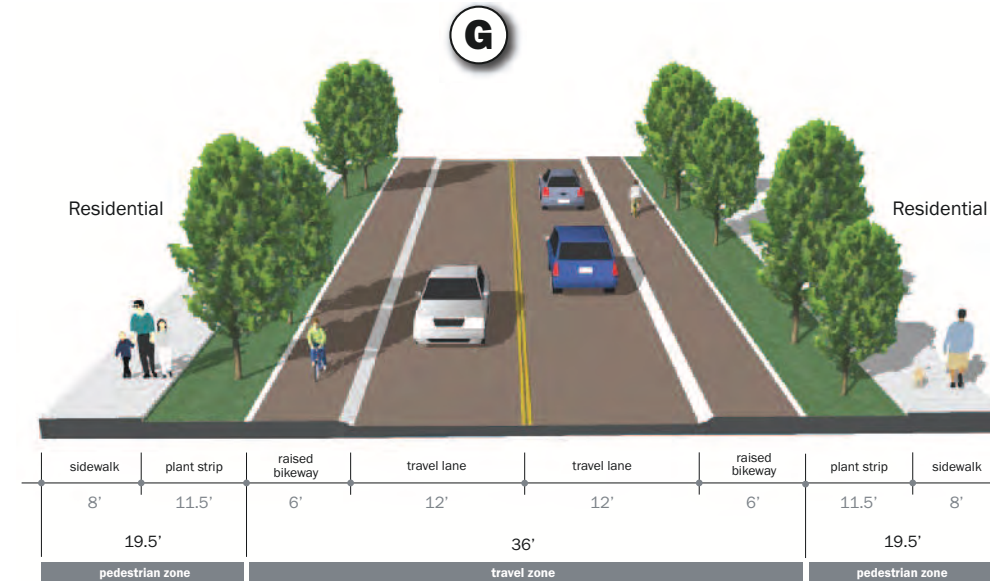
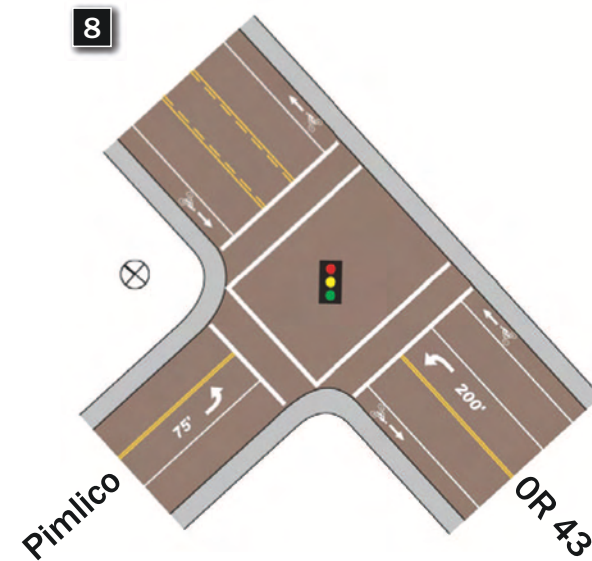
Intersection improvements include a new signal at OR 43 and Pimlico Drive. This new signal is in response to both community input and to the intersection mobility analysis conducted for the project's first technical memo, which showed the intersection's current level-of-service to be deficient. It should be noted that this new signal is subject to ODOT approval.

The summary of impacts related to the intersection improvements at Pimlico are as follows:

- Existing ROW on Highway 43 is approximately 56 to 58 feet. The proposed cross section with 6-foot planter/sidewalk

on each side would require additional ROW of up to 6 feet total width. In order to accommodate intersection right-of-way needs, the planting strip would be narrowed and/or eliminated as it approaches the intersection.

- Three existing driveways south of Pimlico conflict with the proposed left turn lane. A driveway at the intersection conflicts with a proposed crosswalk location.







ORE 43 CONCEPTUAL DESIGN PLAN

Scale: 1"=80'

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LEGEND:

-  TRAFFIC SIGNAL
-  DRIVEWAY IN CONFLICT WITH SIGNALIZED LEFT TURN POCKET

NOTE:

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HIGHWAY 43/PIMLICO DRIVE  
JUNE 1, 2007

\* New traffic signal subject to ODOT approval

**Segments J & K / Intersection 9**

Segment J is a 56' right-of-way surrounded by single-family uses. It includes a 6' sidewalk tucked behind a 4' planting strip. The planting strip may be tapered and/or removed as it approaches the Pimlico intersection, in order to allow for greater intersection right-of-way needs.

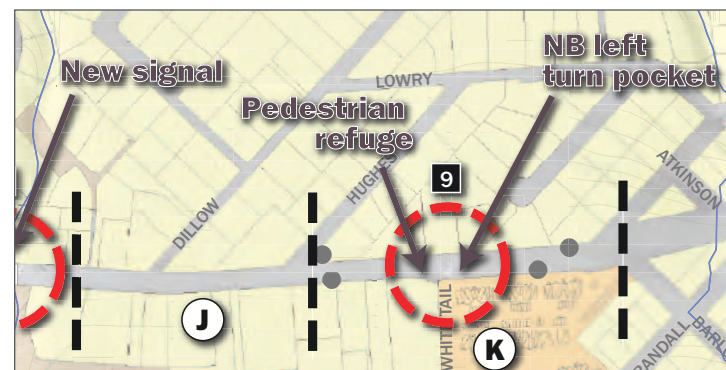
Segment K is a 70' right-of-way, with high-density residential uses on one side of the street, and single-family residential on the other. It includes an 8' sidewalk behind a 9' planting strip.

Intersection improvements include providing a northbound left turn pocket from OR 43 to White Tail Drive. This will facilitate access to the multi-family development.

The left turn pocket allows for a pedestrian refuge island at the northern leg of the White Tail intersection. The crossing will improve pedestrian circulation to and from the multi-family development and to nearby TriMet bus stops, which may warrant adjustment as a result of these improvements.

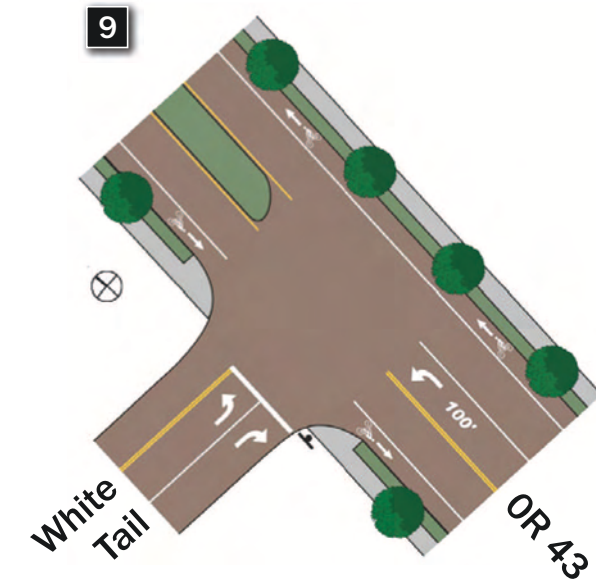
The summary of impacts related to the intersection improvements at Pimlico are as follows:

- Existing ROW on Highway 43 is approximately 57 (north of White Tail) to 69.5 (south of White Tail) feet. By narrowing the proposed planter/sidewalk zone to 6 feet on each side of the proposed cross section, ROW takes of 5 feet in total width would be required north of White Tail. No ROW acquisition would be required south of White Tail.
- There are no existing driveways conflicting with the left turn lane.



sidewalk	plant strip	* raised bikeway	travel lane	travel lane	* raised bikeway	plant strip	sidewalk
6'	4'	6'	12'	12'	6'	4'	6'
10'		36'				10'	
pedestrian zone		travel zone				pedestrian zone	

**J**



**K**



sidewalk	plant strip	* raised bikeway	travel lane	travel lane	* raised bikeway	plant strip	sidewalk
8'	9'	6'	12'	12'	6'	9'	8'
17'		36'				17'	
pedestrian zone		travel zone				pedestrian zone	



ORE 43 CONCEPTUAL DESIGN PLAN



Scale: 1"=80'

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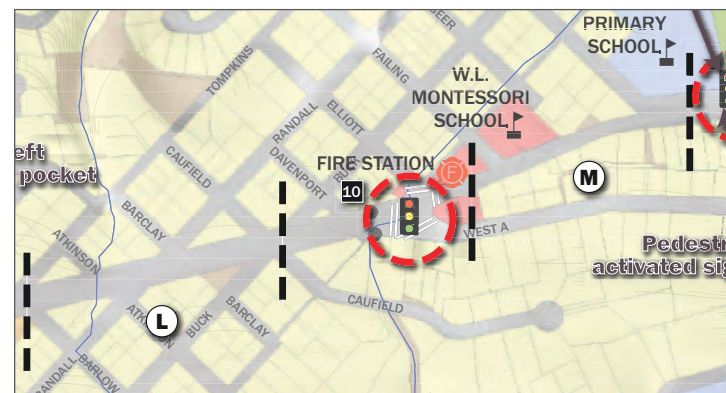
NOTE:

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HIGHWAY 43/WHITE TAIL  
JUNE 1, 2007

**Segments L & M / Intersection 10**

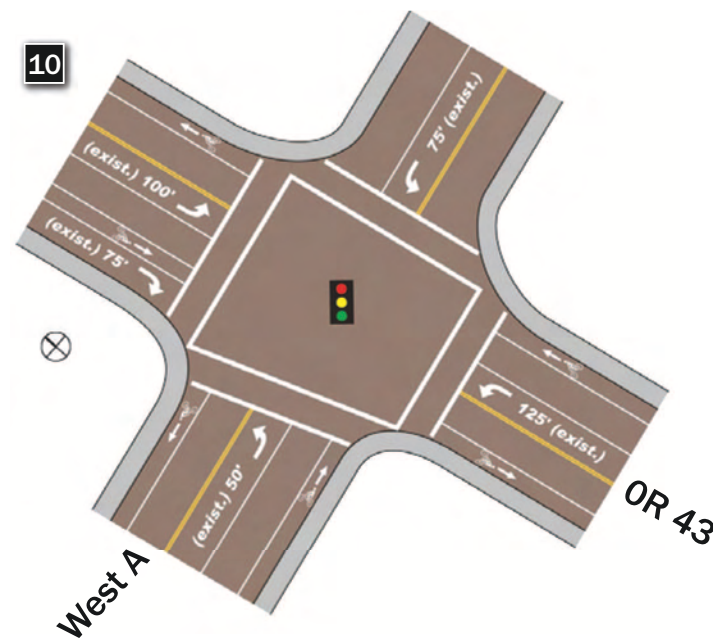
Segment L is a 65' right-of-way running through single-family residential land uses. Because the western, southbound side of the segment runs parallel to a sloped bank where driveways and intersections are absent, the segment presents a unique opportunity to temporarily place the bike lane behind the planting strip. This accomplishes two primary objectives: It further separates the bicyclist from vehicular traffic, providing a greater sense of safety, and it permits the planting strip to serve in a stormwater management capacity. Because planting strips are required to be placed behind the bike lane throughout most of the corridor, their ability to collect street run-off is diminished. However, because Segment L's lack of driveway and intersection conflicts permit the bike lane to be located behind the landscape feature, and allows the planting strip to be located immediately adjacent to the roadway, it is possible to design the planting strip so as to allow stormwater to flow into the planter bed, thereby minimizing stormwater impacts to streams and rivers. As the sloped bank disappears, however, and driveways and intersections once again become an issue, the bike lane and planting strip would once again "switch," and the bike lane would be realigned to be immediately adjacent to the roadway. It should be noted, however, that stormwater swales are not a standard ODOT design, and would be subject to ODOT review to consider cost, safety, and maintenance issues before implementing these features.



Segment M is a 56' right-of-way, and runs through single-family residential uses. Notably, it also passes the West Linn Montessori School. Due to the segment's limited right-of-way, the planting strip is eliminated in order to ensure that adequate sidewalks and bike lanes are provided.

The Tualatin Valley Fire and Rescue District is currently planning to replace the Bolton Fire Station located at 6050 Failing Street. The District would like to restore access to OR 43 from Failing Street in order to improve emergency response time. Having this access could allow for a more context sensitive fire station design, which would be consistent with the Bolton Neighborhood Plan. Opportunities to re-open Failing Street at OR 43 should be considered during project engineering.

No intersection improvements are proposed for the OR 43 / West A Street intersection.



sidewalk	bikeway	plant strip	travel lane	travel lane	raised bikeway	plant strip	sidewalk
6'	6'	8'-6"	12'	12'	6'	8'-6"	6'
20'-6"			30'		14'-6"		
pedestrian zone			travel zone		pedestrian zone		

**L**

**M**



sidewalk	raised bikeway	travel lane	travel lane	raised bikeway	sidewalk
7'	* 6'	12'	12'	* 6'	7'
10'		36'		10'	
pedestrian zone		travel zone		pedestrian zone	

### III. THE PLAN: A DETAILED LOOK

#### Segment N / Intersections 11 & 12

Segment N is a 64' right-of-way, and passes Bolton Primary School and Hammerle Park. Consequently, providing a safe, high-quality pedestrian network is crucial in this segment; thus 6' sidewalks set behind 8' planting strips have been provided on both sides of the street.

A pedestrian activated signal currently exists at OR 43 and Holmes Street. The plan maintains this signal. Additionally, the community has voiced a preference for a pedestrian crossing / refuge island at OR 43 and Lewis Street as well. However, because a left turn pocket has been introduced on OR 43 to allow for left turn movements from the highway into Lewis, the crossing / refuge island would have to be located at the south leg of the OR 43 / Lewis intersection. This placement may present a conflict between pedestrians and left-turning vehicles from Lewis. The final determination regarding the placement of a pedestrian crossing at this location will have to rely upon future safety studies. It should be noted that providing a safe pedestrian crossing at Lewis may result in TriMet removing their nearby stops at Holmes, as these somewhat redundant stops were initially included because of pedestrian safety concerns.

Significant intersection mobility improvements are recommended for Holmes and Lewis. In order to address backups which regularly occur during school drop-off and pick-up hours, the plan recommends a circulation plan, whereby a left turn lane is provided at Lewis, allowing vehicles trying to access the school to

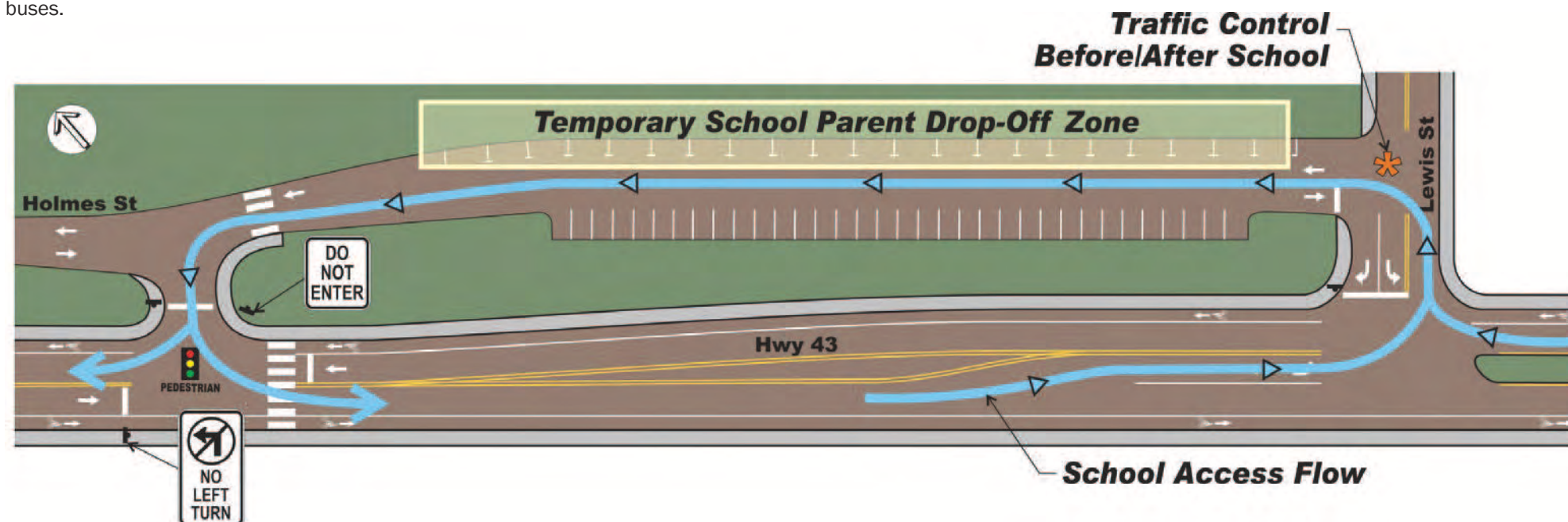
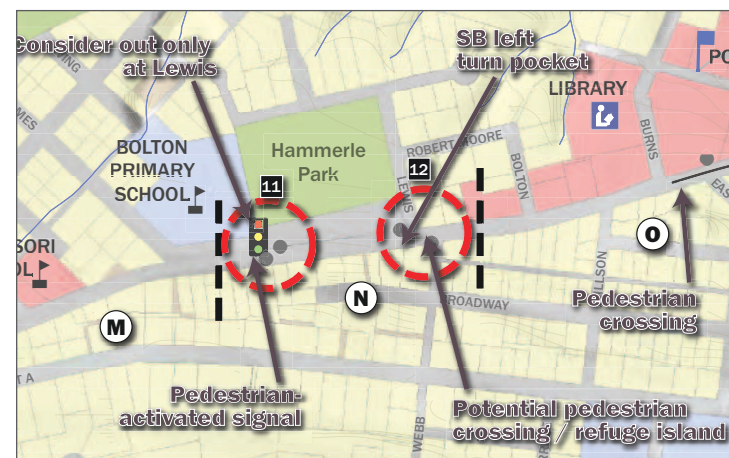
enter here. Students may be dropped off at the Hammerle Park parking area. Vehicles can then proceed through to Holmes, which is converted into an exit-only drive. The proposed circulation plan works largely because of the alternating peak demand hours of the school and the park. During early mornings and afternoons, the park is likely to be in less demand, whereas on weekends and early evenings when park use is likely to be higher, the school is closed.

The summary of impacts related to the intersection improvements at Holmes Street and Lewis Street are as follows:

- The existing ROW on Highway 43 is about 63 feet from Holmes Street to Lewis Street and 112 feet north of Holmes for the segment that includes the combined ROW of Highway 43 and Holmes Street where it doubles back parallel to Highway 43. The proposed cross section at Lewis Street would require 64 feet of ROW, just slightly more than is available, requiring only a small amount of additional ROW.
- The greatest challenge for this segment will be grades as the approach grades to Highway 43 are already somewhat steep and widening of the roadway will make them steeper.
- School bus access is essential, but may be challenging due to grades and geometry at Holmes Street. This will require more in-depth investigation at the preliminary engineering level to determine if the proposed layout is feasible for buses.



sidewalk	plant strip	* raised bikeway	travel lane	travel lane	* raised bikeway	plant strip	sidewalk
6'	8'	6'	12'	12'	6'	8'	6'
14'		36'				14'	
pedestrian zone		travel zone				pedestrian zone	







ORE 43 CONCEPTUAL DESIGN PLAN

Scale: 1"=80'

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LEGEND:

 TRAFFIC SIGNAL

NOTE:

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HIGHWAY 43/HOLMES STREET  
HIGHWAY 43/LEWIS STREET  
JUNE 1, 2007

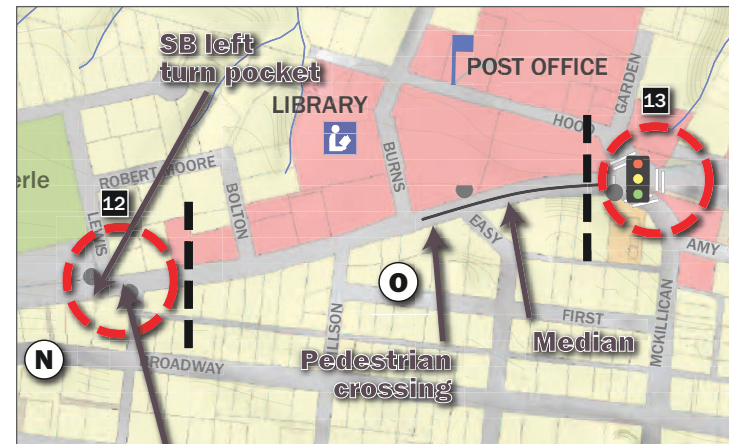
### III. THE PLAN: A DETAILED LOOK

#### Segment 0 / Intersection 13

Segment 0 is a 56' right-of-way, and traverses the Bolton commercial node at the southern limits of the study area. Its limited right-of-way dictates that streetscape elements be prioritized. Accordingly, the cross-section eliminates the planting strip in order to maintain the 6' bike lane and provide sidewalks wide enough to accommodate the needs of a commercial area.

A median currently exists, extending from Hood / McKillican to Easy. The plan recommends extending this median to Burns. Doing so creates an opportunity for a pedestrian crossing at the southern leg of the OR 43 / Burns intersection, thereby maximizing pedestrian circulation and access within the commercial node. The update of the City's Transportation System Plan (TSP) currently underway will examine the need for a new signal at OR 43 and Burns.

Additionally, the plan recommends installing landscaping within the existing, concrete median as a means of beautifying the streetscape.



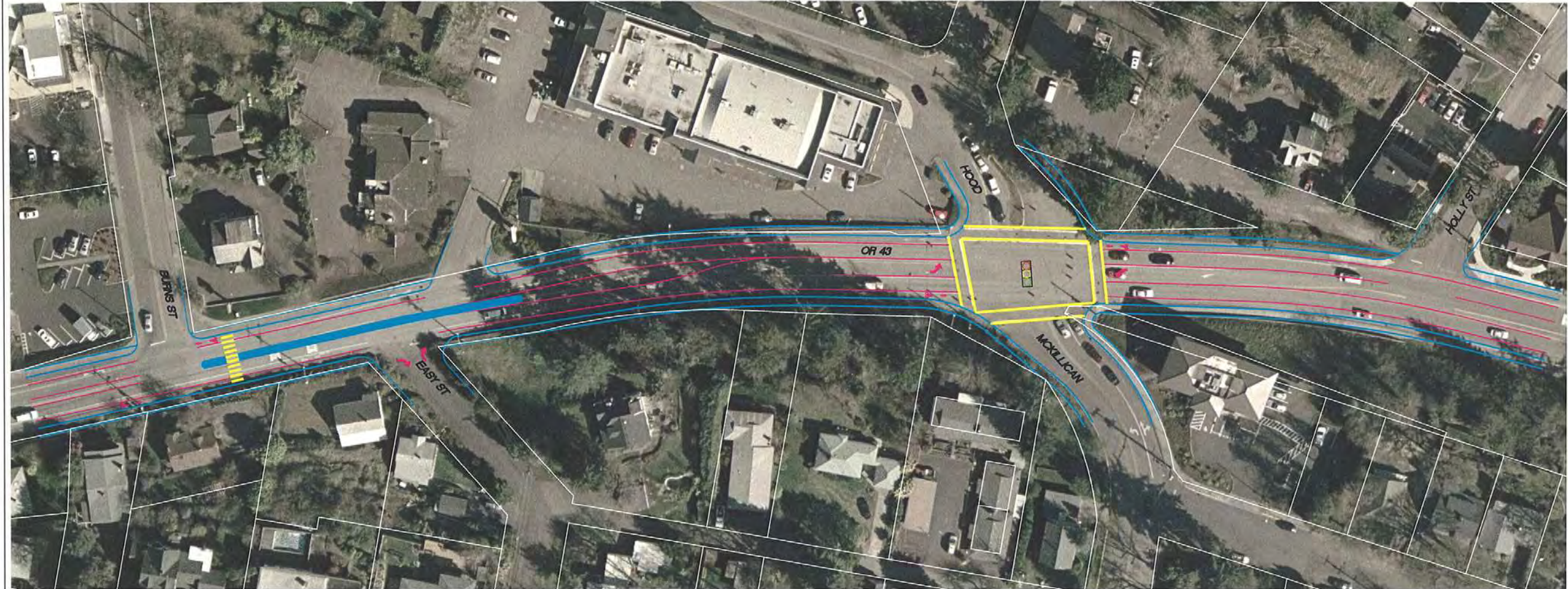
The summary of impacts related to the intersection improvements at Hood Street / McKillican Street are as follows:

- The proposed cross section with left turn lanes would require 64 feet of ROW. At the narrowest point, the existing ROW on Highway 43 is 60 feet, but is generally in the range of 62 to 66 feet so some small slivers of private property acquisition would be required.
- There are no existing driveways that conflict with the proposed left turn lanes on Highway 43.



sidewalk	* raised bikeway	travel lane	* median/ ped refuge	travel lane	* raised bikeway	sidewalk
7'	6'	12'	4'- 6' median 6- 8- striping	12'	6'	7'
7'			42'			7'
pedestrian zone		travel zone			pedestrian zone	





### ORE 43 CONCEPTUAL DESIGN PLAN





Scale: 1"=80'

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LEGEND:

-  TRAFFIC SIGNAL
-  RIGHT-IN/RIGHT-OUT DRIVEWAY

NOTE:

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HIGHWAY 43/MCKILLICAN  
JUNE 1, 2007

# IV. ANALYSIS OF FUTURE TRAFFIC CONDITIONS

This section discusses the effect of the Final Proposed Conceptual Design Plan on 2030 peak hour traffic volumes. The proposed Conceptual Design addresses many of the connectivity and operational issues identified by the public and detailed analysis as deficient throughout the course of the project. However, some issues will require further refinements and, potentially require design exceptions to fully implement this design.

## Review of Traffic Analysis

The following are highlights of the traffic analysis work conducted at the beginning stages of the project, information which was used during the conceptual design process. These findings should help in evaluating how well the proposal meets the needs identified in the corridor. Those key findings are as follows:

- Peak hour conditions at unsignalized locations have significant delay for the minor street approaches to the highway. However, only the Pimlico Drive intersection meets warrants for traffic signal controls.
- Peak hour conditions at the study intersections that are controlled by traffic signals operate with moderate congestion, and all comply with the minimum acceptable standards for a state facility.
- The Pimlico Drive intersection with Highway 43 meets preliminary warrants for installing a traffic signal, based on current peak hour volumes. However, further study is needed to fully justify a traffic signal at this location.
- The two locations that are approaching the minimum acceptable limit are the two adjoining intersections at Cedar Oak Drive and at Hidden Springs Drive. The Cedar Oak Drive intersection operates at 90 percent of capacity in the AM peak hour, and the Hidden Springs Road intersection operations at 83 percent of capacity in the PM peak hour.
- The Bolton School access onto Highway 43 provides for a pedestrian activated signal crossing. Vehicle access at this location can create significant queues on the highway, since there is not enough room for a southbound left-turn lane on the highway. It was also noted that the pedestrian push button can be activated by vehicle occupants to create a 'gap' in traffic for egress onto the highway.
- Most of the segments of the Highway 43 do not meet ODOT access spacing standards today. The most significant

exceptions are those that have a higher frequency of activity, notably those that serve commercial areas.

- Pedestrian volumes recorded during the AM and PM peak hours at the study intersections showed minimal levels at all locations. The exception is at Cedar Oak Drive, where the park and ride lot for transit access is located.
- Similarly, the observed bicycle volumes and transit usage during peak hours is relatively low. It was noted that bicycle volumes generally are higher during midday and on weekends than the levels observed during weekday commute hours.

## 2030 Conditions without Proposed Improvements

The table at right illustrates future (2030) intersection performance assuming no roadway capacity or operational improvements are made to OR 43. The table shows that four of the intersections controlled by traffic signals will exceed the minimum operational standards during one or both of the peak hours by 2030 without improvements either to the traffic signal or to the approaches provided at those locations. Locations without traffic signals will continue to have long delays for traffic turning onto the highway.

**Table 1: 2030 Future Base Weekday Peak Hour Intersection Level of Service**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marybrook Dr	A	6.8	0.51	B	10.8	0.59
Hwy 43 / Maryhurst Dr- Lazy River Way	D	41.9	>1	D	44.7	>1
Hwy 43 / Cedaroak Dr	F	95.3	>1	B	14.8	0.88
Hwy 43 / Hidden Springs Rd	C	21.7	0.78	E	57.2	>1
Hwy 43 / West A St	C	23.8	0.88	C	25.4	0.95
Hwy 43 / Hood St-McKillican St	D	36.0	0.93	D	48.8	>1
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/F	> 50	0.00/0.98	B/F	> 50	0.05/>1
Hwy 43 / Pimlico Dr	B/F	> 50	0.12/>1	B/F	> 50	0.27/>1
Hwy 43 / Holmes St	B/F	> 50	0.06/>1	B/F	> 50	0.04/>1
Hwy 43 / Lewis St	B/F	> 50	0.02/0.49	B/F	> 50	0.02/0.47

Notes: LOS = Level of Service

Delay = Average vehicle delay in the peak hour for entire intersection in seconds.

Unsignalized Intersection Operations:

A/A = Major street turn LOS / Minor street turn LOS

## = Major street turn v/c / Minor street turn v/c

**2030 Conditions with Proposed Concept Design**

The Final Proposed Conceptual Design Plan addresses some, but not all of the identified operational problems, primarily because of issues with terrain and right-of-way constraints along the study corridor. In addition, the City of West Linn and many residents expressed their preference to retain the narrow, three-lane configuration of OR 43 in order to protect the character of their city. This desire is consistent with ODOT’s facility plan for the highway, as well as the Regional Transportation Plan.

At the study intersections, additional turn lanes have been added where they improve overall intersection operations. In several cases, additional northbound and/or southbound through lanes would be required for intersection performance to be within ODOT operational standards. Those intersections will require design exceptions from ODOT.

Storage lengths for turn pockets will generally accommodate the forecasted 2030 95th percentile queue or meet minimum ODOT standards, whichever is greater. Exceptions are those locations where storage is limited by geometry (Lewis Street and Hood Street) or where congestion causes longer queues than can be cleared during a single traffic signal cycle. The proposed lane configurations and storage lengths are shown in the Appendix.

2030 intersection performance according to the improvements suggested as part of the Final Proposed Conceptual Design Plan are illustrated in the table at right.

**Findings and Recommendations**

- According to local residents, many through vehicles pass left-turning vehicles by using the shoulder on the right at the intersection of Highway 43/Arbor Drive, creating conflicts with cyclists who use the shoulder. Left turn lanes should be added on Highway 43 at Arbor Drive to remove left-turning vehicles from the through traffic stream to improve both safety and queuing on Highway 43. However, the added lanes will not improve delay for vehicles turning onto the highway and the intersection will continue to operate at LOS F on Arbor Drive.
- The intersection of Highway 43/Marylhurst Drive cannot be mitigated to meet operational standards without the addition of additional through lanes on Highway 43, which are not included in the proposed conceptual design.

- A private driveway south of the intersection of Highway 43/Cedar Oak Drive should be relocated farther north to become the west leg of the intersection. Traffic counts were not performed at this driveway but an approximation of the trips at this driveway was made based on trip generation for similar land use. This information was used to determine intersection performance and queue lengths for 2030.
- Circulation at the school and park at Holmes Street and Lewis Street should be modified to allow left turns in at Lewis Street only and exit only traffic at Holmes Street. This would re-direct inbound vehicle traffic to the school through the parking lot that adjoins the park area. It is expected that the peak school activity (before and after school session) would not occur at the same times at peak park activity, and so the conflicts between parked vehicles and entering school traffic would be minimal. There is sufficient right-of-way at Lewis Street to provide a southbound left-turn pocket that cannot be accommodated at Holmes Street. Although this modification would not improve operations for the side streets, left turning vehicles would be removed from the through traffic stream. Lewis Street would not meet the PM peak hour traffic signal warrant in 2030 with this modification.
- The intersection of Highway 43/Hood Street - McKillican Street could be mitigated to a v/c of 0.89 with the addition of an eastbound right turn lane. However the eastbound approach is severely constrained by grade and by a newer building and retaining walls at the southwest corner, so this additional lane would probably not be feasible. With an adjustment to signal cycle length, but without the additional lane, the intersection would barely meet operational standards as shown in Table 2. Property owners east of this intersection have raised concerns about existing queuing on Hood Street during the PM peak hour. A study supporting protected left turn phasing for Hood Street and McKillican Street was presented to the City. Intersection operations would meet operating standards under existing conditions with the modification of left turn phasing from permitted to protected, but would be deficient in 2030 with a v/c greater than 1.0 and an increase in average delay per vehicle for southbound through traffic, the heaviest movement in the PM peak hour. Some of the westbound left-turning vehicles could be diverted to a new traffic signal at Highway 43/Burns Street to ease queuing at Hood Street. It should be noted that the two signals would be less than 700 feet apart

**Table 2: 2030 Future Weekday Peak Hour Intersection Level of Service for Proposed Conceptual Design Plan**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marylbrook Dr	A	6.8	0.51	B	10.8	0.59
Hwy 43 / Marylhurst Dr- Lazy River Way	D	41.9	>1	D	44.7	>1
Hwy 43 / Cedaroak Dr	F	> 80	>1	D	36.6	0.93
Hwy 43 / Hidden Springs Rd	C	28.8	0.75	D	50.1	>1
Hwy 43 / Pimlico Dr	C	23.8	0.88	C	31.5	0.99
Hwy 43 / West A St	C	23.8	0.88	C	25.4	0.95
Hwy 43 / Hood St-McKillican St	D	36.0	0.93	D	51.0	0.99
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/F	> 50	0.00/0.98	B/F	> 50	0.05/>1
Hwy 43 / Holmes St	A/F	> 50	n/a />1	A/F	> 50	n/a />1
Hwy 43 / Lewis St	B/F	> 50	0.07/0.27	B/F	> 50	0.07/0.45

*Notes: LOS = Level of Service  
 Delay = Average vehicle delay in the peak hour for entire intersection in seconds.  
 Unsignalized Intersection Operations:  
 A/A = Major street turn LOS / Minor street turn LOS  
 #/# = Major street turn v/c / Minor street turn v/c*

## IV. ANALYSIS OF FUTURE TRAFFIC CONDITIONS

### Traffic Signal Warrants

PM peak hour traffic signal warrants were evaluated for the unsignalized study intersections. The intersection of Highway 43/Pimlico Drive does meet this warrant for the existing traffic volumes and the 2030 future base conditions; however, the intersection would require additional mitigation with the installation of a traffic signal to meet operational standards. It should also be noted that meeting the PM peak hour traffic signal warrant alone is not sufficient justification for installation of new signal and additional study would be required. The remaining unsignalized intersections would not meet the PM peak hour warrant for 2030 future conditions.

### Outstanding Issues

The recommended Conceptual Design Plan fails to meet the ODOT operating standards during the AM and PM peak hours. The deficient locations include:

- Highway 43 / Marylhurst Dr.–Lazy River Way: AM and PM peak hours
- Highway 43 / Cedar Oak Drive: AM peak hour
- Highway 43 / Hidden Springs Road: PM peak hour

In addition, all locations without traffic signals will have major delays for side street approaching traffic during peak hours. This is consistent with the current findings under existing volumes.

While this Conceptual Plan does not include designs for the expansion of OR 43 beyond three lanes, nothing in this Plan shall prohibit the City from considering, at a later date, other options to increase roadway capacity, including additional vehicular lanes and transit accommodations, however other options must be consistent with state and regional plans, policies and standards.

### Park-and-Ride Opportunities

Although it is not within the scope of this document to make recommendations regarding the future land uses along the study area, it is important to note that the City's Transportation System Plan (TSP) specifically identifies the need for additional park-and-ride lots in areas along transit routes. Due to West Linn's topography, lack of transit, and relatively low population density, most citizens must drive to a park-and-ride in order to utilize public transportation and park-and-ride lots are a key provision of

the City's Transportation System Management (TSM) strategy to effectively reduce automobile traffic and to encourage the use of alternative modes of transit. West Linn has but one park and ride lot and this lot at the Emanuel United Presbyterian Church should be maintained and its usage should continue to be promoted by the City. The City should actively pursue and encourage additional park-and-ride lots within the Highway 43 corridor. In the future, all park-and-ride lots should be equipped with a transit bus shelter as well as bicycle parking and convenient pedestrian access. The location, design, and amenities of all future park-and-ride lots must be coordinated with Tri-Met and ODOT as necessary.



# V. COST ESTIMATES AND FUNDING SOURCES

## Project Cost Estimates

Estimated costs for implementing the OR 43 Conceptual Design Plan are outlined in the chart at right. The estimates assume that conventional storm drainage systems will be constructed with the roadway.

## Possible Funding Sources

Several options exist for obtaining the funding needed to implement the Final Conceptual Design Plan. One such option is to increase the City's transportation system development charge (SDC) rate, using the increase to fund improvements along the corridor. However, this option may not have the capacity to produce a significant level of funding if there is in fact little development occurring along the corridor due to existing buildout.

An additional funding option is to create a city-wide major street improvement program, such as Washington County's Major Street Improvement Program (MSTIP), which identified a fixed list of popular projects and funded these projects through property tax increments for a fixed term.

Another option is to compete for Metropolitan Transportation Improvement Program (MTIP) funding. The MTIP is a list of transportation improvement projects compiled by Metro that are funded using federally allocated monies. However, this process is very competitive, and the project would need to be divided into phases in order to compete for funding. The chance of receiving MTIP funding could be improved if the City and/or County is able to have OR 43 designated as a frequent bus route. (Additionally, the pedestrian and bike improvements could be used as opportunities to improve transit accessibility along the corridor.)

## Highway 43 Conceptual Design Plan North West Linn City Limit to south of McKillican Street

Roadway Segment	Total Length [ft]	Limits	Assumed Unit Cost per SF		Cost / Linear Foot	Estimated Cost
			Paved Width	Landscape / Sidewalk		
A	1900	North City Limit to Marylhurst	50	30	\$960	\$1,824,000
B	1080	Marylhurst to Walling Circle (N)	50	30	\$960	\$1,036,800
C	950	Walling Circle (N) to Cedaroak	50	30	\$960	\$912,000
D	700	Cedaroak to Hidden Springs	50	30	\$960	\$672,000
E	750	Hidden Springs to N/o Chow Mein	50	12	\$834	\$625,500
F	1780	N/o Chow Mein to Mohawk Way	50	12	\$834	\$1,484,520
G	270	Mohawk Way to Mark Lane	50	25	\$925	\$249,750
H	590	Mark Lane to Joile Pointe	48	10	\$790	\$466,100
I	630	Jolie Pointe to Pimlico	50	15	\$855	\$538,650
J	850	Pimlico to Hughes	36	20	\$680	\$578,000
K	900	Hughes to Tompkins	50	20	\$890	\$801,000
L	950	Tompkins to Buck	36	29	\$743	\$705,850
M	850	West A Street to Holmes	36	20	\$680	\$578,000
N	840	Holmes to Webb	50	14	\$848	\$712,320
O	1640	Webb to Hood-McKillican	42	14	\$728	\$1,193,920

**A. Total Estimated Roadway Cost \$12,378,410**

## Other Improvements

	Number	Unit Cost	
Traffic Signal / New	1	\$250,000	\$250,000
Traffic Signal / Modified (adding 4th leg)	1	\$100,000	\$100,000
Traffic Signal / Modified (Protected - Permissive Side Streets)	1	\$50,000	\$50,000
Ped Refuge Island	5	\$20,000	\$100,000
New bridge north of Arbor Drive to replace culvert (assumes fish present)*	1	\$500,000	\$500,000

**B. Total Estimated Other Improvements \$1,000,000**

**Subtotal for Street Improvements (A + B) \$13,378,410**

Contingency	25% **	\$3,344,603
Design / Permits	20%	\$2,675,682
Administration	15%	\$2,006,762

**C. Implementation Costs \$8,027,046**

**Grand Total Cost Estimate (A + B + C) \$21,405,456**

\* Without fish, construction costs for a new culvert would be approximately \$16,000 (\$26,000 with implementation costs).

\*\* It is expected that there will be considerable variability in paving costs per section of the highway depending on existing roadway conditions at the time of construction.





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## Technical Memorandum #1

**DATE:** May 1, 2007  
**TO:** Project Management Team  
**FROM:** Carl Springer, PE; Colette Snuffin, PE

**SUBJECT:** **Task 2.2: Technical Memorandum # 1 –  
Existing Conditions and 2030 Base Future Conditions**

P07024-000

This memorandum provides a review of existing and 2030 base future transportation conditions for the ORE 43 Conceptual Design Plan. An analysis of how the transportation system performs today was made to establish a baseline for evaluations. This information is compared to identified performance or design standards, as appropriate, and any elements that are found to be deficient are identified. This information also serves as a basis of comparison for the Proposed Conceptual Design evaluations that will follow. The system review and performance analysis was based upon the transportation system inventory compiled during November 2006, February 2007 and March 2007.

The following ten intersections along Highway 43 (ORE 43) were selected for focused operations analysis. The study intersections are identified in Figure 1.

- Highway 43 / Marylbrook Drive (at Marylhurst University in Lake Oswego)
- Highway 43 / Arbor Drive
- Highway 43 / Marylhurst Drive-Lazy River Way
- Highway 43 / Cedaroak Drive
- Highway 43 / Hidden Springs Road
- Highway 43 / Pimlico Drive
- Highway 43 / West A Street
- Highway 43 / Holmes Street
- Highway 43 / Lewis Street-Webb Street
- Highway 43 / Hood Street-McKillican Street

At each location, traffic data was gathered and analyzed to evaluate current conditions and performance for all modes of travel. Additional data was collected for other aspects of the transportation system including reported vehicle crashes, built facilities as described by City and Metro GIS data, and reported traffic volumes on state and county facilities. The following sections describe the characteristics, usage, and performance of Highway 43 in the City of West Linn.

## Existing Conditions

### Motor Vehicle

Field inventories were conducted to determine characteristics of major roadways in the study area. Data collected included posted speed limits, roadway lanes, geometry and lane configurations, and intersection controls. These characteristics define roadway capacity and operating speeds through the corridor. The results are listed in Table 1.

**Table 1: Existing Study Area Roadway Characteristics by Functional Classification<sup>1</sup>**

Corridor	Posted Speed (mph)	ROW Width (ft)	Number of Lanes	Lane Width (ft)
<i>Principal Arterial</i>				
Highway 43 (Willamette Drive)	35	50-100	2-4	12
<i>Arterial</i>				
Hidden Springs Road	25	60	2	11
West A Street	25	60	2	11
<i>Collector</i>				
Marylhurst Drive	25	50	2	10
Cedaroak Drive	25	50	2	11
Pimlico Drive	25	60	2	14-16
Hood Street	25	40	2	11
McKillican Street	25	60	2	12

Intersection control types at study intersections are shown on Figure 2. Seven of the ten study intersections are controlled by traffic signals. The intersection at Highway 43 / Holmes Street is controlled by a pedestrian-actuated traffic signal. The remaining intersections at Highway 43 / Arbor Drive, Highway 43 / Pimlico Drive, and Highway 43 / Lewis Street-Webb Street are stop-controlled on the minor street approaches.

Highway 43, also known as the Oswego Highway, ORE 43 and Willamette Drive, is a state facility managed by ODOT. The Oregon Highway Plan identifies the Highway 43 as a Statewide Highway within the study area and for the majority of its length in West Linn. Statewide Highways often function as connectors to larger urban areas, ports, provide safe and efficient, high-speed, continuous flow operations, and serve as inter-urban and inter-regional connectors.

Functional classifications and the corresponding design standards for Highway 43 differ slightly between the 1998 West Linn TSP, the Clackamas County Comprehensive Plan and the ODOT's standards. The most significant difference between the three sets of standards is

<sup>1</sup> 1998 West Linn Transportation System Plan, Figure 3-12.

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At each location, traffic data was gathered and analyzed to evaluate current conditions and performance for all modes of travel. Additional data was collected for other aspects of the transportation system including reported vehicle crashes, built facilities as described by City and Metro GIS data, and reported traffic volumes on state and county facilities. The following sections describe the characteristics, usage, and performance of Highway 43 in the City of West Linn.

## Existing Conditions

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Field inventories were conducted to determine characteristics of major roadways in the study area. Data collected included posted speed limits, roadway lanes, geometry and lane configurations, and intersection controls. These characteristics define roadway capacity and operating speeds through the corridor. The results are listed in Table 1.

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West A Street	25	60	2	11
<i>Collector</i>				
Marylhurst Drive	25	50	2	10
Cedaroak Drive	25	50	2	11
Pimlico Drive	25	60	2	14-16
Hood Street	25	40	2	11
McKillican Street	25	60	2	12

Intersection control types at study intersections are shown on Figure 2. Seven of the ten study intersections are controlled by traffic signals. The intersection at Highway 43 / Holmes Street is controlled by a pedestrian-actuated traffic signal. The remaining intersections at Highway 43 / Arbor Drive, Highway 43 / Pimlico Drive, and Highway 43 / Lewis Street-Webb Street are stop-controlled on the minor street approaches.

Highway 43, also known as the Oswego Highway, ORE 43 and Willamette Drive, is a state facility managed by ODOT. The Oregon Highway Plan identifies the Highway 43 as a Statewide Highway within the study area and for the majority of its length in West Linn. Statewide Highways often function as connectors to larger urban areas, ports, provide safe and efficient, high-speed, continuous flow operations, and serve as inter-urban and inter-regional connectors.

Functional classifications and the corresponding design standards for Highway 43 differ slightly between the 1998 West Linn TSP, the Clackamas County Comprehensive Plan and the ODOT's standards. The most significant difference between the three sets of standards is

<sup>1</sup> 1998 West Linn Transportation System Plan, Figure 3-12.

that ODOT does not allow parking while the other two would allow limited parking. Travel lane, bike lane, and sidewalk widths vary somewhat between the three standards. The sample cross section from the West Linn TSP depicts the maximum right-of-way width for a three-lane principal arterial. ODOT standards would require that cross section to have a 16-foot median/turn lane and no parking for a total maximum right-of-way width of 80 feet. The City, County, and State functional classifications and design standards for Highway 43 are listed in Table 2.

**Table 2: Functional Classifications and Design Standards**

Jurisdiction	Functional Classification	Design Standard
City of West Linn	Principal Arterial	Vehicle Lane Widths: 11-14' On Street Parking: limited Bike Lanes: 5-6' Sidewalks: 6-12' Landscape Strips: 0-8' Medians/Turn Lane Widths: 0-14' ROW Width on Hwy 43 (per Development Code): 60-80' Sample Cross Section from the TSP:
Clackamas County	Major Arterial	Paved Width: 36-98' Roadside Parking: restricted Bikeways: yes Sidewalk: yes Landscape Strip: yes, unless impractical due to physical constraints Minimum ROW Width: 60-125'
ODOT	Urban Principal Arterial, Statewide Highway and National Highway System	Travel Lane Width: 12' Left Turn Lane: 16' including 12' raised median with 2' shy on both sides or 12' lane with 2' raised median and 2' shy On-street Parking: none Right Side Shoulder (or Bike Lane): 6' Sidewalk: 6-8' if curbside; 6' with 4-8' buffer strip if separated

Sources: 1998 West Linn TSP, City of West Linn Community Development Code, Clackamas County Comprehensive Plan (updated August 2005), Oregon Highway Plan (updated January 2006), 2003 ODOT Highway Design Manual (Table 8-4)

**Motor Vehicle Volumes**

An inventory of peak hour traffic conditions was performed during November 2006, February 2007, and March 2007. Ten study intersections were selected for focused analysis in coordination with the City of West Linn and ODOT staff to address areas of concern along Highway 43. AM (7:00 to 9:00) and PM (4:00 to 6:00) peak period turn movement counts were conducted at the study intersections for establishing current traffic performance. Existing peak hour turn movement volumes, lane configurations and traffic control type are shown on Figure 2.

Figure 2 also shows the average daily two-way existing traffic volumes on Highway 43. Vehicle volumes on this roadway within the study area range between 20,700 and 26,800 vehicles per day. These two-way traffic volumes can vary from day to day and month to month based on weather, surrounding roadway conditions (such as construction), and holidays.

**Existing Operation Conditions**

Level of Service (LOS) and volume to capacity (v/c) ratios are both used as measures of effectiveness for intersection operation. LOS is similar to a "report card" rating based upon average vehicle delay. Level of Service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. Level of Service D and E are progressively worse peak hour operating conditions. Level of Service F represents conditions where average vehicle delay exceeds 80 seconds per vehicle entering a signalized intersection and demand has exceeded capacity. This condition is typically evident in long queues and delays. Unsignalized intersections provide levels of service for major and minor street turning movements. For this reason, LOS E and even LOS F can occur for a specific turning movement; however, the majority of traffic may not be delayed (in cases where major street traffic is not required to stop). LOS E or F conditions at unsignalized intersections generally provide a basis to study intersections further to determine availability of acceptable gaps, safety and traffic signal warrants.

A volume to capacity ratio (v/c) is the peak hour traffic volume at an intersection divided by the maximum volume that intersection can handle. For example, when a v/c is 0.80, peak hour traffic is using 80 percent of the intersection capacity. If traffic volumes exceed capacity, queues will form and will lengthen until demand subsides below the available capacity. When the v/c approaches 1.0, intersection operation becomes unstable and small disruptions can cause traffic flow to break down.

Level of service, delay and volume to capacity ratios are used as measures of effectiveness for study intersection performance. The minimum operational standard specified in the *City of West Linn Comprehensive Plan* (April 2006) is LOS D for all facilities except principal arterials (Highway 43) where the minimum is LOS E. The

ODOT operating performance standards<sup>2</sup> require intersections on Highway 43 within the study area to operate below a maximum volume-to-capacity (v/c) ratio of 0.99. Although Metro's 2040 Growth Concept Plan Map shows a Town Center area between approximately West A Street and McKillican Street, the area has not met specific development criteria spelled out in the Regional Transportation Plan so ODOT does not apply the Town Center v/c standard to this segment.<sup>3</sup>

The PM peak hour intersection volumes were used to determine the existing study intersection operating conditions based on the *2000 Highway Capacity Manual* methodology for signalized and unsignalized intersections<sup>4</sup>. Traffic volumes and level of service calculations can be found in the appendix.

Table 3 summarizes the existing weekday AM and PM peak hour intersection operation at study intersections. Intersections controlled by traffic signals operate within accepted standards during both periods. Two locations with the highest level of peak hour usage are at two adjoining locations. The ORE 43 intersections at Hidden Springs and at Cedaroak use 83 to 90 percent of available capacity<sup>5</sup> today during peak hours, and can serve some additional traffic growth before reaching the maximum 99 percent level specified by ODOT.

The study intersections that are stop-controlled on the minor approaches do not operate within acceptable standards. The estimated delay for vehicles turning left onto the highway from the minor street is very significant, with an LOS F rating. This is a common situation on major highways throughout the State, and, in most cases, the side street volumes are too low to justify additional improvements. Further review will be made to determine if volumes and spacing are sufficient to justify installation of traffic signals or other higher capacity traffic controls.

**Table 3: Existing (2007) Weekday Peak Hour Intersection Level of Service**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marylbrook Dr	A	6.3	0.39	A	9.7	0.46
Hwy 43 / Marylhurst Dr-Lazy River Way	B	16.5	0.79	B	16.3	0.80
Hwy 43 / Cedaroak Dr	C	22.9	0.90	B	10.4	0.65
Hwy 43 / Hidden Springs Rd	B	18.7	0.73	C	25.0	0.83
Hwy 43 / West A St	B	14.5	0.67	B	12.5	0.74
Hwy 43 / Hood St-McKillican St	C	21.6	0.72	C	23.6	0.76
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/E	44.3	0.00/0.35	B/F	> 50	0.03/0.37
Hwy 43 / Pimlico Dr	A/F	> 50	0.08/>1	B/F	> 50	0.16/>1
Hwy 43 / Holmes St	A/E	45.5	0.03/0.12	B/F	> 50	0.02/0.65
Hwy 43 / Lewis St	B/E	43.4	0.01/0.18	B/E	40.0	0.01/0.15

Notes: LOS = Level of Service  
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.

Unsignalized Intersection Operations:  
A/A = Major street turn LOS / Minor street turn LOS  
## = Major street turn v/c / Minor street turn v/c

**Traffic Signal Warrants**

PM peak hour traffic signal warrants were evaluated for the unsignalized study intersections. The intersection of Highway 43/Pimlico Drive does meet this warrant for the existing traffic volumes; however, the intersection would require additional mitigation with the installation of a traffic signal to meet operational standards. It should also be noted that meeting the PM peak hour traffic signal warrant alone is not sufficient justification for installation of new signal and additional study would be required. The remaining unsignalized intersections do not meet the PM peak hour warrant for existing conditions.

**Parking**

Very little on-street parking is available on Highway 43 within the study area.

<sup>2</sup> 1999 Oregon Highway Plan, Oregon Department of Transportation, August 2006, Policy 1F.  
<sup>3</sup> Ross Kevlin, ODOT, March 9, 2007.  
<sup>4</sup> 2000 Highway Capacity Manual, Transportation Research Board, 2000.  
<sup>5</sup> Percent of capacity = volume-to-capacity ratio. For example, 83% used capacity is the same as 0.83 v/c ratio.

**Access Management**

Proper roadway access spacing is important to maintain operating characteristics and safety. Typically, each parcel is allowed access to the adjacent roadway. However, when roadway access points are located too frequently along a roadway, action may need to be taken. Access management practices can include closure, consolidation or relocation of accesses.

The ODOT access management standards, as defined in OAR 734-051, call for minimum distances between access points on the same side of the highway. The distances required depend on the posted speed of the facility. Within the study area, the ODOT minimum spacing standard that applies to Highway 43 is 770 feet<sup>6</sup> based on the functional classification of Statewide Highway with a posted speed of 35 mph. ODOT would like to change the functional classification of this segment of Highway 43 to a District Highway.<sup>7</sup> The minimum spacing standard for a District Highway with a posted speed of 35 mph is 350 feet<sup>8</sup>.

Most segments of the Oswego Highway (OR 43) do not meet ODOT access spacing standards as a result of frequent roadway intersections or driveways located along the highway as it passes through residential areas.

<sup>6</sup> 1999 Oregon Highway Plan, Oregon Department of Transportation, August 2006, Table 13.  
<sup>7</sup> Ross Kevlin, ODOT, noted on March 21, 2007, that the state would like to change the classification of Highway 43 in West Linn to District Highway, but that it is unknown at this time when that change would occur.  
<sup>8</sup> 1999 Oregon Highway Plan, Oregon Department of Transportation, August 2006, Table 15.

**Traffic Safety**

The last two and a half years (2003 through 2006) of available collision data were obtained from ODOT to identify any areas of traffic safety concern along Highway 43.

Table 4 summarizes the collisions experienced at study intersections and the resulting collision rate calculates the number of collisions per million vehicles entering the intersection. Collision rates of 1.0 or greater are generally used as indicators that specific intersections should be investigated further for potential safety enhancements. As shown, all study intersections maintain collision rates well below 1.0.

**Table 4: Collision Rates**

Intersection	Total Collisions (Year 2003-2006)	Collision Rate
Highway 43 / Marylbrook Drive	2	0.14
Highway 43 / Arbor Drive	1	0.07
Highway 43 / Marylhurst Drive-Lazy River Way	8	0.56
Highway 43 / Cedaroak Drive	5*	0.33
Highway 43 / Hidden Springs Drive	6	0.38
Highway 43 / Pimlico Drive	0	0.00
Highway 43 / West "A" Street	2	0.13
Highway 43 / Holmes St	2	0.13
Highway 43 / Lewis St-Webb St	3	0.20
Highway 43 / Hood Street-McKillican Street	0	0.00

Source: ODOT – Transportation Data Section – Crash Analysis and Reporting Unit, Continuous System Crash Listing, City of West Linn, 2003-2006.

\* One crash at this intersection involved one pedestrian.  
Crash Rate = (Crashes\*1000000) / (Years\*ADT\*340)

**Truck Freight**

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. Clackamas County and the City of West Linn identify Highway 43 as a freight route within the West Linn UGB.

Truck (heavy vehicle) volumes were collected as part of the intersection turn movement counts and were used in motor vehicle operations calculations. Truck volumes and percentages at the study intersections are listed in Table 5. In general, truck volumes are a

much higher percentage of total vehicle traffic during the AM peak hour, 4 to 7 percent, while during the PM peak hour they are typically only 1 or 2 percent of the total traffic flow.

**Table 5: Peak Hour Truck Volumes at Study Intersections**

Intersection	Intersection Truck Volume		Truck % of All Vehicular Traffic	
	AM	PM	AM	PM
Highway 43 / Marylbrook Drive	86	24	6%	1%
Highway 43 / Arbor Drive	57	26	4%	1%
Highway 43 / Marylhurst Drive-Lazy River Way	71	26	4%	1%
Highway 43 / Cedaroak Drive	112	31	6%	2%
Highway 43 / Hidden Springs Drive	122	23	6%	1%
Highway 43 / Pimlico Drive	109	54	6%	3%
Highway 43 / West "A" Street	108	60	6%	3%
Highway 43 / Holmes St	117	45	7%	2%
Highway 43 / Lewis St-Webb St	121	45	7%	2%
Highway 43 / Hood Street-McKillican Street	91	42	5%	2%

Source: Traffic Counts conducted November 2006, February 2007, and March 2007

**Pedestrian**

Narrow sidewalks exist along portions of the study corridor with few connections to existing sidewalks or paths on side streets. At side streets with no vehicular connection to Highway 43, there is generally some way for pedestrians to make their way to Highway 43, but these connections are not ADA compliant. There are no sidewalks north of Cedaroak Drive. South of Cedaroak Drive, there is a narrow sidewalk on at least one side of Highway 43.

Pedestrian crossing volumes at the study intersections were counted between during the AM and PM peak periods. The weather on the days of the counts was cloudy to partly cloudy with precipitation between 0.01 and 0.94 inches and high temperatures in the mid 50s to mid 60s. The peak hour pedestrian volumes indicate the relative differences in pedestrian demand at study intersections. Although the study area vehicular evening peak hour typically occurs from 4:00 to 5:00 PM, intersections located near schools and other activity centers may experience higher pedestrian volumes earlier in the day. The highest pedestrian counts for the study area were near the existing park-and-ride facility at Cedaroak Drive. Pedestrian volumes at each study intersection are shown in Table 6. The location with the highest pedestrian counts during the peak period is highlighted in gray.

**Table 6: Peak Hour Pedestrian Crossing Volumes at Study Intersections**

Intersection	North/South Pedestrian Volume		East/West Pedestrian Volume	
	AM	PM	AM	PM
Highway 43 / Marylbrook Drive	0	6	1	1
Highway 43 / Arbor Drive	0	2	0	0
Highway 43 / Marylhurst Drive-Lazy River Way	2	7	0	3
Highway 43 / Cedaroak Drive	3	2	2	14
Highway 43 / Hidden Springs Drive	0	2	1	0
Highway 43 / Pimlico Drive	1	1	4	1
Highway 43 / West "A" Street	0	1	0	3
Highway 43 / Holmes St	2	1	2	6
Highway 43 / Lewis St-Webb St	0	1	0	0
Highway 43 / Hood Street-McKillican Street	1	0	1	1

Source: Traffic Counts conducted November 2006, February 2007, and March 2007

**Bicycle**

Bike lanes are present throughout the study area on Highway 43. The only connecting street with bike lanes within the study area is West A Street.

Bicycle counts were conducted during the AM and PM peak periods. The weather on the days of the counts was cloudy to partly cloudy with precipitation between 0.01 and 0.94 inches and high temperatures in the mid 50s to mid 60s. The peak hour bicycle volumes at each study intersection are shown in Table 7. These volumes indicate extremely low bicycle activity at the study intersections.

**Table 7: Bicycle Crossing Volumes at Study Intersections**

Intersection	North/South Bicycle Volume		East/West Bicycle Volume	
	AM	PM	AM	PM
Highway 43 / Marylbrook Drive	0	0	0	0
Highway 43 / Arbor Drive	0	0	0	2
Highway 43 / Marylhurst Drive-Lazy River Way	0	0	0	0
Highway 43 / Cedaroak Drive	0	0	0	1
Highway 43 / Hidden Springs Drive	0	0	0	0
Highway 43 / Pimlico Drive	0	1	0	0
Highway 43 / West "A" Street	0	0	0	0
Highway 43 / Holmes St	1	0	0	1
Highway 43 / Lewis St-Webb St	1	0	0	1
Highway 43 / Hood Street-McKillican Street	0	1	0	0

Source: Traffic Counts conducted November 2006, February 2007, and March 2007

**Transit**

Transit service is provided in West Linn by the Tri County Metropolitan Transportation District of Oregon (TriMet), which provides transit service for the Portland Metro area including the counties of Clackamas, Multnomah and Washington. TriMet Route 35 travels through West Linn along Highway 43, connecting the Oregon City Transit Center and downtown Portland. There is one park-and-ride in West Linn located at Highway 43 / Cedaroak Drive for commuters wishing to travel north on Route 35. TriMet service to the study area is summarized in Table 8.

**Table 8: Transit Service Route Weekday Peak Period Level of Service**

Transit Route	Average Headways (Minutes)			Level of Service Based on Time between Buses		
	AM	Midday	PM	AM	Midday	PM
#35 Inbound	13	30	27	B	E	D
#35 Outbound	30	30	18	E	E	C

*Note: AM Period = 6:00-08:30 AM, Midday Period = 8:30 AM-4:00 PM, PM Period = 4:00-6:00 PM  
Level of Service for transit service based on headway: less than 10 minutes = LOS A;  
10-14 minutes = LOS B; 14-19 minutes = LOS C; 20-29 minutes = LOS D; 30-60 minutes = LOS E;  
And greater than 60 minutes = LOS F.*

The existing transit routes, shelters and amenities are illustrated on Figure 3. Within the study area, there are only two stops with bus shelters, at Marylhurst University and near the Bolton Area shopping center.

Of the 60 bus stops currently within West Linn, TriMet is proposing to abandon eight stops for Route 35 on Highway 43 due to low ridership and poor pedestrian access.<sup>9</sup> The stops listed in Table 9 and labeled on Figure 3 will likely be removed spring 2007.

**Table 9: Bus Stops TriMet Proposing to Abandon**

Stop ID	Cross Street	Travel Direction	Relative Position
9243	Chow Mein Lane	Northbound	Opposite
9244	Chow Mein Lane	Southbound	Farside
6342	Mohawk Way	Northbound	Opposite
6343	Mohawk Way	Southbound	Farside
6323	Hughes Lane	Northbound	Nearside
6315	Failing Street	Northbound	Nearside
6316	Failing Street	Southbound	Opposite
6313	Easy Street	Southbound	Farside

<sup>9</sup> Information from Young Park, TriMet, received March 5, 2007. For additional information regarding the status of the proposal, contact Myleen Richardson, TriMet.

A TriMet bus stop generally has to serve at least 35 passengers per weekday to be a candidate for a shelter. Based on a TriMet 2006 ridership census, only two stops in the study area have more than 35 passengers per weekday, Highway 43 / Cedaroak Drive (northbound) and Highway 43 / Hidden Springs Drive (southbound). The stop with the next highest activity level is the northbound stop at Highway 43 / Marylbrook Drive, which does not have a shelter, but serves too few passengers to warrant one.

**2030 Base Future Conditions**

Future travel forecast information was developed for the Highway 43 study area for the year 2030 using the current regional travel demand forecast model from Metro.

**Travel Forecasting Method**

The growth in peak hour volume through the corridor averages just over 1 percent per year. These forecasts include expected local re-development and infill changes, as well as regional growth that would use the corridor. The base year traffic volumes at the study intersections were factored<sup>10</sup> to estimate 2030 volumes by applying the rate calculated from the travel demand model. Figure 4 provides a summary of the forecasted AM and PM peak hour traffic volumes for the 2030 Future Base Conditions that were developed based on the regional travel demand model.

**Future Operations Analysis**

The study intersection performance for the 2030 Future Base Conditions listed in Table 10 is based on existing geometries and traffic controls. No roadway capacity or operational improvements have been assumed in this analysis; we used the same roadway features and traffic control measures as exists today to determine how well traffic would operate without any improvements.

<sup>10</sup> Growth factor of 1.1 percent per year for 23 years was applied to 2007 traffic counts. The total growth for the study period was 1.29 times current volumes.



**Table 10: 2030 Future Base Weekday Peak Hour Intersection Level of Service**

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Average Delay (Sec)	Volume/Capacity (v/c)	LOS	Average Delay (Sec)	Volume/Capacity (v/c)
<i>Signalized Intersections</i>						
Hwy 43 / Marylbrook Dr	A	6.8	0.51	B	10.8	0.59
Hwy 43 / Marylhurst Dr- Lazy River Way	D	41.9	>1	D	44.7	>1
Hwy 43 / Cedaroak Dr	F	95.3	>1	B	14.8	0.88
Hwy 43 / Hidden Springs Rd	C	21.7	0.78	E	57.2	>1
Hwy 43 / West A St	C	23.8	0.88	C	25.4	0.95
Hwy 43 / Hood St-McKillican St	D	36.0	0.93	D	48.8	>1
<i>Unsignalized Intersections</i>						
Hwy 43 / Arbor Dr	A/F	> 50	0.00/0.98	B/F	> 50	0.05/>1
Hwy 43 / Pimlico Dr	B/F	> 50	0.12/>1	B/F	> 50	0.27/>1
Hwy 43 / Holmes St	B/F	> 50	0.06/>1	B/F	> 50	0.04/>1
Hwy 43 / Lewis St	B/F	> 50	0.02/0.49	B/F	> 50	0.02/0.47

Notes: LOS = Level of Service  
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.  
Unsignalized Intersection Operations:  
A/A = Major street turn LOS / Minor street turn LOS  
## = Major street turn v/c / Minor street turn v/c

**Traffic Signal Warrants**

PM peak hour traffic signal warrants were evaluated for the unsignalized study intersections. The intersection of Highway 43/Pimlico Drive does meet this warrant for the existing traffic volumes and the 2030 future base conditions; however, the intersection would require additional mitigation with the installation of a traffic signal to meet operational standards. It should also be noted that meeting the PM peak hour traffic signal warrant alone is not sufficient justification for installation of new signal and additional study would be required. The remaining unsignalized intersections would not meet the PM peak hour warrant for 2030 Future Base conditions.

**Findings**

Recommended mitigations have not been determined. Several of the study intersections fail to meet the ODOT operating standards during the AM and PM peak hours. The deficient locations include:

- Highway 43 / Marylhurst Dr. – Lazy River Way AM and PM peak hours
- Highway 43 / Cedaroak Drive AM peak hour
- Highway 43 / Hidden Springs Road PM peak hour
- Highway 43 / Hood St. – McKillican St. PM peak hour

In addition, all locations without traffic signals will have major delays for side street approaching traffic during peak hours. This is consistent with the current findings under existing volumes.

Further evaluation is required to determine the specific type and extent of improvements that may address the poor performance noted above. This analysis will be addressed in subsequent technical reports.

# ORE 43 Conceptual Design Plan



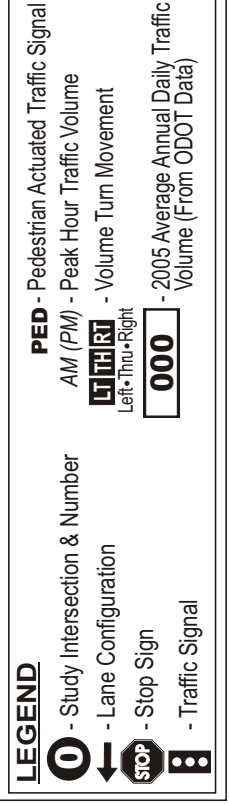
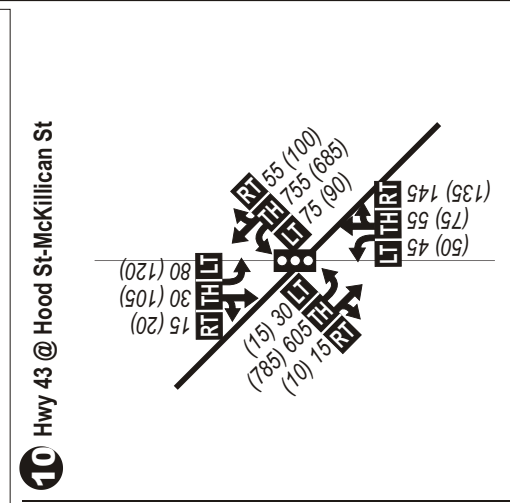
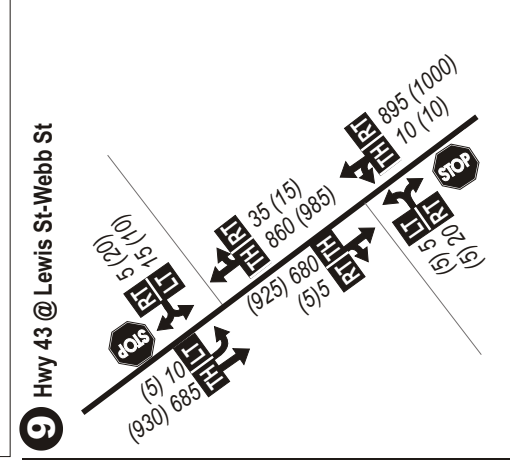
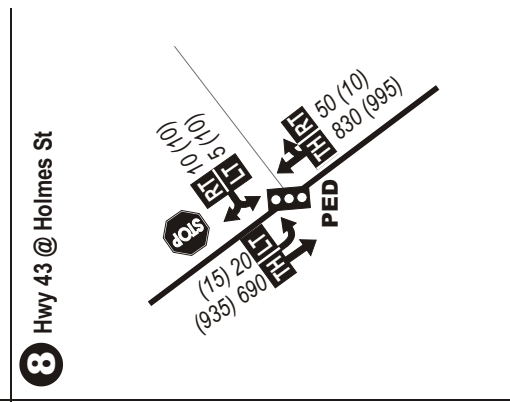
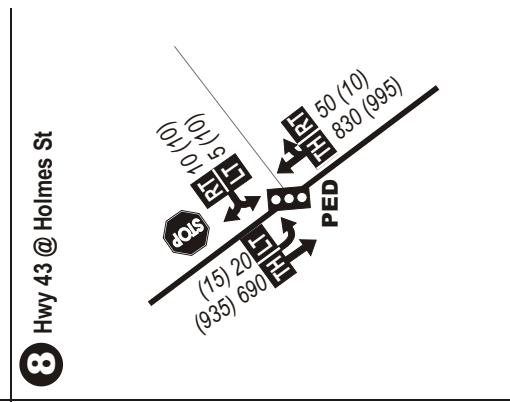
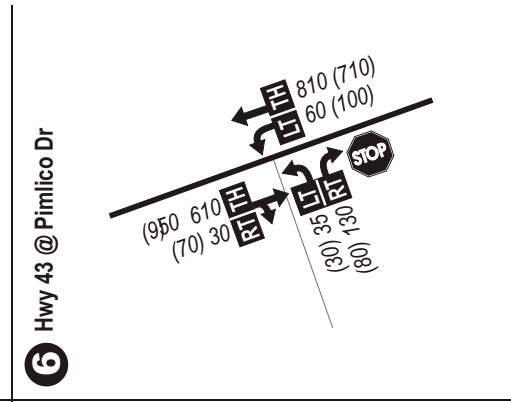
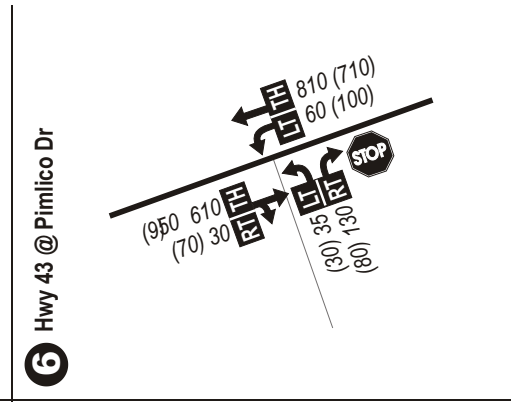
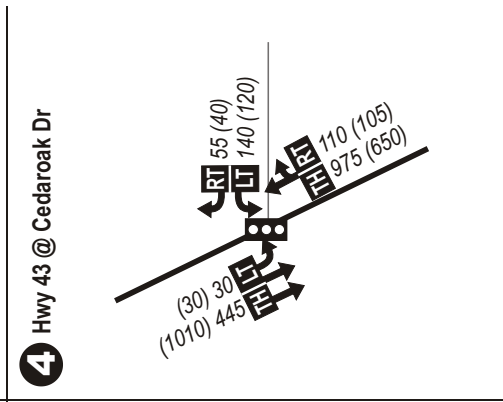
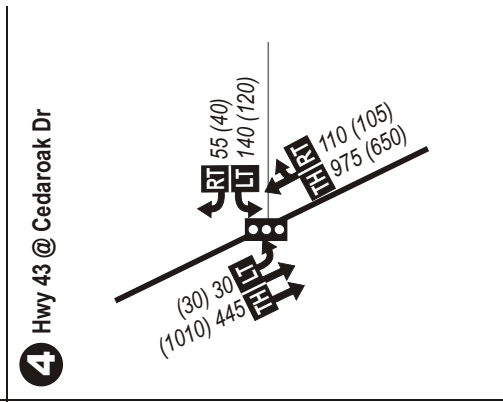
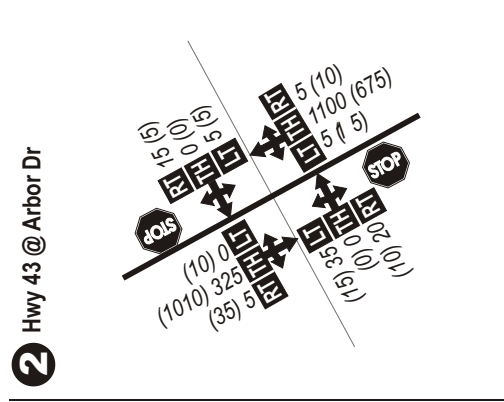
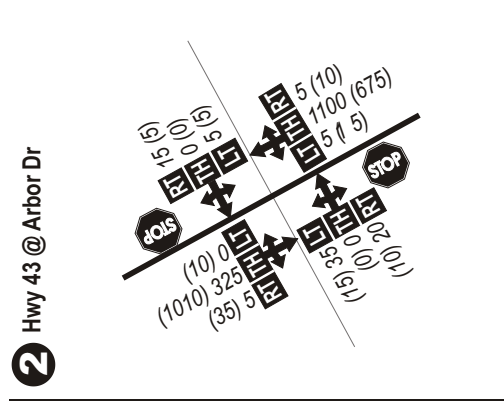
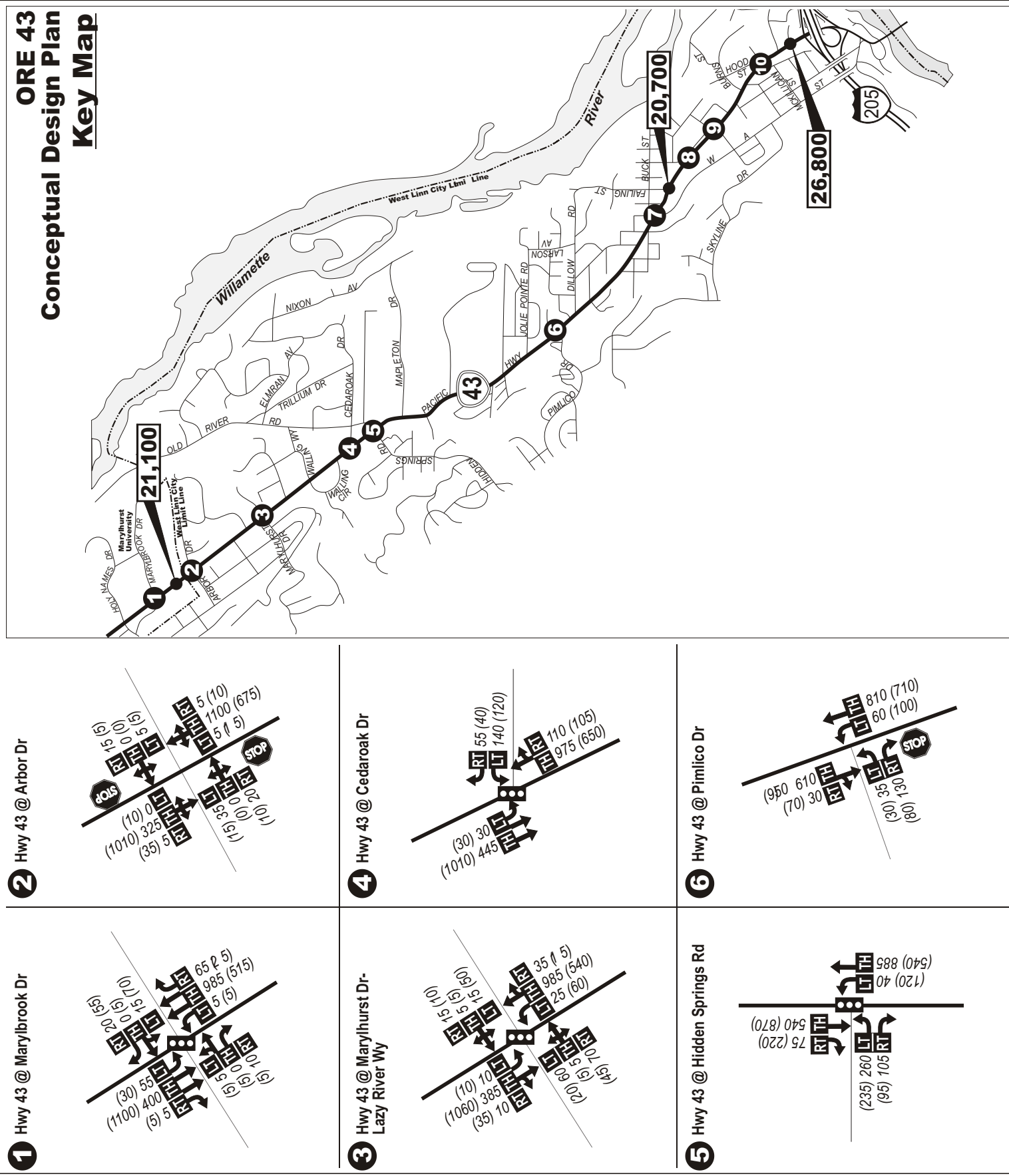
**LEGEND**

**0** - Study Intersection & Number

**DKS Associates**  
TRANSPORTATION SOLUTIONS



**Figure 1**  
**STUDY AREA**





**FIGURE 3**







**EXISTING  
TRANSIT FACILITIES**

**LEGEND**

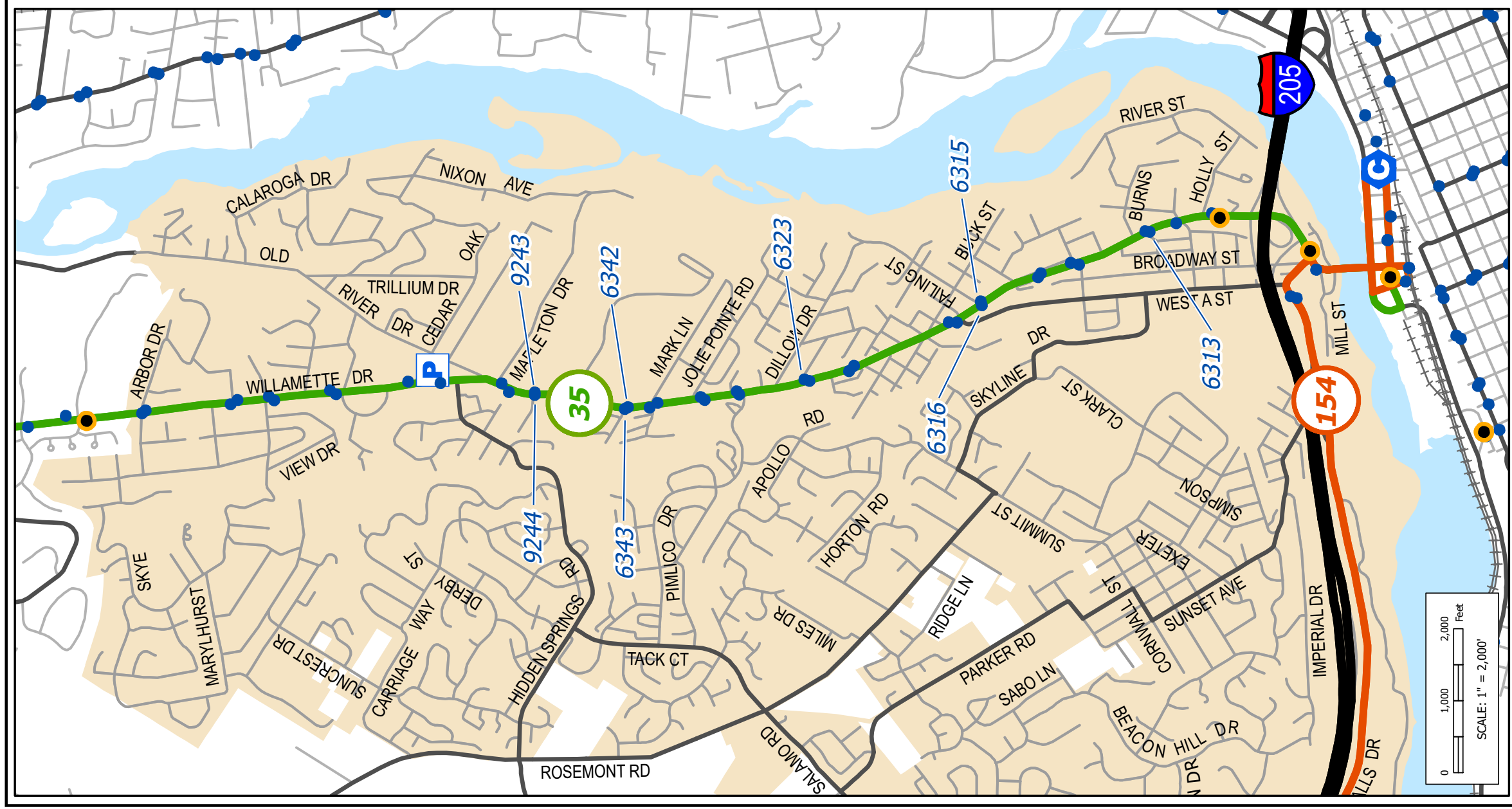
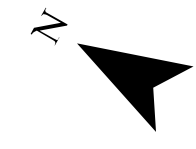
-  Bus Route w/ Route No. < 30 Min. Headway
-  Bus Route w/ Route No. > 30 Min. Headway

**Transit Facilities**

-  Stop
-  Stop ID
-  Shelter
-  Transit Center
-  Park and Ride

-  Freeway
-  Major Roads
-  Streets
-  Railroad
-  Water
-  City Limits

Note: bus routes outside West Linn not shown





# Multi-Modal Street Examples

## OR HWY 43 Conceptual Design Plan

### Medians



Medians serve an access management function within commercial areas by limiting the number of left turns and improving the overall flow of traffic. They can also provide a safe place for pedestrians to cross the roadway. Medians may be vegetated or hardscape. Planted medians can serve a stormwater management function, and can significantly soften the visual appearance of the street.

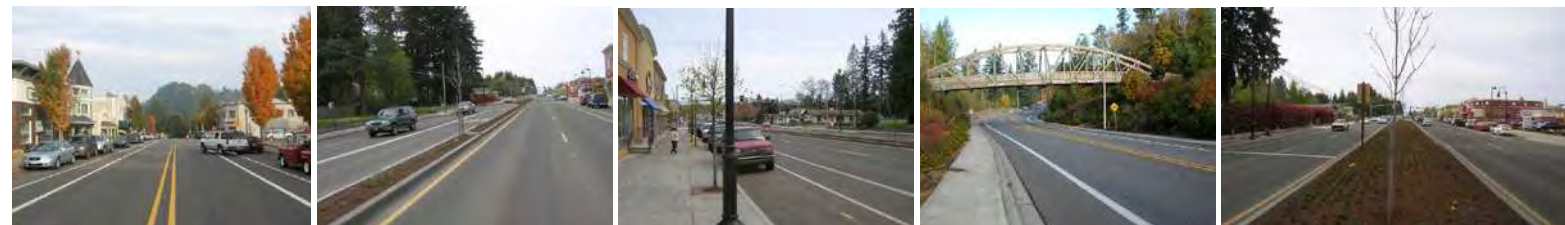
### General Examples of Right-of-Way Configurations



Landscaped medians with four travel lanes and left turn pockets

These photographs present various examples of multi-modal streetscapes. Possibilities for allocating the right-of-way include:

- Travel lanes
- Turn lanes
- Medians
- Pedestrian refuge islands
- On-street parking
- Bike lanes
- Sidewalks
- Landscaping / Street trees
- Stormwater Management
- Street furniture



Two travel lanes with clearly marked bike lanes, on-street parking and street trees

Four travel lanes separated by a landscaped median

Wide commercial sidewalks, street trees, on-street parking and clearly marked bike lanes

Bike lanes and curb-tight sidewalks

Landscaped median with four travel lanes and on-street parking

### Planting Strips and Street Trees

### On-Street Parking

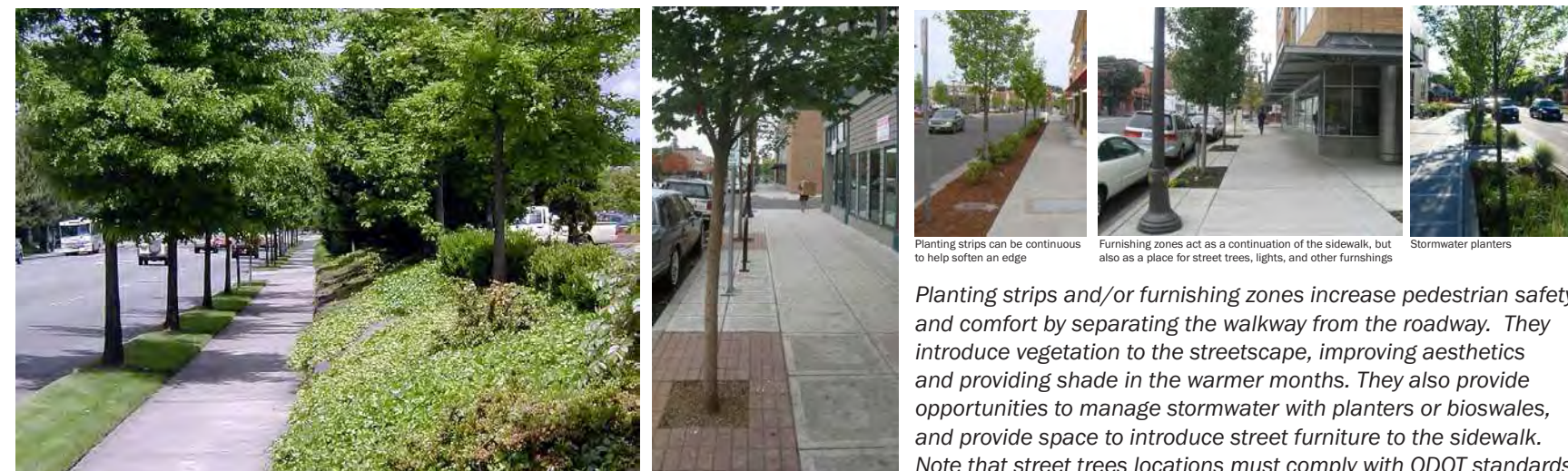


Permeable pavers can be used in parking areas to mitigate stormwater runoff

Distinct paving materials help to visually differentiate the on-street parking area from the travel lanes

On-street parking can help provide a buffer between sidewalks and moving vehicles

Clearly marked on-street parking is typically found in commercial areas. Parking areas may be marked through striping, or additionally by installing distinct paving materials. However, additional on-street parking may not be feasible in many locations; also on-street parking reduces the capacity, efficiency, and safety of the highway, and limited right-of-way may be better allocated elsewhere, such as for sidewalks and planter strips.



Heavily vegetated pedestrian areas can create a more green and/or suburban feel; this image also shows how the visual impact of parking areas can be mitigated with landscaping

Street trees can also provide a visual buffer / amenity (and shade) within more urban commercial or mixed-use districts

Planting strips can be continuous to help soften an edge

Furnishing zones act as a continuation of the sidewalk, but also as a place for street trees, lights, and other furnishings

Stormwater planters

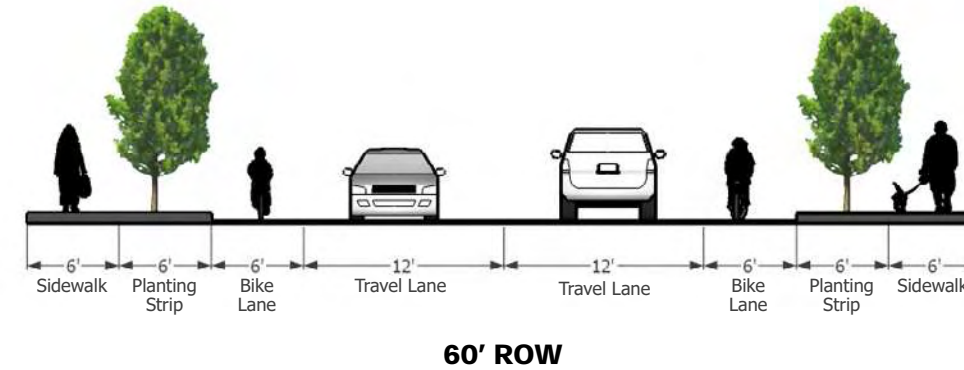
Planting strips and/or furnishing zones increase pedestrian safety and comfort by separating the walkway from the roadway. They introduce vegetation to the streetscape, improving aesthetics and providing shade in the warmer months. They also provide opportunities to manage stormwater with planters or bioswales, and provide space to introduce street furniture to the sidewalk. Note that street trees locations must comply with ODOT standards.



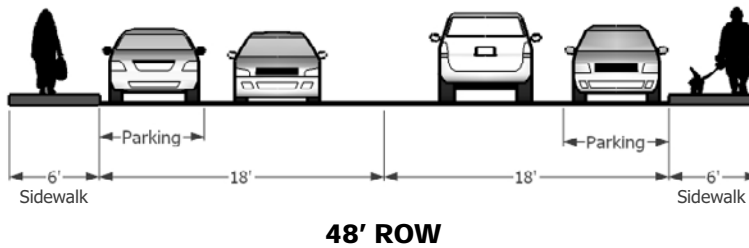
## Existing Cross Sections for Arterials and Collectors that Intersect OR 43

These cross sections present current conditions for arterials and collectors that intersect Hwy 43 as defined by the Transportation System Plan.

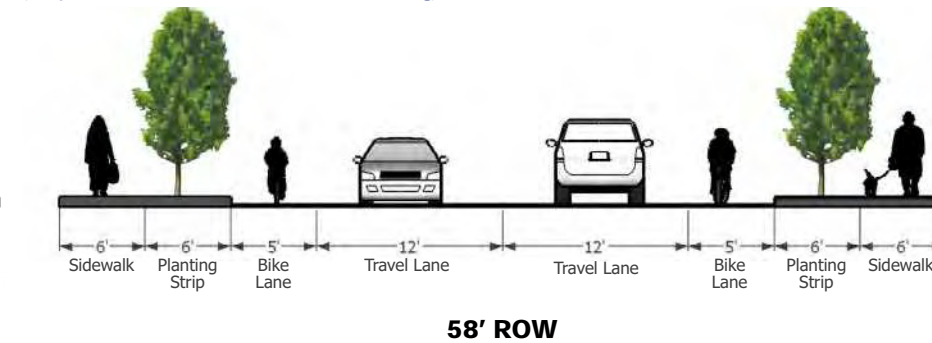
Arterials:  
(Hidden Springs, West A)



Collector Constrained:  
(Mapleton)



Collector w/o Median:  
(Marylhurst, Cedar Oak, Jolie Pointe, Pimlico, Failing)



## Bike Lanes



Clearly marked bike lanes increase safety for bicyclists.

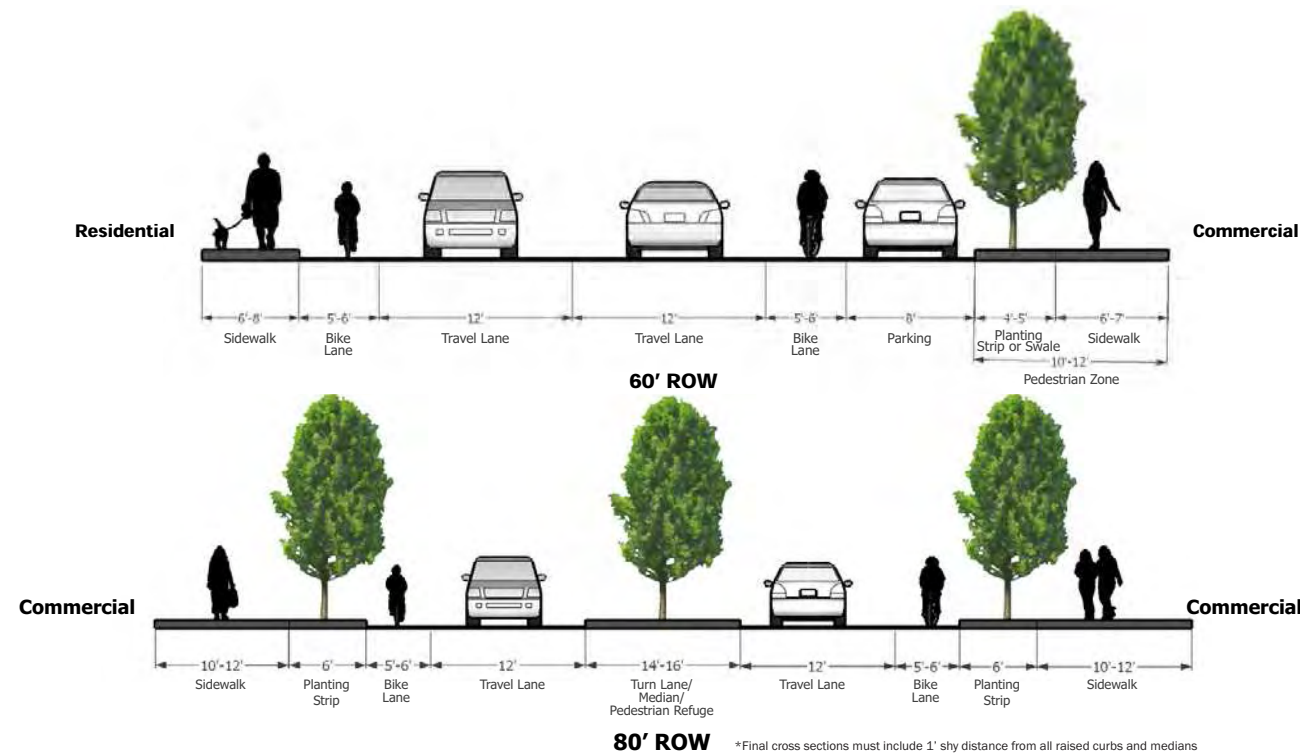


## Wide Sidewalks



Sidewalks in commercial areas should be a minimum of 10' wide to allow for greater foot traffic and to provide a more pleasant and safe pedestrian environment.

## Example Right-of-Way Configurations for OR 43 in Commercial Areas



These cross sections present potential configurations for the available right-of-way within commercial areas of Hwy 43. Note that wider sidewalks are provided adjacent to commercial areas. (While on-street parking currently exists in some areas, additional on-street parking may not be feasible.) Where possible, planting strips should be provided to create a buffer between the pedestrian and the street, and to provide opportunities for stormwater management. Medians may also provide landscaping elements and access management.

## Off-Street Trails



Existing Condition along OR 43



Off-street pedestrian and bike paths provide non-motorized travel and recreation options for pedestrians and bicyclists of all ages and abilities.

## Gateways



Distinct "Gateways" help to define a place as unique, and mark one's arrival into the city or district.

## Pedestrian Crossings



Pedestrian refuge islands provide a safer way for pedestrians to cross the street by allowing the pedestrian to focus on one lane or direction of traffic at a time. Curb extensions can also be used to shorten crossing distances. Additionally, clearly marked crosswalks and intersection treatments help signal the presence of pedestrians to drivers. Different paving treatments help to highlight the pedestrian realm and calm traffic. With all of these methods, illumination is crucial to maximizing visibility and increasing safety for pedestrians.



Textured crosswalk

Landscaped median with curb extensions

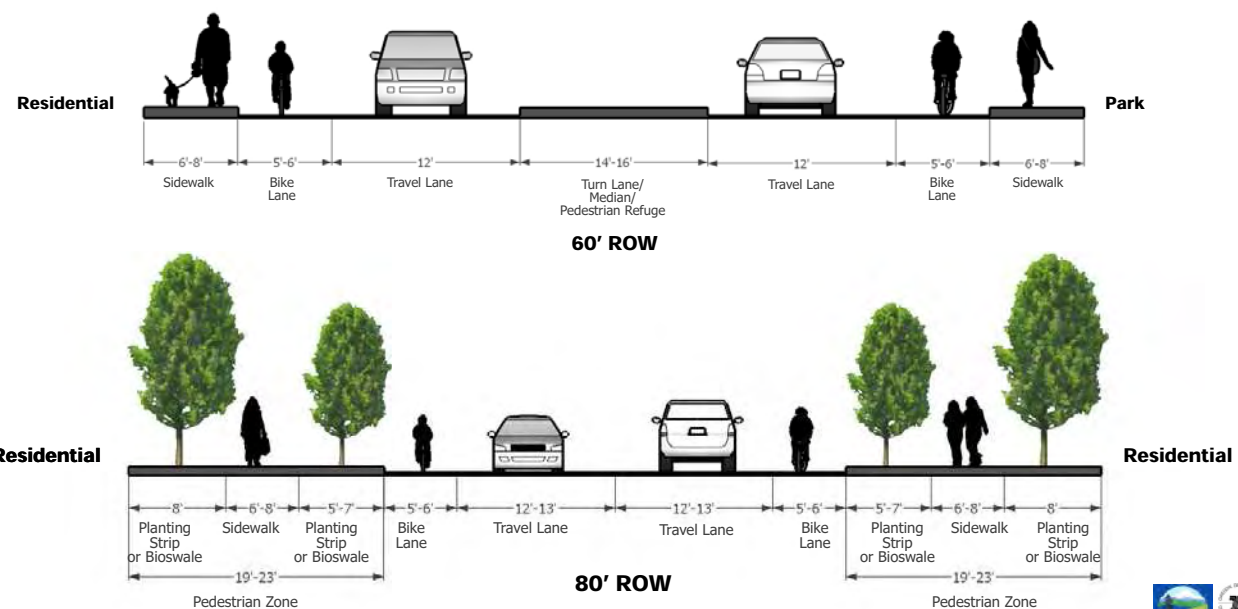
Textured / colored intersection

Mid-block crossing with refuge

## Example Right-of-Way Configurations for OR 43 in Residential Areas

These cross sections present potential configurations for the available right-of-way within residential areas of Hwy 43. (Note that sidewalks have been provided along both sides of the street.) Pedestrian refuges may be provided to provide access to parks or other community destinations.

Where right-of-way permits, planting strips may be provided between the sidewalk and the street to create a buffer between the pedestrian and moving traffic, and to provide opportunities for stormwater management. Additional plantings could help create a sense of green along the corridor.

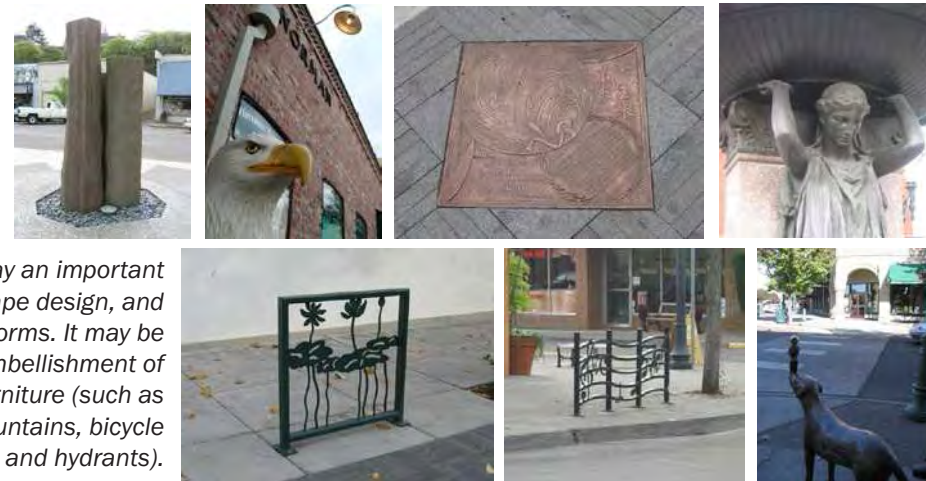


\*Final cross sections must include 1' shy distance from all raised curbs and medians





## Public Art



Public art can play an important role in a streetscape design, and may take many forms. It may be sculptural, or an embellishment of existing street furniture (such as trash cans, water fountains, bicycle racks, benches, and hydrants).



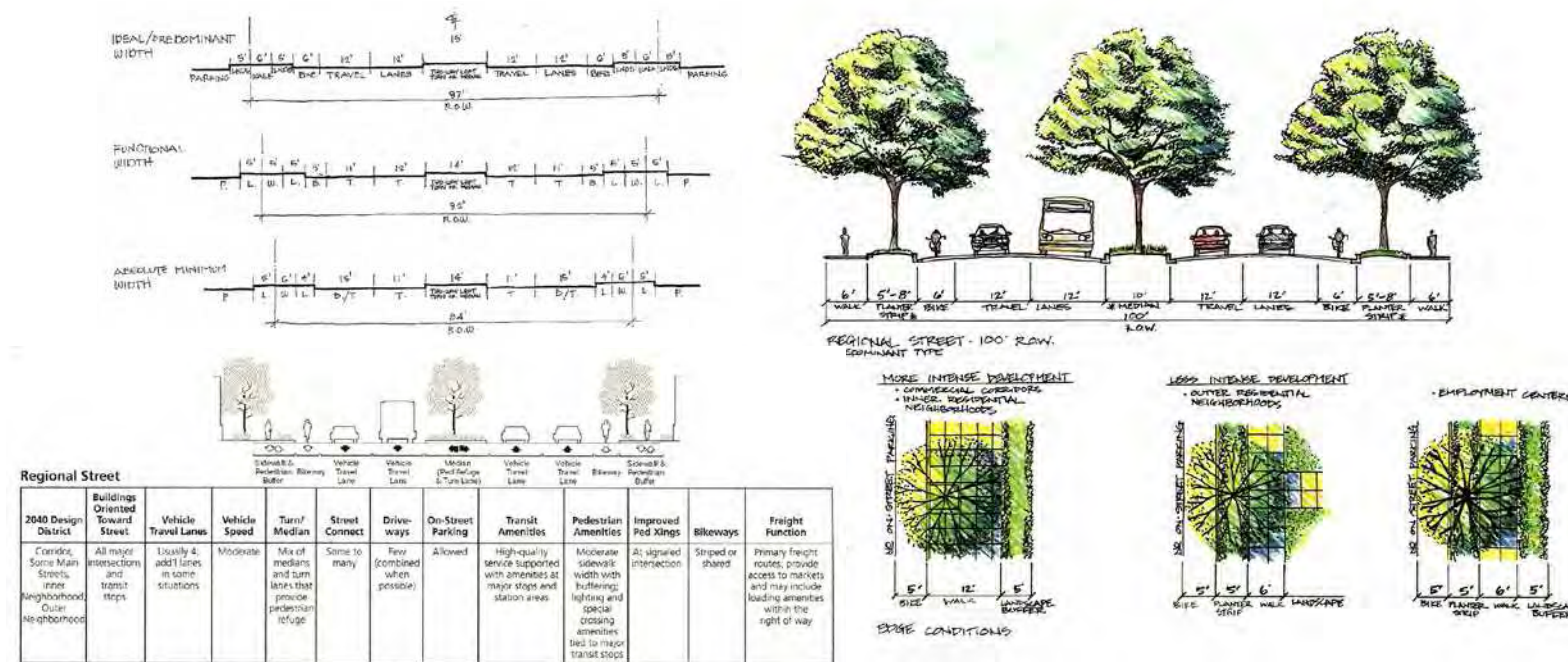
## Transit Stops



Existing Condition along OR 43 Existing Condition along OR 43 Existing Condition along OR 43

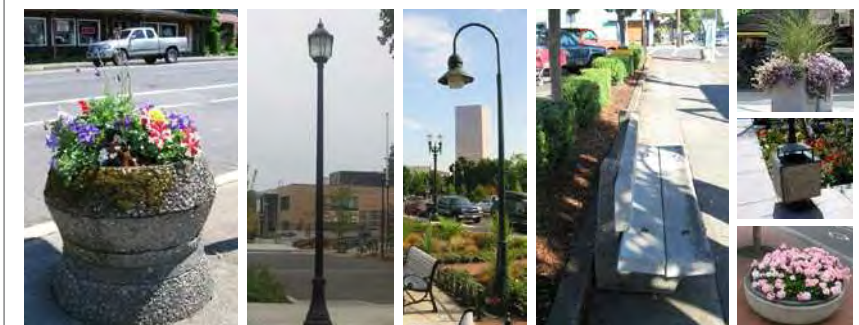
Transit shelters shield riders from the elements while waiting for a bus, and can provide display boards that communicate the current time and scheduling information. (TriMet limits shelter placement to those stops with 35 or more boardings per weekday. The responsibility (and cost) of providing shelters at stops not meeting required TriMet ridership levels may lie with the City.) Because the City of West Linn currently prohibits advertising on benches (and because advertising revenues are often used to pay for benches), the City may need to work with TriMet, adjacent business owners, and business and neighborhood associations to provide and maintain benches at transit stops.

## Metro Examples of Regional Street Design



Metro's "Creating Livable Streets, Street Design Guidelines" presents street design recommendations for various street types. These diagrams illustrate design recommendations for "Regional Streets," which span from 84 feet to 100 feet in total right-of way width.

## Street Furnishings



Coordinated street furnishings such as plantings, ornamental light fixtures, benches and trash cans can visually enhance the streetscape.

Source: Metro, Creating Livable Streets: Street Design Guidelines, 2002

# Green Street Examples

## OR HWY 43 Conceptual Design Plan

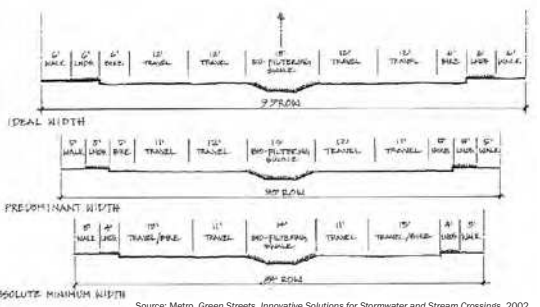
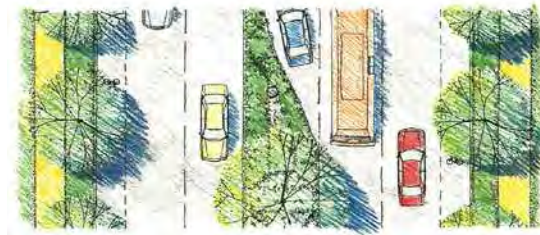
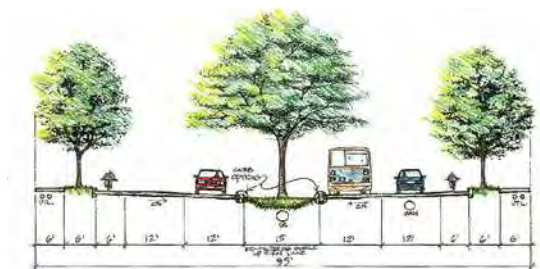
“Green Streets” are designed to minimize stormwater runoff, thereby reducing impacts to streams and wetlands and improving the region’s water quality. They incorporate stormwater management into the right-of-way through landscape features which capture stormwater runoff and allow it to infiltrate naturally into the ground. This allows pollutants to settle and filter out as the water percolates through the soil.

Green Street treatments may take many forms, and can have significant space requirements depending on the amount of runoff to be captured.

They may utilize a series of landscaped planters or street tree wells within the planting strip or median. These typically utilize perforated curbs which direct water into the planter. Green Streets may also be curbless features or medians with planted swales or detention basins. Permeable paving used within parking strips, shoulders, and sidewalks also allows water to infiltrate naturally into the ground.

When contemplating the installation of Green Street treatments, one should consider substantial amount of space necessary (depending on capacity standards), as well as responsibilities for financing and completing initial installation, as well as maintenance, which may lie with the State, City, and/or adjacent property owners.

### Metro Guidelines for Regional Green Streets



Metro’s “Green Streets, Innovative Solutions for Stormwater and Stream Crossings” presents recommended methods for designing a Regional Street as a Green Street. Because these streets are typically very wide and have large rights-of-way, a higher-capacity swale is recommended to handle larger amounts of runoff. The swale may be located in a central median or between the outer travel lane (or parking strip) and the sidewalk. Ideally, swale systems should be a minimum of 250 feet long in order to be most effective.

### Green Street Planters with Curbs



Landscaped planters within the planting strip manage stormwater and serve as a visual amenity



Slotted curbs direct water into the planter, where it is allowed to collect and eventually seep into the ground



Green Street treatments create opportunities to teach the importance of stormwater management



Green street planters can add a “sense of green” to the street



A curb cut channels street runoff into structured planters, where it is allowed to percolate into the soil



A Green Street planter combined with a sidewalk bump out



A sign explains how the Green Street works to improve water quality to passersby

Landscaped planters may be located within the planting strip between the street and the sidewalk, or within a central median. They typically utilize a series of curb cuts which channels water to structured, landscaped reservoirs, where water is allowed to collect and infiltrate the soil. Structured planters are particularly appropriate for commercial areas or other areas with curbs.



Stormwater planters are often linked together, so that when one planter fills up, water flows down into the next planter



A slotted curb adjacent to the sidewalk allows the planter to collect runoff from sidewalks as well as street runoff



## Curbless Green Streets



Paving treatments can be used to visually define the edge of the street in the absence of curbs



Curbless green streets are often found in residential areas. In this example, the green street treatment acts as a buffer between the sidewalk and roadway, and provides an amenity for adjacent homes



Vegetated bioswales can serve as a visual amenity in residential or commercial areas



Curbless green streets allow water to flow freely into vegetated bioswales, where it is allowed to seep into the ground or pass beneath driveways into other swales

Curbless streets allow water to flow freely into vegetated bioswales. These treatments may be located within a central median, along the side of the street between the outside travel lane and the sidewalk, and along the outer edge of the walkway (to capture runoff from sidewalks). Curbless Green Streets could be best suited for residential areas along OR 43 or on its side streets. (Note: should curbless green streets be used at transit stop locations, additional engineering would be required to meet TriMet and ADA boarding and alighting requirements)

## Other Green Street Treatments

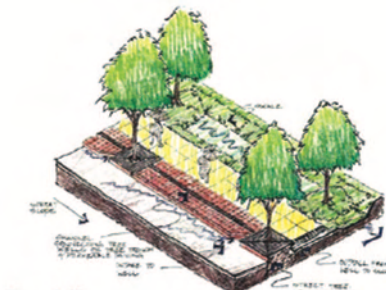


Figure 5-17 Street Tree Wells as Detention Basins for Sidewalk Runoff (Within Restricted Right of Way)

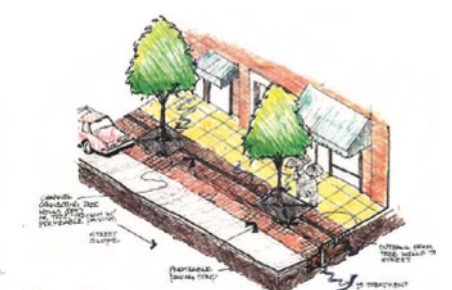


Figure 5-18 Street Tree Wells Attenuating Road Runoff into Bio-filtering Swale

Diagrams: Metro, Green Streets, Innovative Solutions for Stormwater and Stream Crossings, 2002

Street tree wells may be used as detention basins to capture runoff from sidewalks and other limited areas. These treatments should be used in conjunction with other Green Street features as their limited capacity prevents this system from accommodating all of the runoff from the right-of-way.

Porous pavement within parking strips, shoulders, sidewalks and other low traffic areas also allows water to permeate into the ground.



Porous paving within the on-street parking strip serves both to define the parking area as distinct from the rest of the right-of-way, and manage stormwater runoff

## Green Street Curb Options

Figure 5-12 Curb Option Range for Areas of Moderate- to Low-Density Development

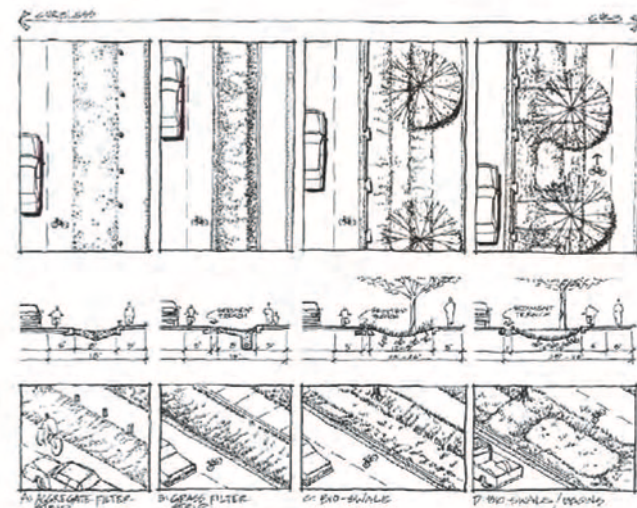
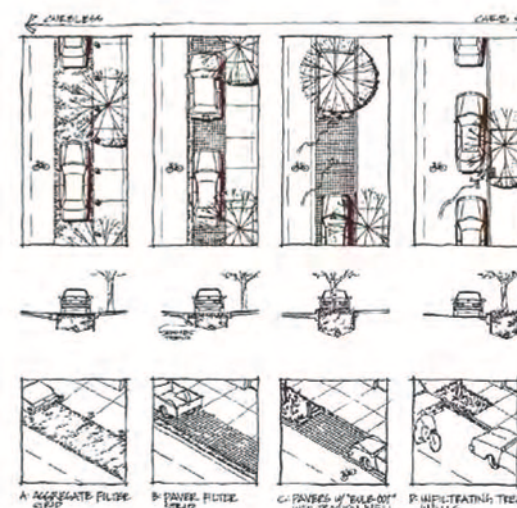


Figure 5-11 Curb Option Range for Areas of Compact Development



(a) Invisible curb with "lip"



(b) Double invisible curb with sediment trench



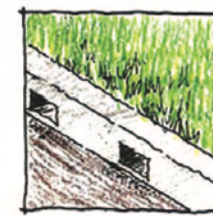
(c) Rumble strip with sediment trench



(d) Curb inserts



(e) Perforated curb



Diagrams: Metro, Green Streets, Innovative Solutions for Stormwater and Stream Crossings, 2002

Metro's "Green Streets, Innovative Solutions for Stormwater and Stream Crossings" presents a range of curb design options for Green Streets. In areas with more compact development and higher volumes of pedestrian and vehicular traffic, curbs may be most appropriate as they help to visually and physically separate different modes of travel. Less developed, lower-density areas, on the other hand, are ideal for curbless swales and basins.

**MEMORANDUM**

**DATE:** March 23, 2007  
**TO:** Bryan Brown, City of West Linn  
 OR 43 Conceptual Design Plan Project Management Team  
 OR 43 Conceptual Design Plan Technical Advisory Committee  
**FROM:** Matthew Arnold & Michelle Marx, SERA Architects  
 Kirstin Greene & Teak Wall, Cogan Owens Cogan  
**RE:** *OR 43 Opportunities & Constraints*

The following memorandum summarizes Opportunities and Constraints for Oregon Highway 43 through the City of West Linn. In doing so, it draws upon the findings presented in Technical Memorandum #1 (*Transportation Existing and 2030 Base Future Conditions*) and the series of Base Maps produced for Task 2.1. It also draws upon the Robinwood Neighborhood Plan, the Bolton Neighborhood Plan, the City of West Linn’s Community Development Code, and information gathered at the Project Kick-Off Meeting (2/5/07).

The general topics or categories covered in this memo include:

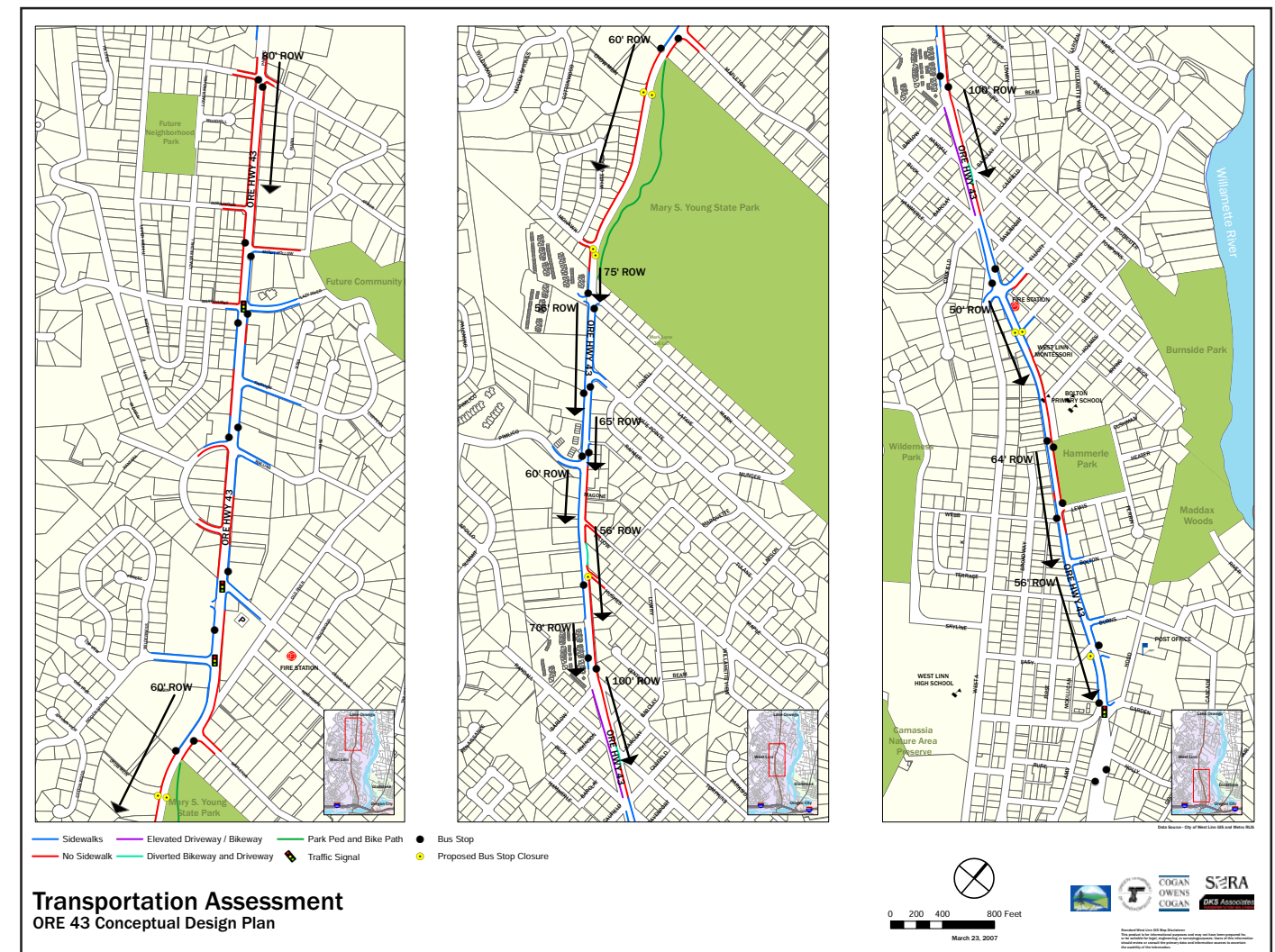
- **Right-of-Way** – including a discussion of the wide range of ROW widths along the corridor, the difficulties with future ROW allocations, and the potential for employing access management strategies;
- **The Pedestrian Realm** – including an analysis of issues related to pedestrian access, connectivity, safety, and comfort;
- **Transit** – issues related to bus stops and transit access;
- **Bicycle Access** – opportunities to improve conditions for cyclists of varying levels of ability;
- **Environmental Considerations** – opportunities and constraints related to topography, waterways, existing trees, and stormwater management;
- **Existing Land Use** – issues related to current land uses and the potential for providing transportation facilities that are better suited to serve them;
- **Development Code** – examination of commercial design and development standards and their effects on the multi-modal potential along OR 43.
- **Proposed Robinwood Overlay Zone** – examination of the proposed overlay zone for the Robinwood Neighborhood.

This work, in part, will form the basis for the conceptual design plan and inform the public workshops.

Thank you for your review.

**Right-of-Way**

The available right-of-way along the OR 43 corridor varies significantly within the study area. At its widest, the right-of-way measures approximately 110 feet across, but is only 50 feet at its most narrow. This tremendous variation has and will continue to constrain streetscape design options in certain areas. There will be an on-going need to closely examine the various trade-offs implicit in allocating right-of-way (ROW).



Examples of existing cross sections along OR 43 - based on available width, adjacent land uses, and transportation demands



In general, intersections are areas that have the most demands put upon them - to balance out through traffic, turning movements, pedestrian and bike access, transit, stormwater management, etc. In some cases along OR 43, there may be a need to acquire additional right-of-way at key intersections to accommodate these various demands.

As reported in Tech Memo #1, the signalized intersections along OR 43 generally function within acceptable limits today. Four of these intersections (OR 43 and Marylhurst/Lazy River, Cedar Oak, Hidden Springs, and Hood/McKillican) are expected to become deficient by 2030 based on Metro's travel demand forecast model. Two non-signalized intersections (OR 43/Pimlico and OR 43/Arbor) are currently experiencing difficulties for those motorists turning onto OR 43. There are also noticeable difficulties for drivers making left turns onto OR 43 from side streets that intersect the highway at less than a 90-degree angle - a situation which is often exacerbated by the change in grade as one approaches the highway. Although no improvements have been proposed for any of these locations and situations as part of this project, it should be noted that there will be increasing demand to provide for a variety of users (pedestrian, bicycle, stormwater, transit, autos, etc.) within limited rights-of-way.

Despite fairly heavy traffic volumes (approximately 21,000 vehicles per day) and the need to move traffic through West Linn along OR 43, very few access management / channelization techniques have yet been employed. There are only two medians (and one is only a narrow extended curb) in the study area limiting left turn movements (see photos). In commercial areas, where ROW allows, there are opportunities to utilize medians to improve traffic flow, provide safer pedestrian crossings, and potentially beautify the streetscape. Consolidating commercial driveways is another access management strategy that can focus turning movements and thus improve traffic flow. (Existing driveway spacings are generally too close to meet ODOT highway standards.) However, the City's development code generally requires driveway access to individual taxlots. While the code does allow for some exceptions to this rule, additional modifications may be necessary before enough driveway consolidation can occur.



The OR 43/Arbor intersection is currently experiencing difficulties; existing ROW may allow for left turn lanes onto Arbor, but volumes do not warrant a signal to help traffic turning onto OR 43



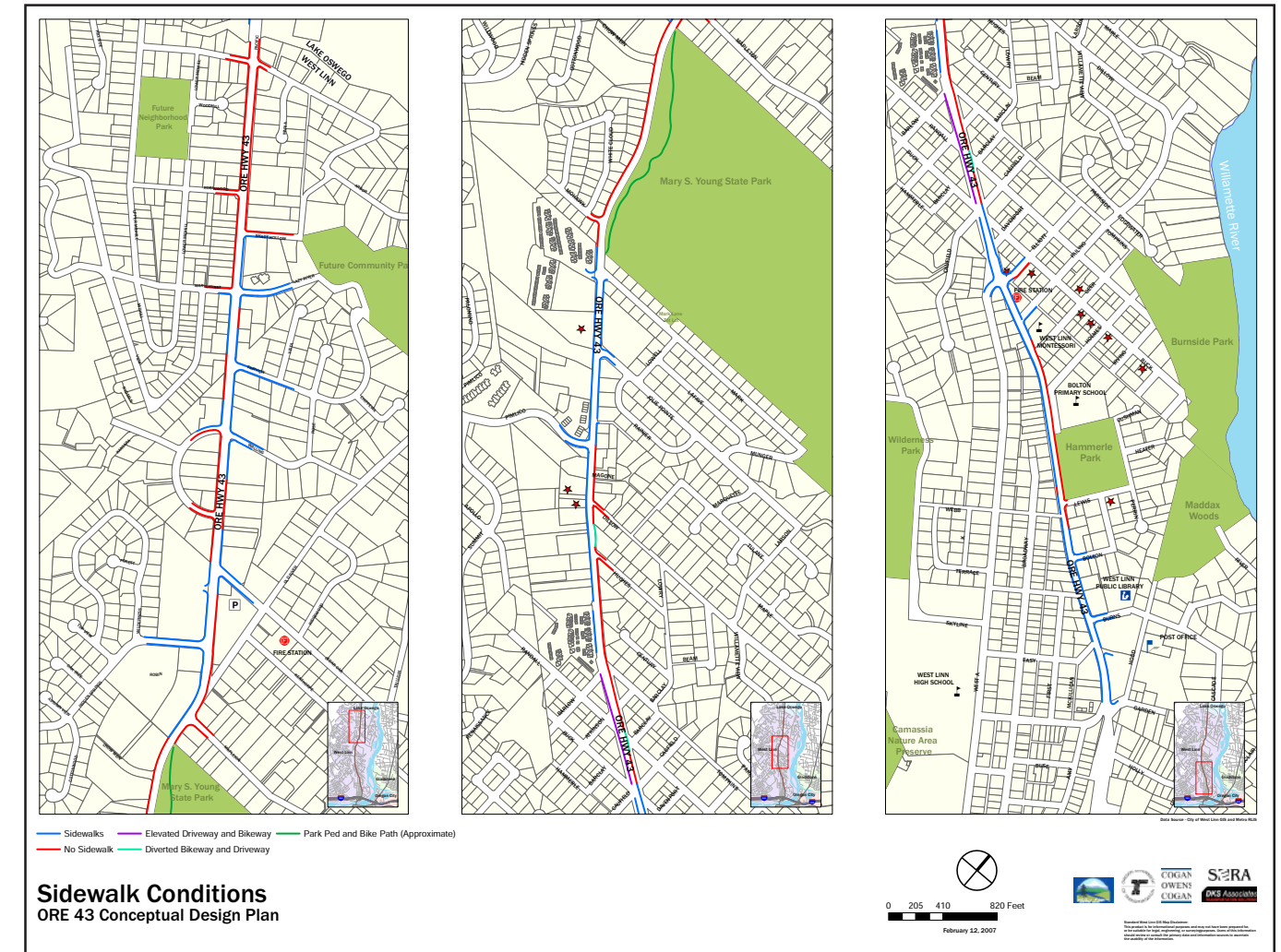
This curb/median prevents left turning movements to/from this shopping center driveway; shoppers instead must use the left turn lane and signal at the Hidden Springs intersection



This substantial median prevents left turning movements to/from the Central Village Development; patrons are thus directed to the signalized intersection at Hood/McKillican

## The Pedestrian Realm

The vision statement of the Robinwood Neighborhood Plan calls for curbs and sidewalks along OR 43, while the Bolton Neighborhood Plan calls for "a sidewalk and pathway system that allows all to walk safely to the Library, schools, stores, and parks...." The map below illustrates that sidewalks along OR 43 are sporadic in many areas, and are altogether absent in others. Sidewalks may exist on one side of the street but not the other, and in the residential areas to the north, they are lacking on both sides of the street. The Robinwood commercial area provides sidewalks on both sides of the street, but these sidewalks are fragmented, often leaving a pedestrian with no option but to walk on the roadway. It should also be noted that where auto access has been closed from OR 43 to intersecting residential streets, it is especially important to ensure reliable pedestrian access.



Examples of fragmented and missing sidewalks along OR 43



Where sidewalks do exist, they are often narrow (sometimes only 3' to 4' wide), making it difficult for two people to walk abreast. Sidewalks occasionally contain obstacles such as telephone or light poles, rendering them impassable to citizens in wheelchairs, people on crutches, or children on bicycles who may not feel safe riding on the roadway. More common are the driveways - which bring pedestrians into direct conflict with motor vehicles.

Sidewalks throughout the study area are "curb-tight," meaning that in most instances there is no buffering between pedestrians and the roadway. Planting strips and/or furnishing zones (in commercial areas) located between the pedestrian way and the street could help not only to visually enhance the streetscape, but also to shield the pedestrian from fast-moving traffic - thereby improving the perceived safety of the sidewalk. These extra amenities could also make walking along OR 43 more attractive by providing shade, visual interest, pedestrian-scale lighting, and the occasional bench for taking a break.

As summarized in Tech Memo #1, there is currently very little pedestrian traffic along OR 43. That few users of the roadway are walking may be attributed to the lack of sidewalks, the quality and/or fragmented nature of the sidewalks that are available, the relatively low-density of nearby development, and the auto-oriented nature of much of that development. Should these various factors improve, one would expect the number of pedestrians to increase.

Interestingly, such a situation may also lead to additional pedestrian-auto conflicts, which are relatively rare under current conditions. Specifically, there are only a handful of signalized intersections within the 2.8-mile study area, meaning that those pedestrians that choose to cross without benefit of a signal will compete with the approximately 21,000 vehicles per day that use the highway. Therefore, opportunities should be explored to provide pedestrian refuge islands, pedestrian-activated signals, and other crossing treatments where full signals are not warranted.

There may also be opportunities to improve the corridor's existing pedestrian crossings by employing a variety of paving treatments at crosswalks to increase visibility, improving lighting, and installing pedestrian refuge islands and/or curb extensions where crossing distances are excessively wide.



*This image contains a particularly ironic example - a light pole (with pedestrian crossing button) that blocks access to a crosswalk curb ramp*



*Curb-tight sidewalk*



*Wide Pedestrian Crossing*



*Sidewalks are sometimes non-existent near popular destinations - such as schools and parks*

While pedestrian safety and access are of primary importance, aesthetic conditions also greatly influence a street's pedestrian appeal. Currently, utility lines and poles line both sides of the highway. Burying these utilities could create a more visually appealing environment. However, undergrounding utility lines is often prohibitively expensive, and all or most of that cost would likely lie with the City. Additionally, private property and/or business owners along the corridor would bear the cost of hooking up to these new utility lines.

Trees are a defining feature of the OR 43 corridor, and the City currently maintains an ordinance aimed at preserving and protecting trees on private property (enforced during site development through design review). The City also requires trees / vegetation on private property along the right-of-way when trees are not provided in a planting strip. There may be opportunities to provide more street trees in commercial areas (where sidewalks are currently curb-tight) and to protect existing trees within the right-of-way when future improvements are made.

Street trees also serve to enhance the aesthetic appeal of the streetscape. However, existing ODOT criteria regarding roadside trees will necessarily guide street tree placement within the conceptual design plan. Currently, ODOT permits trees along highways when the highway design speed is 45 mph or less. Trees may be located in a planter strip between the curb and sidewalk only where posted speed is 35 mph or less and there is a standard shoulder or on-street parking. Where posted speeds are higher than 35 mph, or the shoulder is substandard (or there is no on-street parking), ODOT requires that trees be located at least 6 feet back from the curb. Additionally, roadside trees must be set back from driveways and intersections to maintain visibility. However, access management practices may help to increase the overall area available for trees.

## Transit

TriMet operates the #35 bus line through West Linn along OR 43, and the corridor contains several bus stops. There are currently 37 bus stops. As reported in Tech Memo #1, TriMet is considering abandoning eight of these stops due to a lack of ridership. While the OR 43 corridor through West Linn contains a healthy number of residences and general commercial uses, overall density is relatively low and there are no major employment centers. Therefore transit functions primarily as a commuting option, and as a transportation option for those relatively few for whom other options are not available or desirable.

However, it must be noted that transit stops - and the connections to them - could be greatly improved along the highway. Several stops have sidewalk approaches from only a single direction, while others lack sidewalks entirely. Completing sidewalk connections to transit stops will be crucial to ensure that transit riders can make their connections safely and comfortably. Improving pedestrian connections throughout the corridor also may help to increase ridership, which may in turn introduce the possibility of reinstating closed bus stops in the future.



*Above-ground utility lines along OR 43*



*Trees, often of substantial size, form a defining characteristic of the OR 43 highway alignment*



*Benches are found at some bus stops (above), but not others (below)*



While some stops do provide benches, most do not, and only one stop within the study length provides a bus shelter (the northbound one at the southern end). Opportunities exist, therefore, to provide significant transit amenities (including shelters, benches, trash cans, etc.) for bus stops along the corridor. (Note: most bus stops along the alignment do not meet TriMet ridership quotas for shelters, so negotiations and/or additional funding may be necessary if additional shelters are desired.)



Some bus stops have no sidewalks connecting to them whatsoever

## Bicycle Access

Although bike counts are very low along OR 43 (see Tech Memo #1), bicycle travel facilities are provided on both sides of the highway throughout the corridor - either as striped bike lanes, shoulders, or shared bike / parking lanes. While basic facilities are provided, there are several opportunities to improve conditions for cyclists along OR 43. For example, there is an opportunity to attract more cyclists, especially those that might be intimidated by riding on a state highway that carries 21,000 vehicles per day.



Bicycles and parked cars share, and sometimes compete, for the same shoulder

Where parallel on-street parking is provided, the parking zone and the bike zone intermingle, and autos often infringe upon the bike lane. In fact, in some areas, a shoulder is only wide enough for a parked car, which forces bikes out into the travel lane. Providing adequate width for bikes and, where necessary, parked cars, and laying down additional striping to further define the bike lane from the parking area, may help to limit confusion and conflict. It is also important to prevent bike lanes from being too wide. Bike lanes wider than six feet are often confused for narrow travel lanes or turn lanes, and drivers may take advantage of wide bike lanes for passing or making right turns.



Some areas are wide enough to accommodate parked cars or bikes - but not both

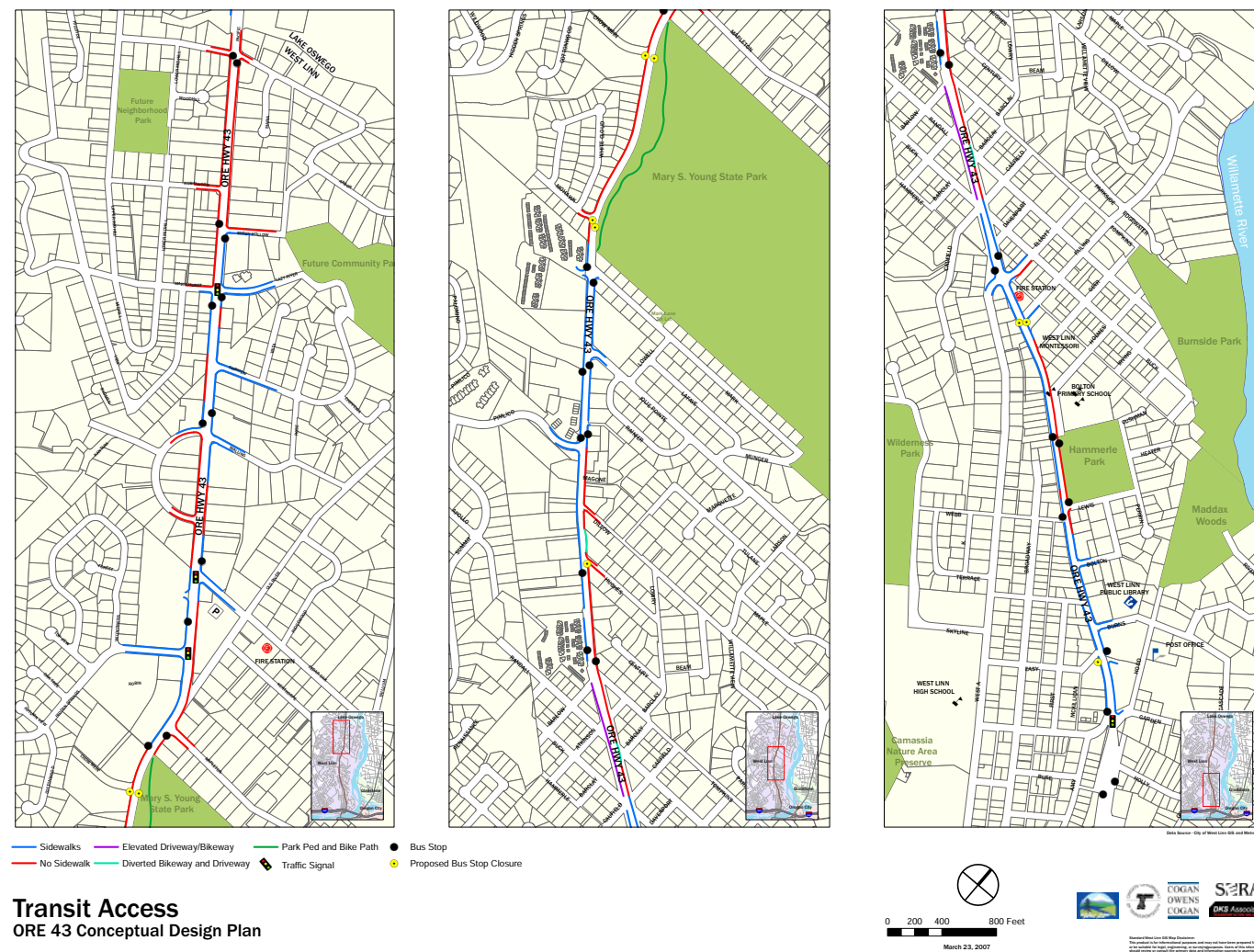
Bike lanes / shoulders are often littered with debris - mostly sand and gravel - that is uncomfortable for cyclists and potentially hazardous. Regular sweeping could help improve this condition. Where bikes use the road shoulder, and where sidewalks are not present, they are forced to dodge trash and recycling containers, which are left out in this zone.

Continuous, grade-separated sidewalks and/or shared off-street paths that can be used by both cyclists and pedestrians provide opportunities for bicyclists who may not be comfortable riding in traffic. Neighbors have voiced support for off-street trails, in particular, where possible.



Obstructions in the bike lane make cycling difficult

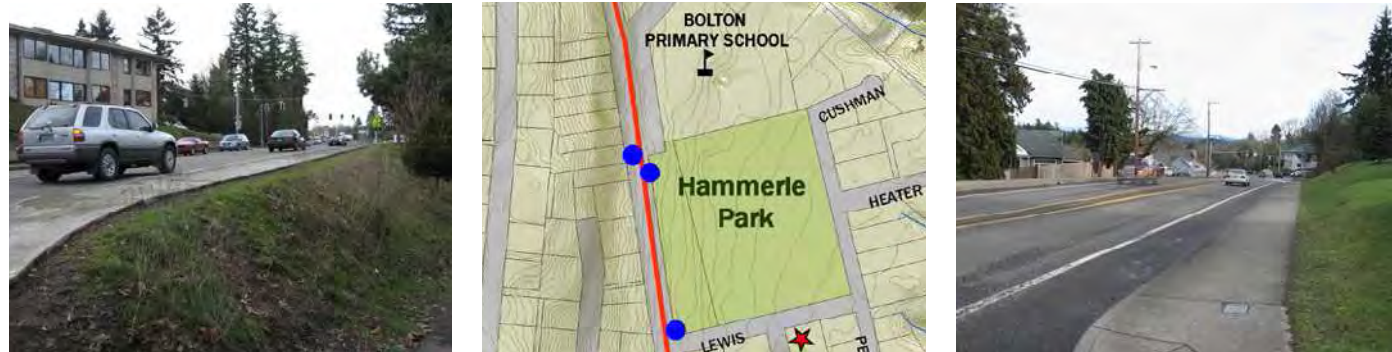
Lastly, few bike racks are provided at commercial developments along the corridor, meaning that locking bicycles at destinations is difficult at best.



Transit Access  
ORE 43 Conceptual Design Plan

## Environmental Considerations

The highway lies at the foot of a significant slope to the northeast, and the resulting variations in topographic conditions along the length of the corridor presents significant constraints in the middle and southern portions of the study area. Where steep slopes are present immediately adjacent to one or both sides of the highway, choices for right-of-way allocation will be quite limited.



Steep slopes adjacent to and within the right-of-way sometimes limit the ability to expand existing facilities or provide new ones

According to Metro GIS data, OR 43 crosses nine streams within the study area. It will be of great importance that these water courses be protected from polluting run-off with any modifications that are made within the highway right-of-way. In more developed areas of the corridor, stormwater run-off is currently channeled with curbs to storm drains. In less intense residential areas at the northernmost portion of the study length, stormwater is allowed to collect in ditches at the side of the roadway (a situation which the Robinwood Neighborhood Plan calls for correcting). Given the steep slopes in portions of the study area, run-off during the rainiest times can be quite heavy. There are significant opportunities to introduce sustainable stormwater practices along OR 43, which could help to protect water quality and provide visual (green) amenities along the corridor.



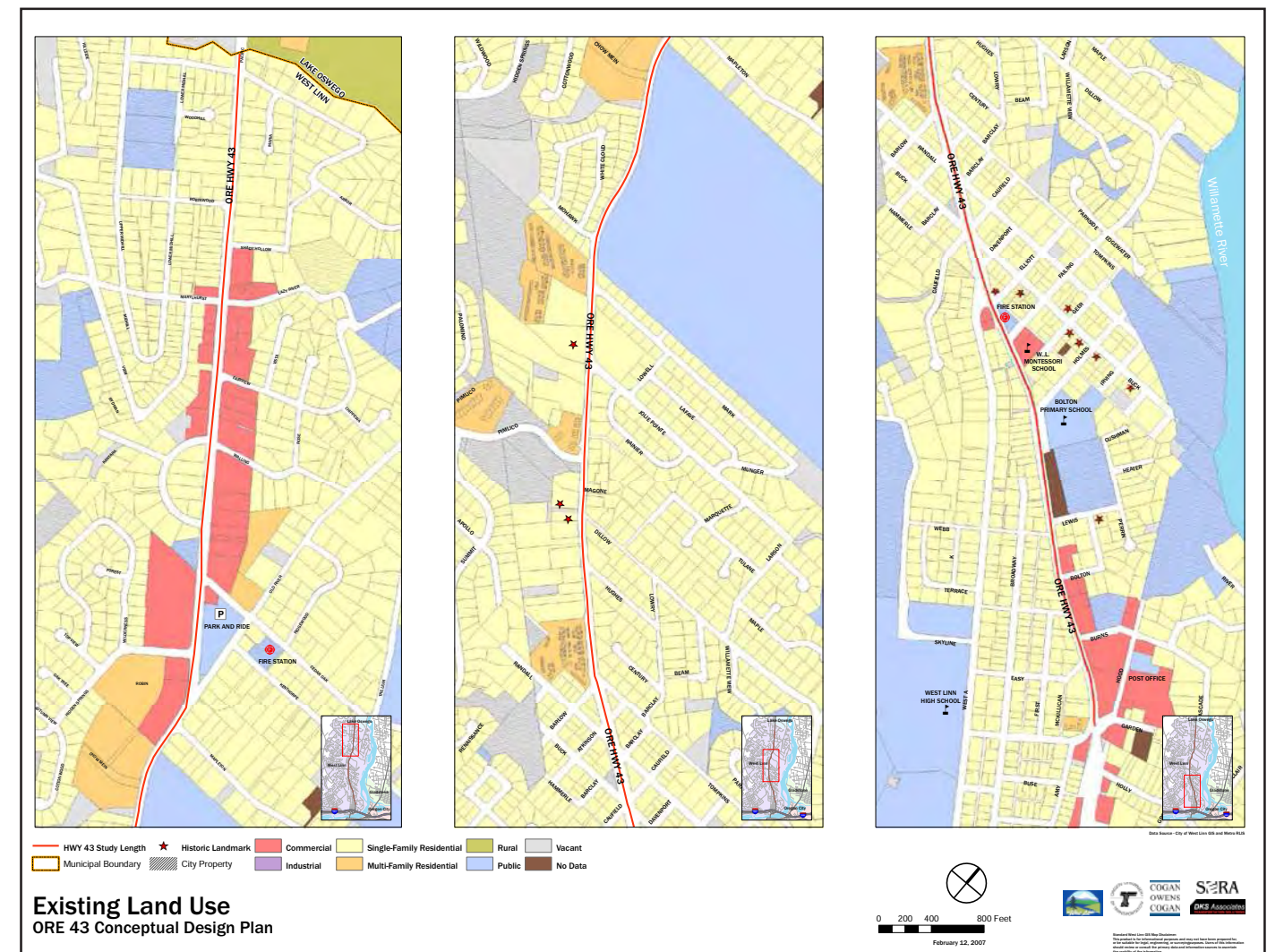
Stormwater is currently directed into traditional sewer systems or drainage ditches; instituting green / sustainable stormwater management practices can help protect the various waterways that cross beneath OR 43 in West Linn



## Land Use

The OR 43 Conceptual Design Plan study area extends approximately 2.8 miles along OR 43 from the West Linn / Lake Oswego municipal boundary, southeast to the intersection with Hood Street. The corridor passes through areas with distinctly different land uses. The northernmost section of the corridor is less-intensely developed with residential homes (primarily single family). Two higher-density, commercial nodes occur along the corridor - one within the Robinwood neighborhood, and the other within the Bolton neighborhood. Between these two commercial areas lies Mary S. Young State Park - a significant community and regional asset - as well as a mix of single-family and multi-family residential uses. There are also four historic properties located along the OR 43 right-of-way.

This continuous shift in land uses and character along the corridor suggests a need to customize the streetscape in differing ways to meet the unique demands of various uses and densities. For example, higher-density commercial nodes suggest a need for wider sidewalks, on-street parking, and access management features. (It must be noted, however, that new on-street parking facilities seem may not be permitted, given ODOT highway standards and right-of-way constraints.) These is also an opportunity to better connect these commercial areas to nearby residences, many of which are not served by sidewalks currently. Less foot traffic and on-street parking demand in predominantly residential areas may allow for narrower sidewalks.





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## Community Development Code

This section examines the City of West Linn’s Community Development Code as it pertains to commercial zones along the OR 43 study area. It is intended to provide an understanding of how existing design and development standards for commercial zones may impact the OR 43 streetscape. This section also identifies potential modifications to existing standards that may improve the function of the corridor according to project objectives.

While the design and development standards make some provisions for other users, they tend to promote auto-oriented rather than multi-modal development – and indeed this is reflected in the existing conditions along OR 43.

### **Setbacks**

Building commercial uses close to the street creates a “street wall,” which encloses the right-of-way and gives definition to the pedestrian environment. While there is currently no minimum setback requirement for development within the General Commercial (GC) and Office-Business Commercial (OBC) zones, there is a maximum setback for both zones is 25 feet (Chapters 19, 21) – a distance which is too great to create an inviting sense of enclosure for pedestrians.

Clear vision areas on corner lots increase visibility for pedestrians, allowing them to see approaching vehicles on intersecting right-of-ways. For structures located on the corner, there is currently a 4 foot requirement for pedestrian clearance areas along sidewalks (Chapter 54). These clearance areas should be maintained.

### **Off-Street Parking and Loading**

The Development Code currently allows surface parking to be located between the building and the street, provided that parking lots do not occupy more than 50% of the lot frontage (46.150). The city should consider requiring that all surface parking along OR 43 be located to the side or rear of commercial buildings, and that buildings be brought up closer to the sidewalk. Additionally, parking should be screened with vegetation to soften its visual impact.

Currently, owners of two or more structures or parcels may agree to share parking and/or loading spaces (46.050). This stipulation allows for an overall reduction in the amount of parking needed within the study area. The City should encourage utilizing this provision for joined/shared parking where possible in order to consolidate access, thereby improving safety and mobility along the corridor. The City may also consider reducing minimum parking requirements as a means of reducing the overall amount of land dedicated to surface parking.

Current code allows existing developments along transit streets or near transit stops to redevelop up to 10 percent of existing parking spaces to provide transit-oriented facilities, including bus pullouts, bus stops and shelters, park and ride stations, and other similar facilities (46.090). The City should consider offering reduced parking requirements as an incentive for such transit improvements made in off-street parking areas.

### **Access, Egress, and Circulation**

All lots are required to have access from a public street or from a private platted street (48.020). However, owners of two or more structures or parcels may agree to utilize jointly the same access and egress when certain conditions are met (48.060). Because reducing the number of curb cuts along the street dramatically increases safety for pedestrians and bicyclists (as well as increasing traffic flow), the City should consider further incentivizing shared driveway access.

Additionally, the Code establishes a maximum curb cut of 40 feet along OR 43, and sets a minimum distance of 150 feet between any two curb cuts on the same side of the street (48.060). As stated above, curb cuts and driveways create points of conflict between cars and pedestrians and/or bikes. Reducing the number and width of curb cuts greatly improves safety for these groups. The City may consider re-evaluating both of these requirements.

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## Landscaping

When parking, loading, or service areas abut a street, these areas are required to be set back from the right-of-way by a perimeter landscaping strip of at least 10 feet (54.020). Along the OR 43 frontage, it is recommended that parking not be allowed to locate between the building and the street.

The Development Code currently requires that all proposed changes in width in a public street ROW or any proposed improvement shall, where feasible, include allowances for planting strips (54.030). Planting strips separate the pedestrian from traffic, and improve the perceived safety of the sidewalk, and should be incorporated into the streetscape whenever possible. Additionally, however, the City may consider requiring that trees be planted in the front/setback area where street trees are not feasible.

The Code also requires that a site inventory be conducted, and that every reasonable attempt be made to preserve and protect existing trees and significant landscaping (54.020). The City may also consider updating the Code to reflect the new City’s new tree preservation ordinance (Ord. 1542).

### **Right-of-Way Width, Block Length, and Intersections**

The Code stipulates that Highway 43 maintain a right-of-way between 60 and 80 feet (85.200.B). Minimizing travel lane widths slows the speed of traffic, and increases safety for pedestrians and bikes. Particularly in areas where pedestrian traffic is higher (such as commercial zones), this relationship should be considered, and the City may consider minimizing travel lane widths and or speed limits in these areas.

Minimizing block lengths and decreasing distance between intersections is crucial to creating a multi-modal (i.e. walkable) environment. The code recommends that blocks be 400 feet in length, and that blocks not exceed 800 feet in length (85.200.B). The City should encourage the 400-foot block to the greatest extent possible within pedestrian-oriented commercial districts. Additionally, the Code establishes the minimum distance between intersections on arterial streets as 500 feet (85.200.B). This standard should also be maintained.

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## Proposed Robinwood Overlay Zone

In August 2003 the Robinwood Neighborhood Association completed and presented to City Council the Robinwood Neighborhood Vision, and in March 2005, a neighborhood association subcommittee began developing implementation measures for the land use action items included in that document. The result of that process is the proposed Robinwood Neighborhood Overlay Zone, which provides additional land use regulations and development standards to be overlaid on the neighborhood's existing R-15, R-10, and GC zones. This section examines how these proposed regulations might relate to the OR 43 Conceptual Streetscape Design process. Of particular interest are the recommended changes to the General Commercial zone along the Hwy 43 corridor - including permitting residential mixed-use by right in the GC zone, prohibiting certain auto-oriented uses along the corridor, limiting building height, prohibiting certain building materials, and regulating parking lot design.

The proposed overlay recommends adding residential/commercial mixed-use buildings as a permitted use in the GC zone - allowing residential uses on upper floors or a portion of the ground floor of commercial buildings along the OR 43 corridor. Increasing residential uses within the Robinwood GC node would place greater demand on the area's pedestrian infrastructure, and would place greater priority on improving pedestrian accessibility and comfort in these areas.

Additionally, in an attempt to create a more pedestrian-oriented environment along OR 43, the proposed overlay also recommends prohibiting certain auto-oriented and heavy commercial uses in the GC zone. Suggested prohibited uses include automotive repair, light and heavy equipment repair, sales or rentals of light or heavy equipment, storage of recreation vehicles and boats, construction sales and services, light industrial manufacturing or finishing of products, wholesale storage and distribution, mini-warehouses, super stores, self service storage, and household hazardous waste depots. The Neighborhood argues that such uses are in conflict with their stated desire to create a pedestrian-oriented commercial street along OR 43. Limiting these auto-oriented uses would maximize any pedestrian improvements made as part of the streetscape plan, and would create a more visually appealing corridor overall.

The proposed overlay also recommends limiting building height along the corridor. The GC zone currently permits 2.5 stories or 35' in building height for any structure within 50 feet of a low- or medium-density residential zone, and 3.5 stories or 45' for any structure located 50' or more from a low- or medium-density zone. The proposed overlay, however, recommends limiting building height to 2.5 stories (or 35'), whichever is less, as measured from the grade in the center of Highway 43 to the nearest lot line of the subject parcel. Measuring building height from the centerline of the street (rather than from the base of the building) takes the area's slope into account, and prevents upslope commercial buildings from towering over downslope buildings and blocking downslope residential views. This may also create a more symmetrical building face along the corridor, preventing the appearance of greater bulk on one side of the street than the other. However, while 35' may be an appropriate building height for most commercial buildings, a maximum building height of 35' may limit residential mixed-use building opportunities along the corridor.

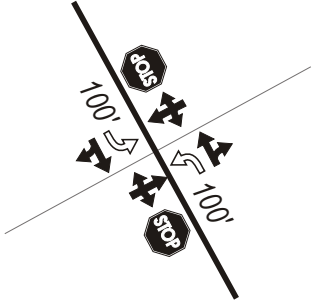
The proposed overlay seeks to improve the overall architectural quality of new buildings along the corridor by amending existing design review standards to encourage the use of "long-lasting" building materials such as cast stone, terra cotta, and wood. It also recommends prohibiting certain building materials such as T1-11, plain concrete or concrete block, corrugated metal, full sheet plywood, sheet pressboard, synthetic stucco, and pre-fabricated tilt-up concrete, except as a secondary finish for up to 10% of the façade surface area. Encouraging more "timeless" building materials could have a positive visual impact along the corridor, which can help to create a more pleasing environment for pedestrians.

Finally, the proposed Robinwood Neighborhood Overlay Zone suggests limiting on-site parking lots to one side of an access driveway, and prohibiting double-loaded parking lots for any new permitted or conditional use. Limiting surface parking lot frontage and overall surface parking lot area can increase a street's pedestrian appeal by decreasing breaks in the street wall. However, the overlay's recommended approach does not address parking lot location or overall off-street parking requirements, which may be more important in mitigating the visual impact of surface parking than parking lot design alone. For example, the overlay recommends that parking lots be limited to one side of an access drive only, but does not address whether that parking lot may be at the side of a building or in front of a building. To the greatest extent possible, parking should be minimized between the building and the street. Additionally, the overlay recommends prohibiting double-loaded parking lots, but does not address overall off-street parking requirements. For many developments (especially those with substantial parking requirements), single-loaded parking lots may not be a viable option. However, minimizing the visual impact of surface parking by requiring that it be located to the side or rear of the building - or through heavy landscaping - can have a substantial positive impact on the quality of the pedestrian environment.

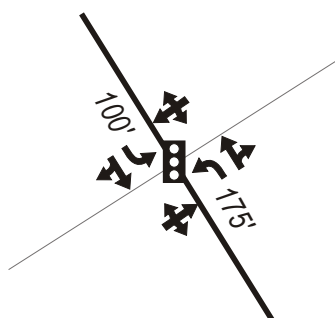
**1** Hwy 43 @ Marybrook Dr



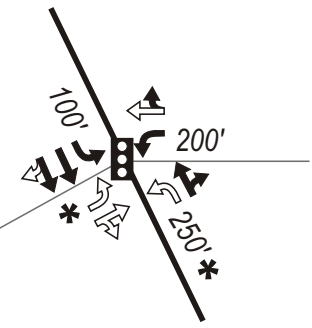
**2** Hwy 43 @ Arbor Dr



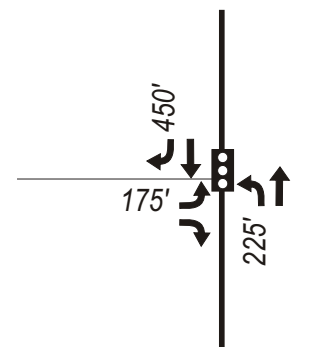
**3** Hwy 43 @ Marylhurst Dr-Lazy River Wy



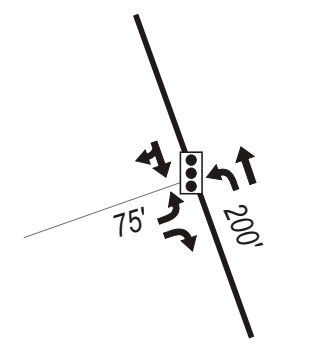
**4** Hwy 43 @ Cedaroak Dr



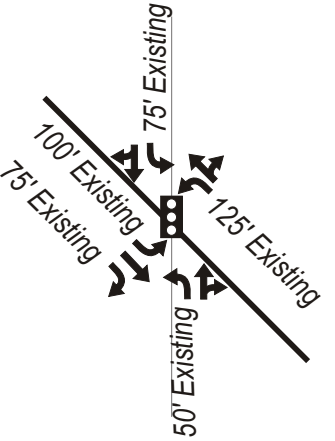
**5** Hwy 43 @ Hidden Springs Rd



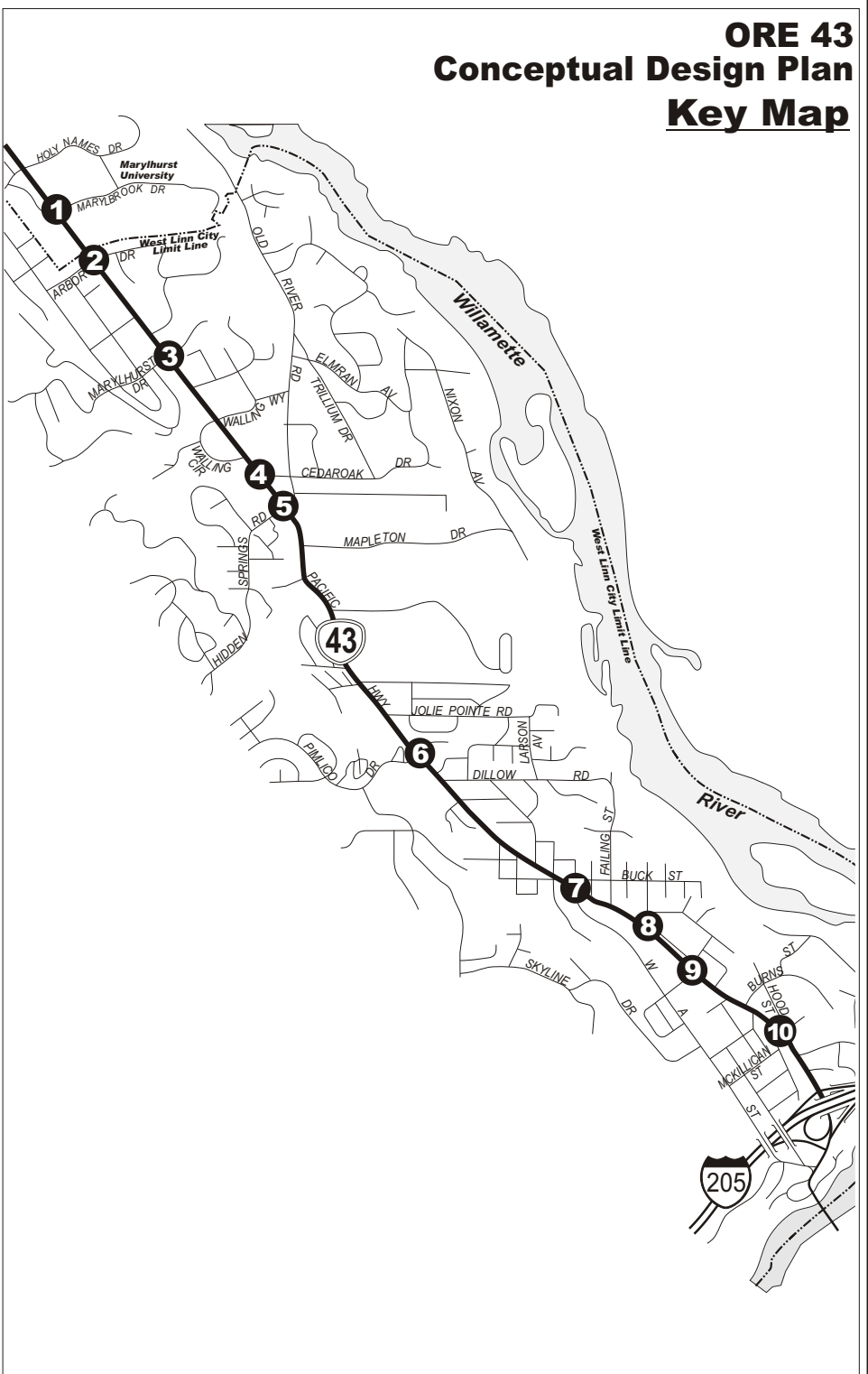
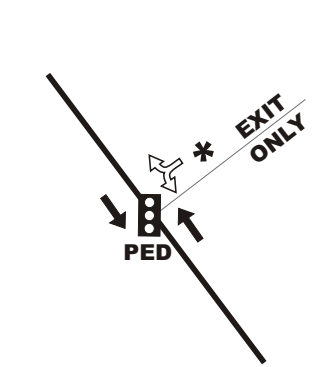
**6** Hwy 43 @ Pimlico Dr



**7** Hwy 43 @ West A St



**8** Hwy 43 @ Holmes St



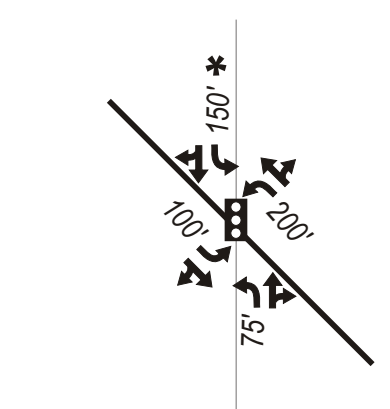
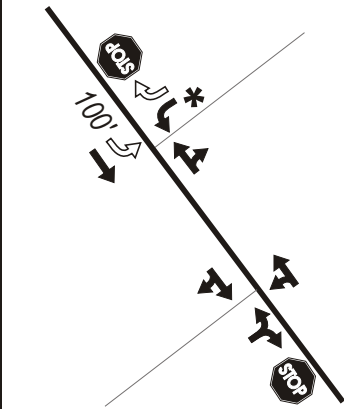
**ORE 43  
Conceptual Design Plan  
Key Map**

**7** Hwy 43 @ West A St

**8** Hwy 43 @ Holmes St

**9** Hwy 43 @ Lewis St-Webb St

**10** Hwy 43 @ Hood St-McKillican St



**LEGEND**

- 0** - Study Intersection & Number
- ← - Existing Lane Configuration
- ⇐ - Proposed Lane Configuration
- STOP** - Existing Stop Sign

- Existing Traffic Signal
- Proposed Traffic Signal
- PED** - Pedestrian Actuated Traffic Signal
- 00' - Storage Length
- \* - Maximum Storage Length Allowed by Geometry

**DKS Associates**  
TRANSPORTATION SOLUTIONS



**Figure 1**

**PROPOSED  
LANE CONFIGURATION  
AND STORAGE LENGTHS**

Comment from ODOT Preliminary Design	Response from Consultant
<b>Miscellaneous</b>	
Median width: 14 feet except for cross section O (6 feet). Where is this section?	Section O is the narrowest section, next to the Bolton Shopping Center, between Burns Street and McKillican.
Curb return radii: 20 feet - we recommend to use a 30-foot radius at intersections at this planning/conceptual level, although we would use a 20 foot radius at minor and/or less traffic generated intersections.	Change would be corrected at the time of Preliminary Engineering (PE).
<b>Chow Mein Lane and Mary S. Young Entrance:</b>	
"...and a 7-foot planter/sidewalk on the east side "will require some evaluation/review from the Region Technical Center and an approval from Technical Services. If the intent is no planter, then a 7-foot sidewalk is fine.	Comment noted.
2nd bullet: If there are no access reservations to the undeveloped properties then the non-raised median proposal in this section is OK. But, if there are access reservations or any plan from any parties either developers or the City to apply for accesses to the highway then this is ODOT's opportunity to plan for a raised median or reserve some access control measure.	Change would be corrected at the time of PE.
Pimlico Drive: A 6-foot planter/sidewalk will require some evaluation/review from the Region Technical Center and an approval from Technical Services. A 6-foot sidewalk is fine, but not for both.	Change would be corrected at the time of PE.
White Tail Drive: See previous comment on the proposed planter/sidewalk dimension.	Change would be corrected at the time of PE.

Comment from ODOT Preliminary Design	Response from Consultant
<b>HWY. 43 INTERSECTION DRAWINGS</b>	
<p>General: Can it be "ORE 43 CONCEPTUAL PLAN" instead of "ORE 43 CONCEPTUAL DESIGN PLAN"? If elements were drawn up from a GIS format and/or based on other unknown factors, i.e. the topography along the corridor, I would say these are not quite conceptual design plans yet. Just my opinion.</p>	<p>Given the very limited scope and budget, the emphasis at this stage is Conceptual and not Design.</p>
<p>MARYLHURST DR. - FAIRVIEW: 300'-400' from Marylhurst to the north (left) is Shady Hollow Way. The approach point is in the middle of the median taper. There should be some raised traffic separator (island) to prevent left-turn out in the narrow median prior to a signalized intersection.</p>	<p>Change would be corrected at the time of PE.</p>
<p>CEDAROAK - HIDDEN SPRINGS: I'm seriously concerned with this proposal. Potentially, it can be a fatal flaw. The proposal with a driveway connected to a signalized intersection, severe skew-angled approach from Cedaroak, access to a business off Cedaroak to close to signal, and the current/proposed trap lane should be re-evaluated. It's a red flag for conflicting movements and signing.</p>	<p>These issues would be ironed out at the time of PE. We agree that the angles of the side streets should be more similar to improve visibility and conflicts for turning vehicles, but the primary scheme is to re-organize the access to be safer and more efficient. We should not drop it because it is non-standard. Potential solutions could include: modifying the new west leg to line up better with existing skew on Cedaroak, acquiring a business on the NE or SE corner, acquiring more property to the north to continue the same centerline east-west, etc.</p>

Comment from ODOT Preliminary Design	Response from Consultant
<p>Also, with the left-turn pockets on the highway and left-turn out from businesses on the north side plus the current add/trap lane, there should be some raised traffic separator between Walling Circle and Cedaroak as a measure to reduce conflicting movements.</p>	
<p>CHOW MEIN - MARY S. YOUNG: Full median width should be from Mapleton to Mary S. Young. Also, a business access on the west side of the hwy and right the intersection of hwy 43/Mapleton should be restricted or moved away.</p>	<p>Change would be corrected at the time of PE.</p>
<p>PIMLICO DRIVE: What's the reason(s) to taper or eliminate the median to the left of the Pimlico Drive intersection? Is it a mistake? Also, there should be some preventive measure to restrict left-turn out from the residential driveway within the intersection footprint? Can it be done with a elongated island in the median? Can it be relocated?</p>	<p>The median could be extended as a two-way left-turn (TWLT). This issue would be revisited at the time of PE.  This is a brand new house and driveway. The access could be modified through the PE design, but seems challenging, at least.</p>
<p>WHITE TAIL: What are the movements at the approach just to east of the map? Is it right-in only? or full movement? If the latter is so, it needs to be re-aligned.</p>	<p>It is a residential driveway, which has full access today. It could be moved to line up better with White Tail, potentially.</p>
<p>My Insert: HWY 43/BUCK ST./CAUFIELD INTERSECTION: Is there any thought to simplify this intersection configuration since it is close the next signalized intersection to the south (Elliot)?</p>	<p>Good question to revisit during PE.</p>
<p>My Insert: BOLTON ST. - BURNS ST.: What is the extra pavement to the right of the NB bike lane? Is it parking? If so, we propose to remove it.</p>	<p>No on-street parking is proposed.</p>

Comment from ODOT Preliminary Design	Response from Consultant
<p>McKILLICAN: Can the northerly approach (HOOD) be narrowed down? It looks wide. Is it for (big) truck right turn off the highway?</p>	<p>This is the route to the high school, and the steep grade makes it difficult for any trucks or buses. If it were narrowed, the Hood Street approach on the other side would not align well. However, this can be sorted out at the time of PE.</p>