APPENDIX

DKS Associates
TRANSPORTATION SOLUTIONS

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.

DKS Associates
TRANSPORTATION SOLUTIONS

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[1]

Corridor	Posted Speed (mph)	ROW Width (ft)	Number of Lanes	Lane Width (ft)
Principal Arterial				
Highway 43 (Willamette Drive)	35	50-100	2-4	12
Arterial				
Hidden Springs Road	25	60	2	11
West A Street	25	60	2	11
Collector				
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

[1] 1998 West Linn Transportation System Plan, Figure 3-12.

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.

1400 SW Fifth Avenue
Suite 500
Portland, OR 97201

(503) 243-3500
(503) 243-1934 fax

DKS Associates
TRANSPORTATION SOLUTIONS

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[1]

Corridor	Posted Speed (mph)	ROW Width (ft)	Number of Lanes	Lane Width (ft)
Principal Arterial				
Highway 43 (Willamette Drive)	35	50-100	2-4	12
Arterial				
Hidden Springs Road	25	60	2	11
West A Street	25	60	2	11
Collector				
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.

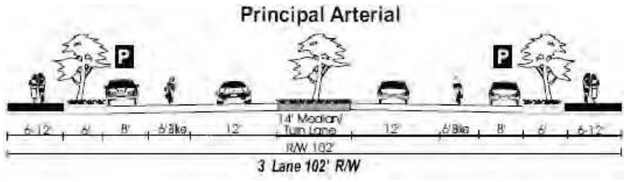
Highway 43, also known as the Oswego Highway, ORE 43 and Willamette Drive, is a state facility managed by ODOT. The Oregon Highway Plan identifies the Highway 43 as a Statewide Highway within the study area and for the majority of its length in West Linn. Statewide Highways often function as connectors 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

[1] 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)

DKS Associates
TRANSPORTATION SOLUTIONS

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[2] 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.[3]

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[4]. 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[5] today during peak ours, 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.

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

DKS Associates
TRANSPORTATION SOLUTIONS

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)
Signalized Intersections						
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
Unsignalized Intersections						
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.

Access Management

Proper roadway access spacing is important to maintain operating characteristics and safety. **T**ypically, 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 ODO**T** access management standards, as defined in OAR 734-051, call for minimum distances between access points on the same side of the highway. **T**he distances required depend on the posted speed of the facility. Within the study area, the ODO**T** minimum spacing standard that applies to Highway 43 is 770 feet[6] based on the functional classification of Statewide Highway with a posted speed of 35 mph. ODO**T** would like to change the functional classification of this segment of Highway 43 to a District Highway.[7] **T**he minimum spacing standard for a District Highway with a posted speed of 35 mph is 350 feet[8].

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

[6] *1999 Oregon Highway Plan*, Oregon Department of **T**ransportation, August 2006, **T**able 13.
[7] Ross Kevlin, ODO**T**, 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.
[8] *1999 Oregon Highway Plan*, Oregon Department of **T**ransportation, August 2006, **T**able 15.

DKS Associates
TRANSPORTATION SOLUTIONS

Traffic Safety

The last two and a half years (2003 through 2006) of available collision data were obtained from ODO**T** 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. **T**he 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. **T**ruck volumes and percentages at the study intersections are listed in **T**able 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.

DKS Associates
TRANSPORTATION SOLUTIONS

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.[9] 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

[9] Information from Young Park, TriMet, received March 5, 2007. For additional information regarding the status of the proposal, contact Myleen Richardson, TriMet.

DKS Associates
TRANSPORTATION SOLUTIONS

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[10] 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.

[10] 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)
Signalized Intersections						
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**
Unsignalized Intersections						
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

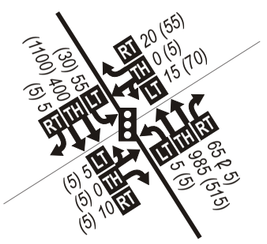
0 - Study Intersection & Number

DKS Associates
TRANSPORTATION SOLUTIONS

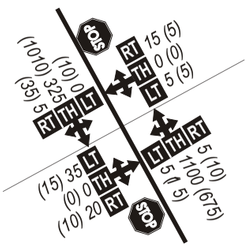
NO SCALE

Figure 1
STUDY AREA

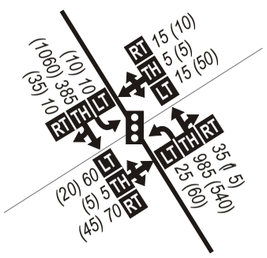
1 Hwy 43 @ Marylbrook Dr



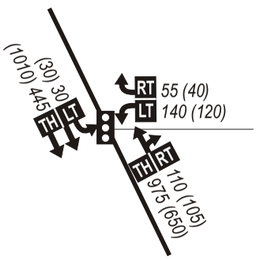
2 Hwy 43 @ Arbor Dr



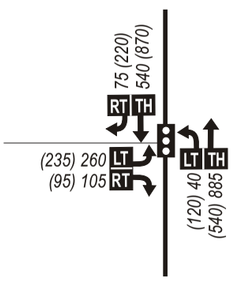
3 Hwy 43 @ Marylhurst Dr-Lazy River Wy



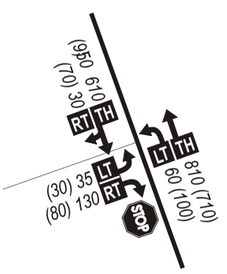
4 Hwy 43 @ Cedaroak Dr



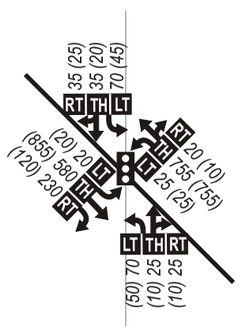
5 Hwy 43 @ Hidden Springs Rd



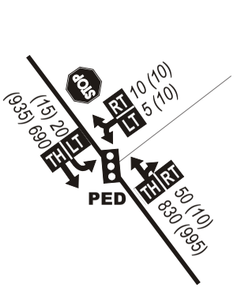
6 Hwy 43 @ Pimlico Dr



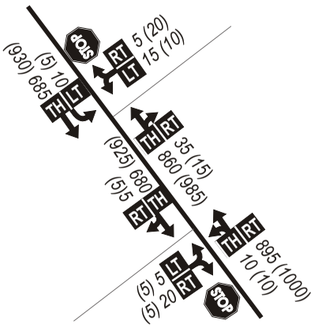
7 Hwy 43 @ West A St



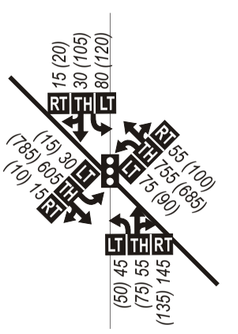
8 Hwy 43 @ Holmes St



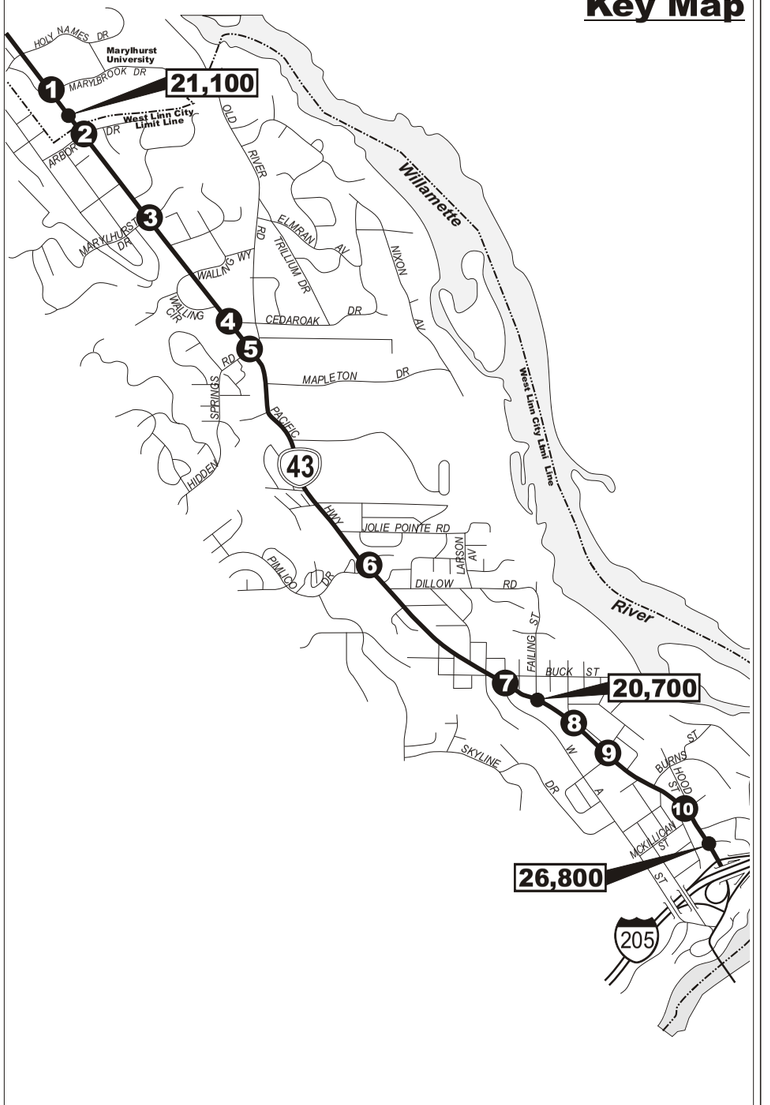
9 Hwy 43 @ Lewis St-Webb St



10 Hwy 43 @ Hood St-McKillican St



ORE 43
Conceptual Design Plan
Key Map



LEGEND

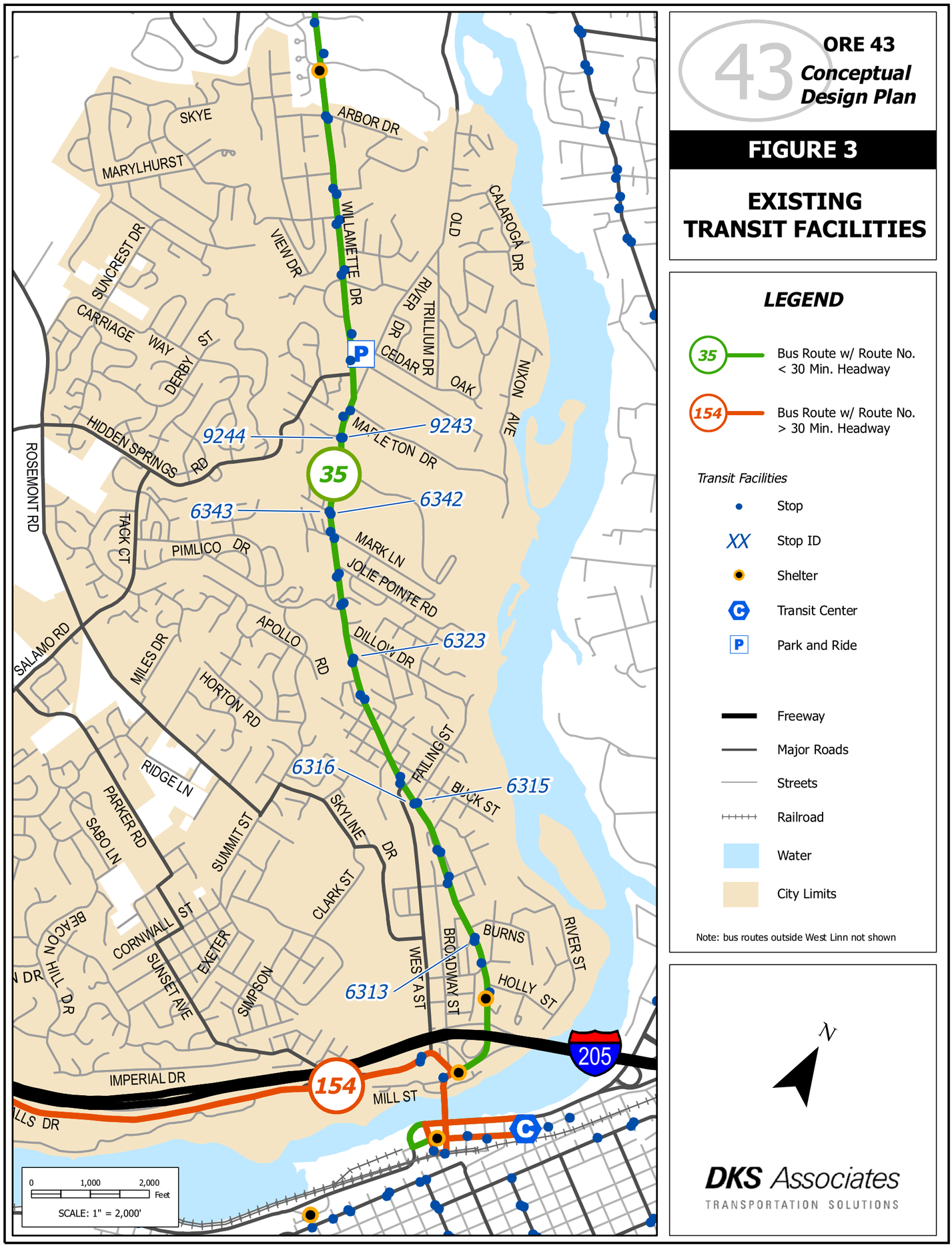
- 0 - Study Intersection & Number
- ← - Lane Configuration
- STOP - Stop Sign
- - Traffic Signal
- **PED** - Pedestrian Actuated Traffic Signal
- *AM (PM)* - Peak Hour Traffic Volume
- LT TH RT (Left • Thru • Right) - Volume Turn Movement
- 000 - 2005 Average Annual Daily Traffic Volume (From ODOT Data)

DKS Associates
TRANSPORTATION SOLUTIONS

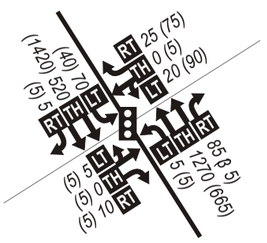
NO SCALE

Figure 2

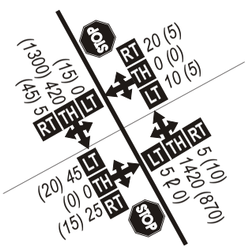
EXISTING CONDITIONS


43
ORE 43
Conceptual Design Plan
FIGURE 3
EXISTING TRANSIT FACILITIES
LEGEND
35 Bus Route w/ Route No. < 30 Min. Headway
154 Bus Route w/ Route No. > 30 Min. Headway
Transit Facilities
Stop
XX Stop ID
Shelter
Transit Center
Park and Ride
Freeway
Major Roads
Streets
Railroad
Water
City Limits
Note: bus routes outside West Linn not shown
N
DKS Associates
TRANSPORTATION SOLUTIONS
0 1,000 2,000 Feet
SCALE: 1" = 2,000'
ARBOR DR
SKYE
MARYLHURST
WILLAMETTE DR
VIEW DR
SUNCREST DR
CARRIAGE WAY
DERBY ST
OLD RIVER DR
TRILLIUM DR
CEDAR DR
OAK
CALAROGA DR
NIXON AVE
HIDDEN SPRINGS RD
ROSEMONT RD
MARYLETON DR
9244
9243
35
6343
6342
TACK CT
PIMLICO DR
MARK LN
JOLIE POINTE RD
SALAMO RD
MILES DR
APOLLO RD
DILLON DR
6323
HORTON RD
RIDGE LN
PARKER RD
SABO LN
SUMMIT ST
6316
FAILING ST
6315
BLOCK ST
SKYLINE DR
CLARK ST
BEACON HILL DR
CORNWALL ST
SUNSET AVE
EXETER
SIMPSON
WEST A ST
BROADWAY ST
BURNS
HOLLY ST
RIVER ST
6313
205
IMPERIAL DR
154
MILL ST

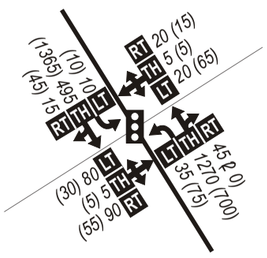
1 Hwy 43 @ Marylbrook Dr



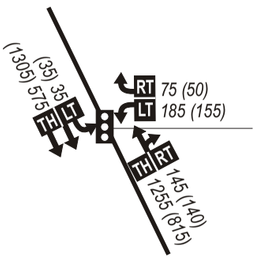
2 Hwy 43 @ Arbor Dr



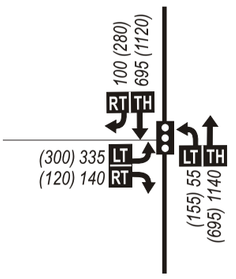
3 Hwy 43 @ Marylhurst Dr-Lazy River Wy



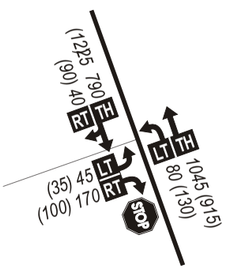
4 Hwy 43 @ Cedaroak Dr



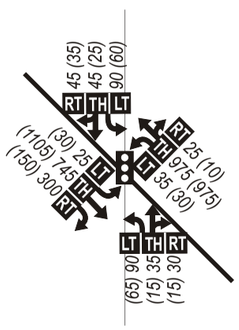
5 Hwy 43 @ Hidden Springs Rd



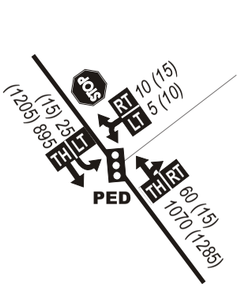
6 Hwy 43 @ Pimlico Dr



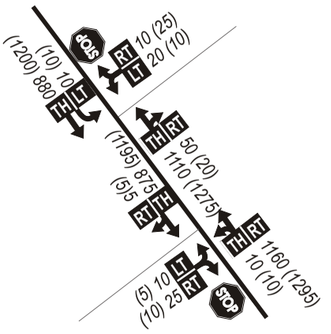
7 Hwy 43 @ West A St



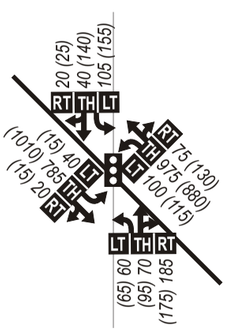
8 Hwy 43 @ Holmes St



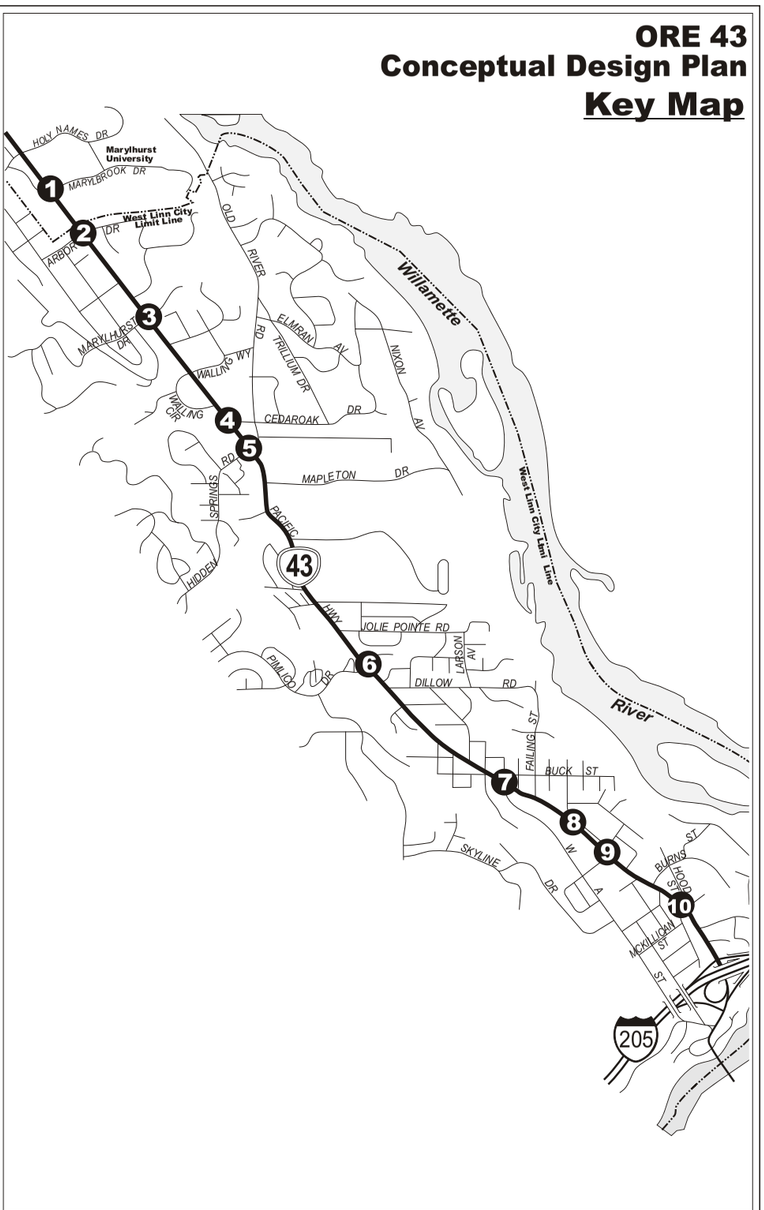
9 Hwy 43 @ Lewis St-Webb St



10 Hwy 43 @ Hood St-McKillican St



ORE 43
Conceptual Design Plan
Key Map



LEGEND

- 0 - Study Intersection & Number
- ← - Lane Configuration
- STOP - Stop Sign
- - Traffic Signal
- **PED** - Pedestrian Actuated Traffic Signal
- *AM (PM)* - Peak Hour Traffic Volume
- LT TH RT - Volume Turn Movement (Left • Thru • Right)

NO SCALE

DKS Associates
TRANSPORTATION SOLUTIONS

Figure 4

2030 BASE CASE TRAFFIC VOLUMES

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.

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.

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

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 landcaping

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 furnshings

Stormwater planters

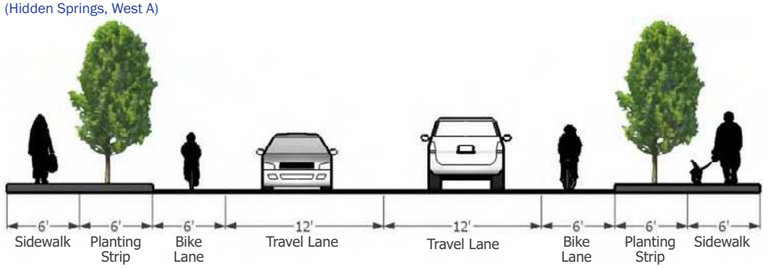
Planting strips and/or furnishing zones increase pedestrian safety and comfort by separating the walkway from the roadway. They introduce vegetation to the streetscape, improving aesthetics and providing shade in the warmer months. They also provide opportunities to manage stormwater with planters or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

Multi-Modal Street Examples

Existing Cross Sections for Arterials and Collectors that Intersect OR 43

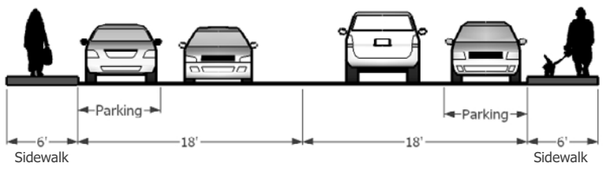
These cross sections present current conditions for arterials and collectors that intersect Hwy 43 as defined by the Transportation System Plan.

Arterials:
(Hidden Springs, West A)



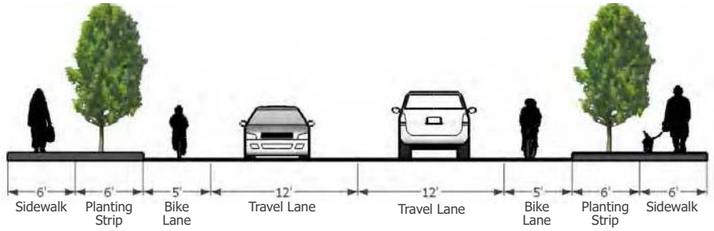
60′ ROW

Collector Constrained:
(Mapleton)



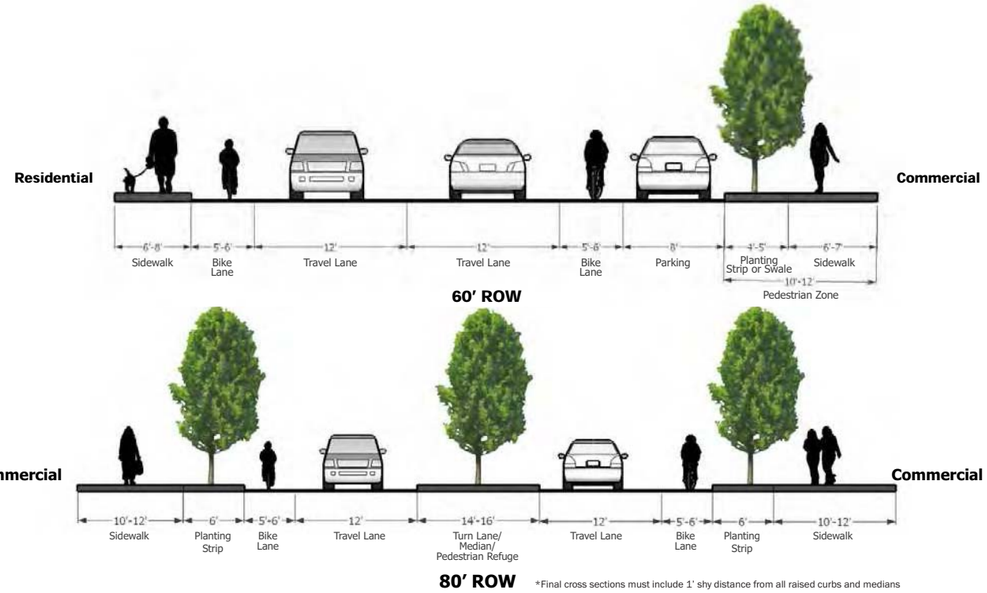
48′ ROW

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



58′ ROW

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.

*Cross sections must include 1' shy distance from all raised curbs and medians

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.

Multi-Modal Street Examples

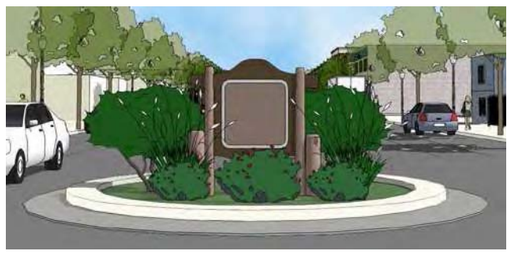
Off-Street Trails

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

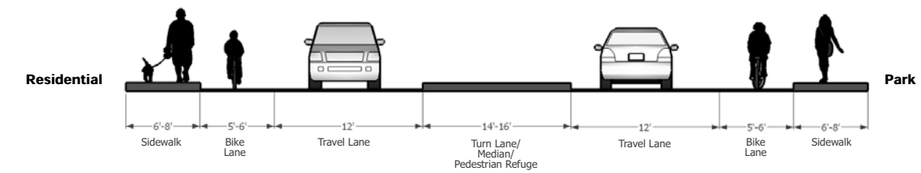
Textured / colored intersection

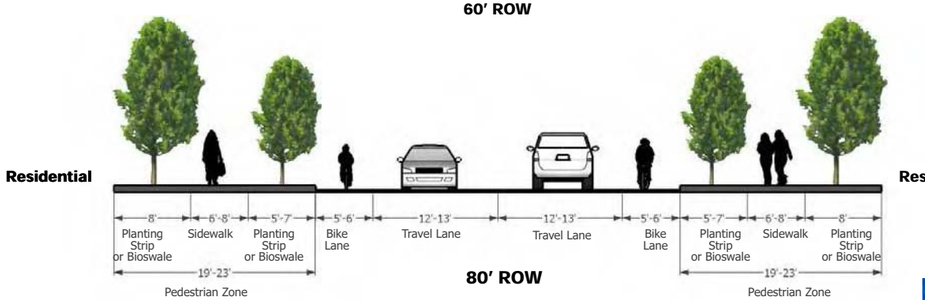
Mid-block crossing with refuge

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

Multi-Modal Street Examples

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).

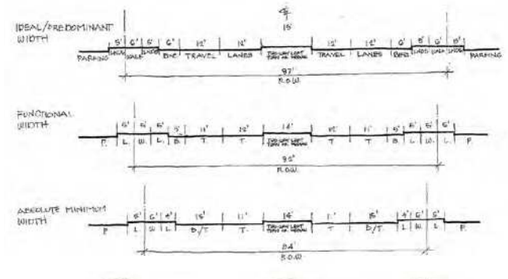
Transit Stops

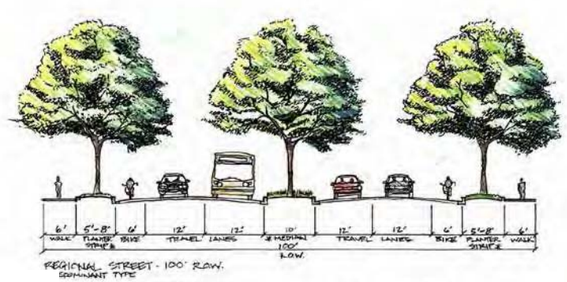



Existing Condition along OR 43 | Existing Condition along OR 43 | Existing Condition along OR 43

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 responsibilty (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 advertsing 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





Regional Street

2040 Design District	Buildings Oriented Toward Street	Vehicle Travel Lanes	Vehicle Speed	Turn/ Median	Street Connect	Drive-ways	On-Street Parking	Transit Amenities	Pedestrian Amenities	Improved Ped Xings	Bikeways	Freight Function
Corridor, Some Main Streets, Inner Neighborhood, Outer Neighborhood	All major intersections and transit stops	Usually 4; add'l lanes in some situations	Moderate	Mix of medians and turn lanes that provide pedestrian refuge	Some to many	Few (combined when possible)	Allowed	High-quality service supported with amenities at major stops and station areas	Moderate sidewalk width with buffering; lighting and special crossing amenities (like to major transit stops	At signalled intersection	Striped or shared	Primary freight routes; provide access to markets and may include loading amenities within the right of way

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

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.

Green Street Examples

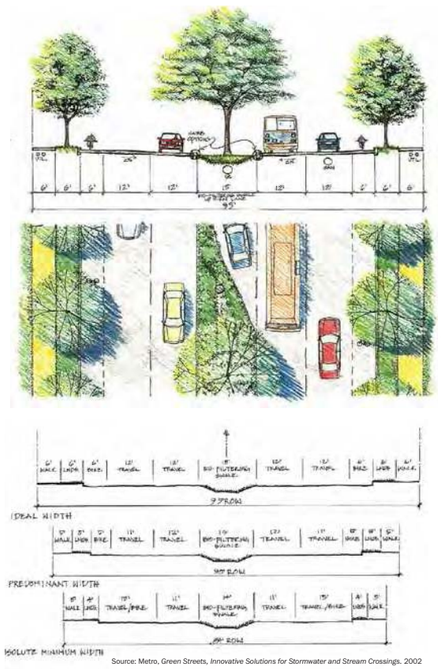
OR HWY 43 Conceptual Design Plan

"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



Source: Metro, *Green Streets, Innovative Solutions for Stormwater and Stream Crossings*. 2002

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

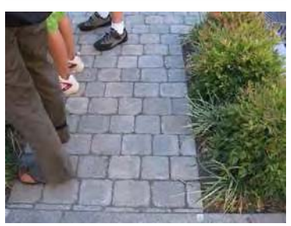
A curb cut channels street runoff into structured planters, where it is allowed to percolate into the soil

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.

A Green Street planter combined with a sidewalk bump out

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

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

Green Street Examples

Curbless Green Streets

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

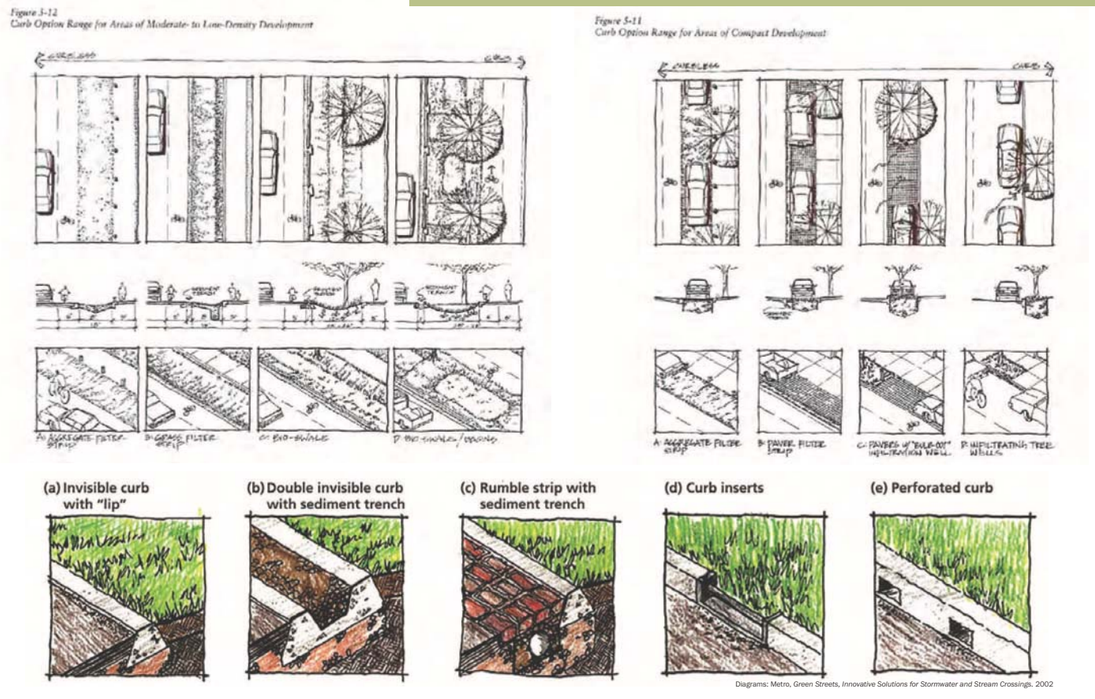
Curbless green streets are often found in residential areas. In this example, the green street treatment acts as a buffer between the sidewalk and roadway, and provides an amenity for adjacent homes

Vegetated bioswales cans 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 cubless green streets be used at transit stop locations, additional engineering would be required to meet TriMet and ADA boarding and alighting requirements)

Green Street Curb Options



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.

Other Green Street Treatments

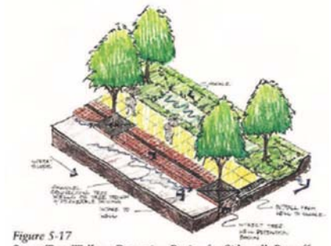


Figure 5-17
Street Tree Wells as Detention Basins for Sidewalk Runoff (Within Restricted Right of Way)

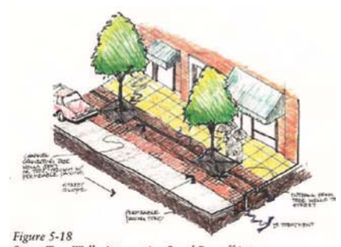


Figure 5-18
Street Tree Wells Attenuating Road Runoff into Bio-filtering Swale

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.

Pervious 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

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:

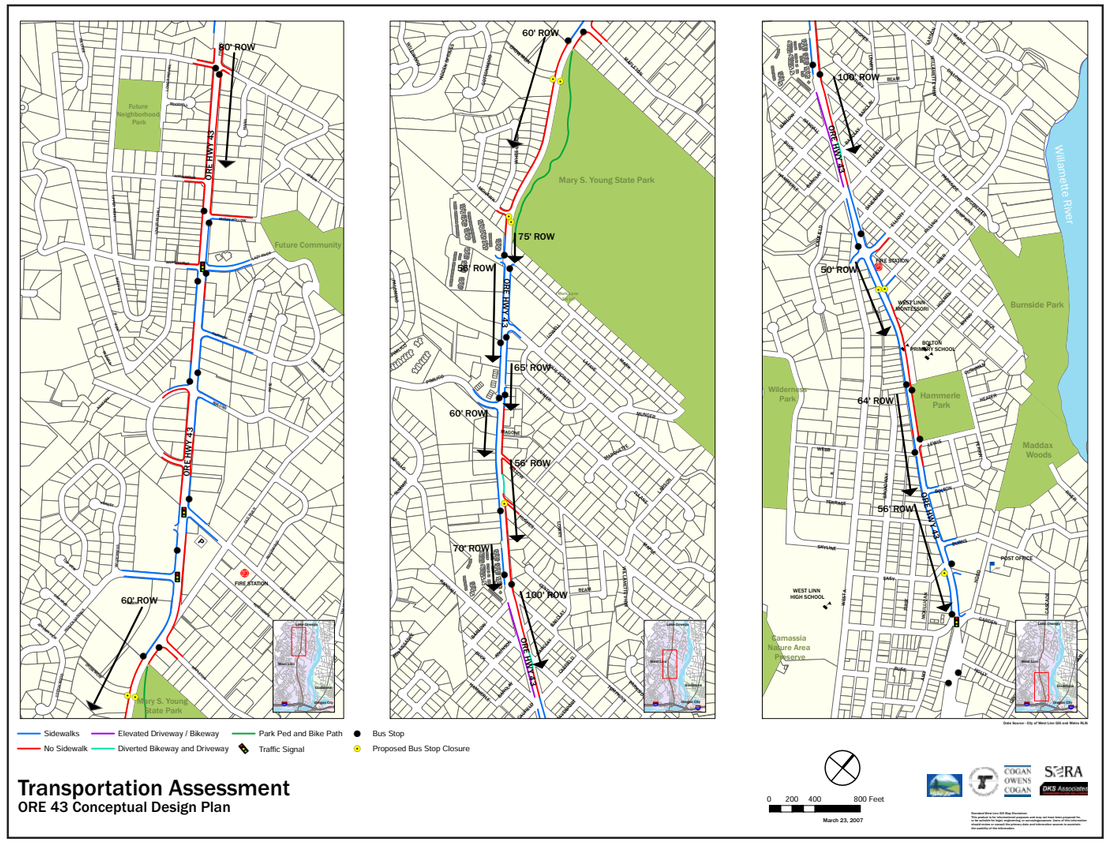
- **Right-of-Way** – including a discussion of the wide range of ROW widths along the corridor, the difficulties with future ROW allocations, and the potential for employing access management strategies;
- **The Pedestrian Realm** – including an analysis of issues related to pedestrian access, connectivity, 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.

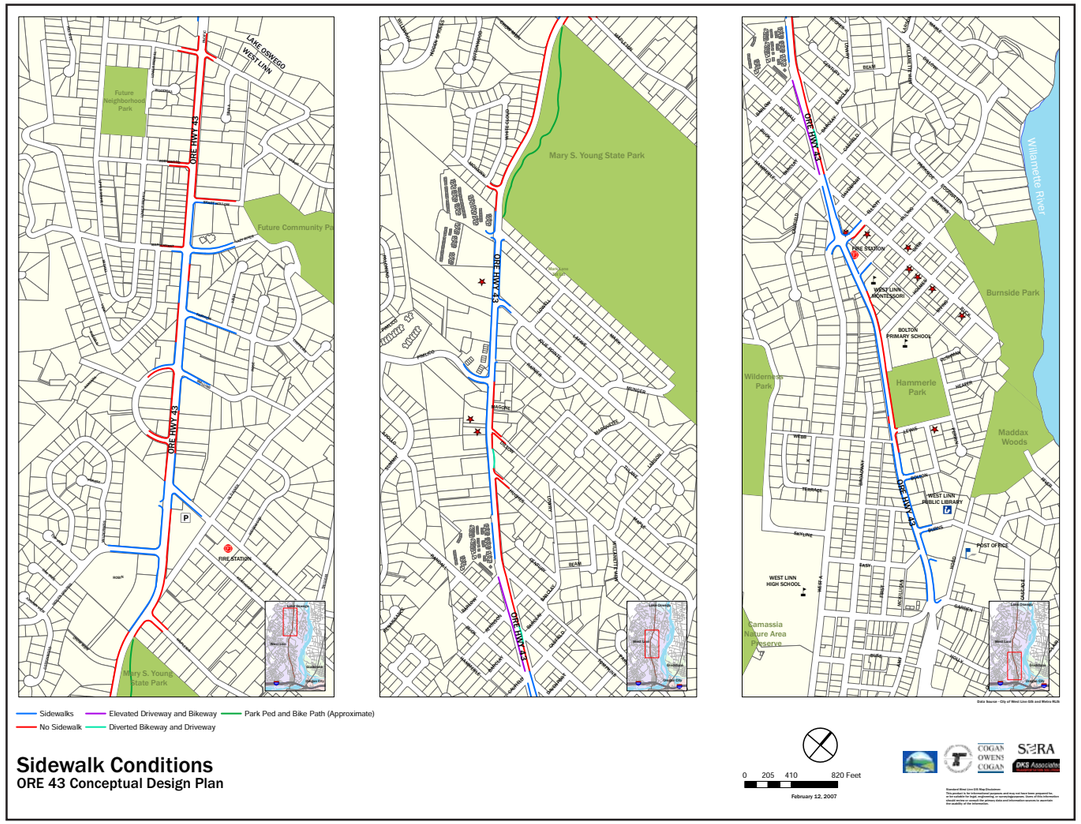
The OR 43/Arbor intersection is currently experiencing difficulties; existing ROW may allow for left turn lanes onto Arbor, but volumes do not warrant a signal to help traffic turning onto OR 43

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 or 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.

Above-ground utility lines along OR 43

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

Transit

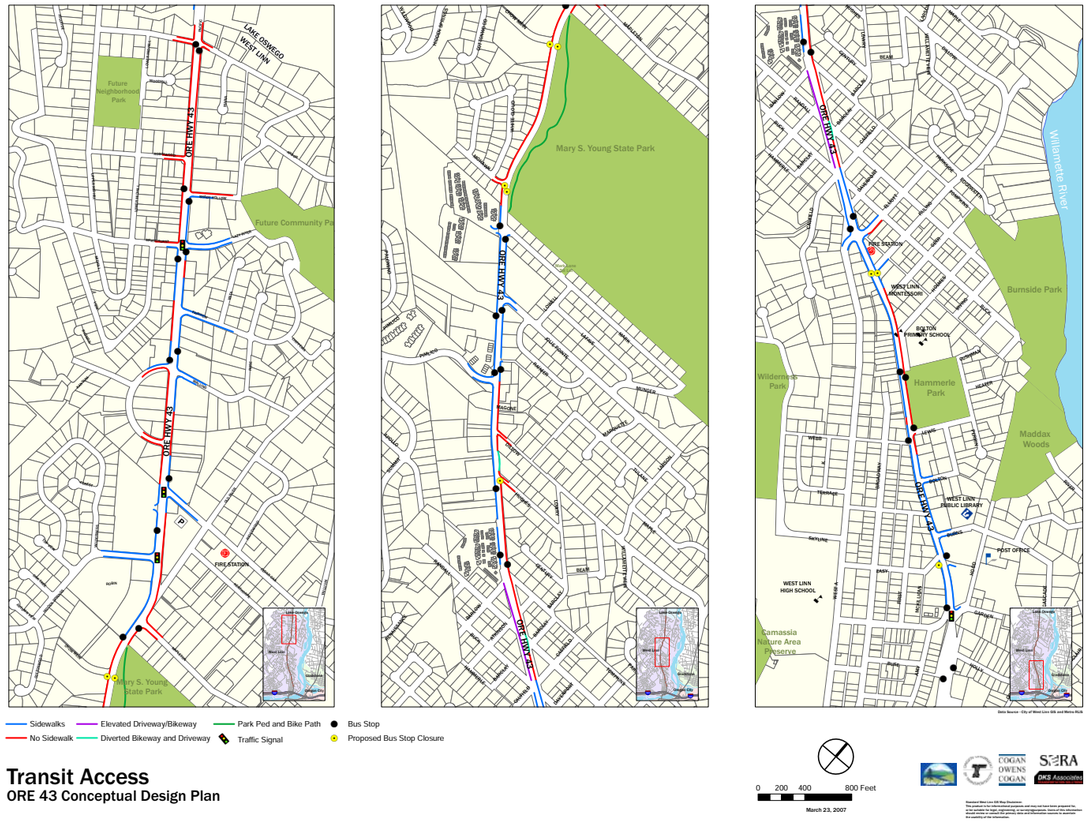
TriMet operates the #35 bus line through West Linn along OR 43, and the corridor contains several bus stops. There are currently 37 bus stops. As reported in Tech Memo #1, TriMet is considering abandoning eight of these stops due to a lack of ridership. While the OR 43 corridor through West Linn contains 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.

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



Transit Access
ORE 43 Conceptual Design Plan

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.

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 be 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.

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.

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

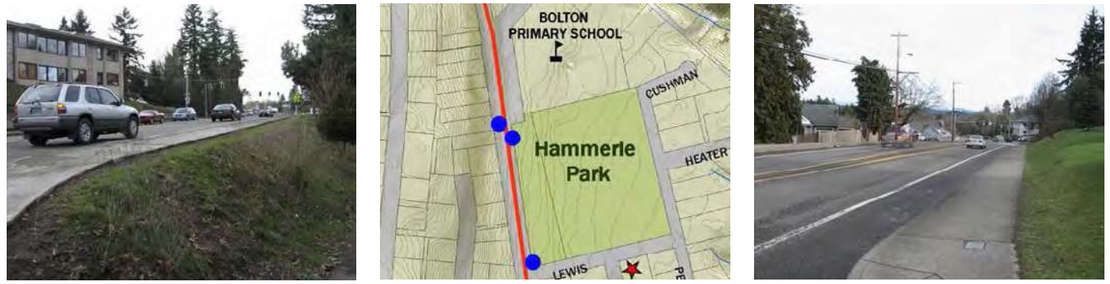
Bicycles and parked cars share, and sometimes compete, for the same shoulder

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

Obstructions in the bike lane make cycling difficult

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

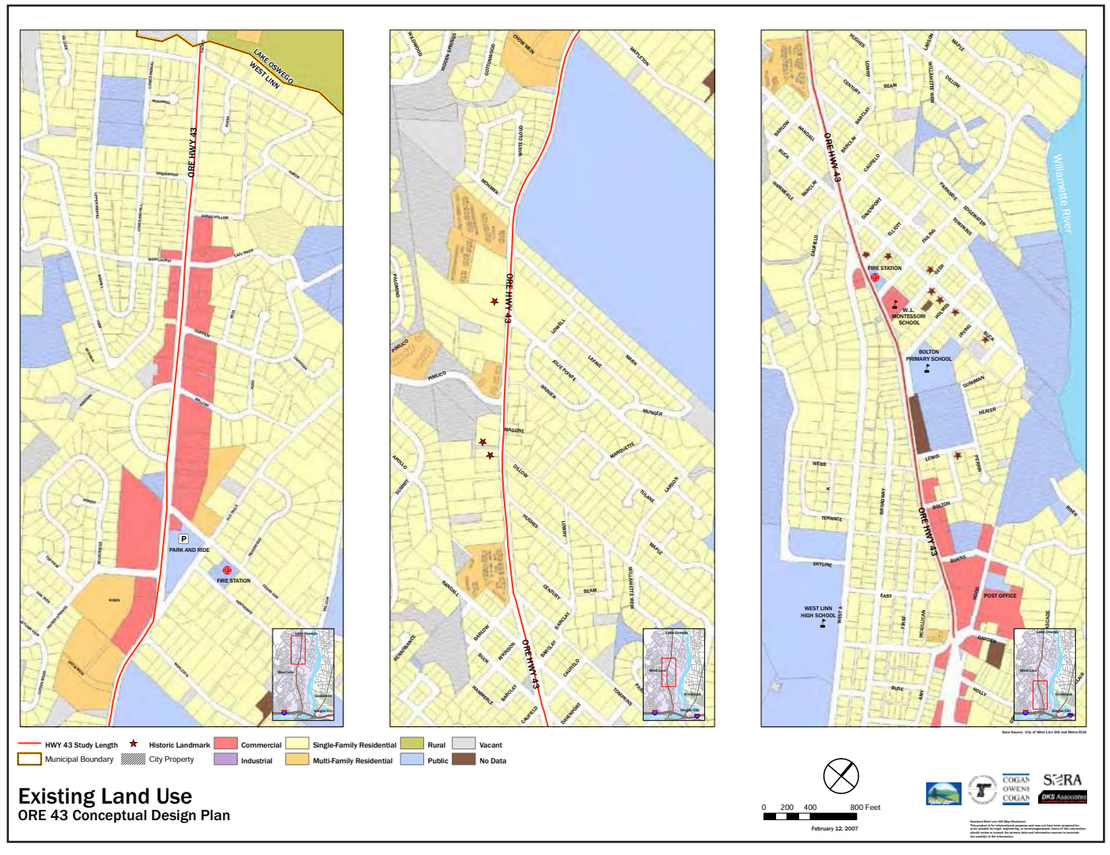
According to Metro GIS data, OR 43 crosses nine streams within the study area. It will be of great importance that these water courses be protected from polluting run-off with any modifications that are made within the highway right-of-way. In more developed areas of the corridor, stormwater run-off 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.



Existing Land Use
ORE 43 Conceptual Design Plan

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.

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.

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 - includeing 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.

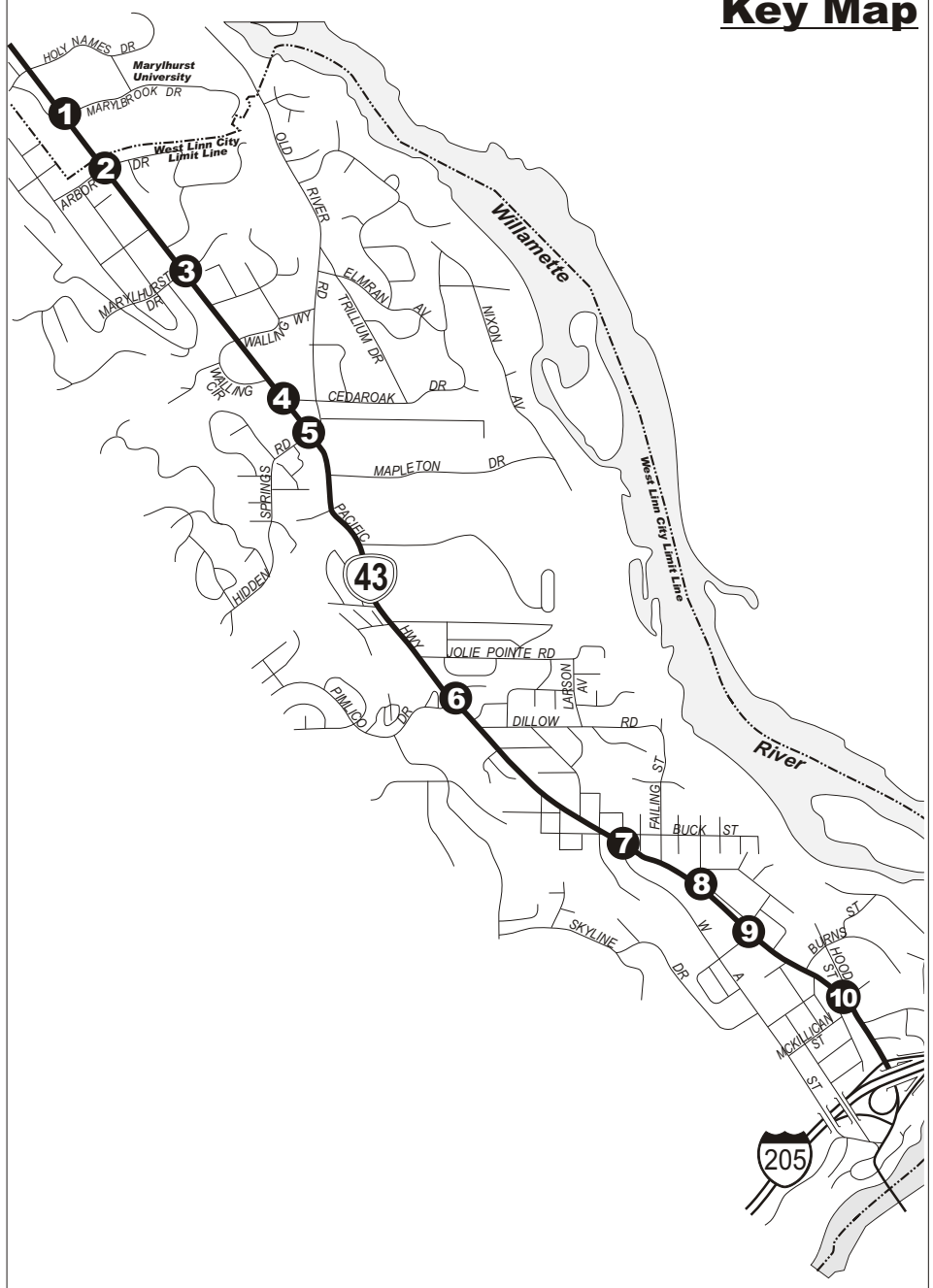
Additionally, in an attempt to create a more pedestrian-oriented environment along OR 43, the proposed overlay also recommends prohibiting certain auto-oriented and heavy commercial uses in the GC zone. Suggested prohibited uses include automotive repair, light and heavy equipment repair, sales or rentals 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.

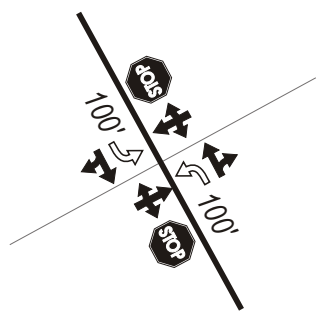
Finally, the proposed Robinwood Neighborhood Overlay Zone suggests limiting on-site parking lots to one side of an access driveway, and prohibiting double-loaded parking lots for any new permitted or conditional use. Limiting surface parking lot frontage and overall surface parking lot area can increase 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.

ORE 43
Conceptual Design Plan
Key Map

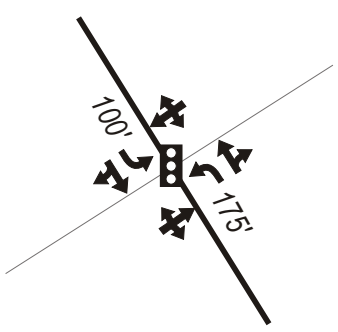


1 Hwy 43 @ Marylbrook Dr

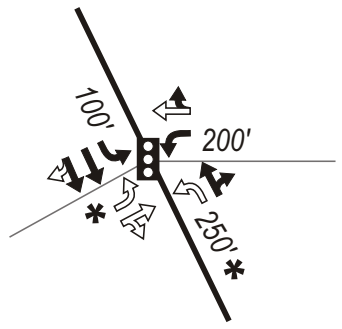
2 Hwy 43 @ Arbor Dr



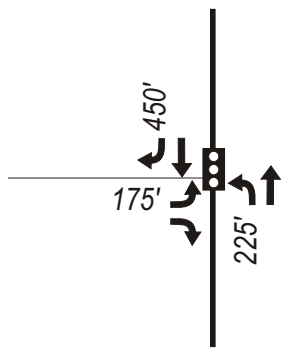
3 Hwy 43 @ Marylhurst Dr-Lazy River Wy



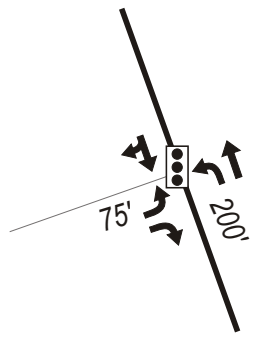
4 Hwy 43 @ Cedaroak Dr



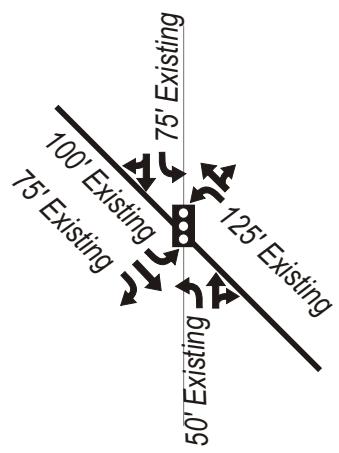
5 Hwy 43 @ Hidden Springs Rd



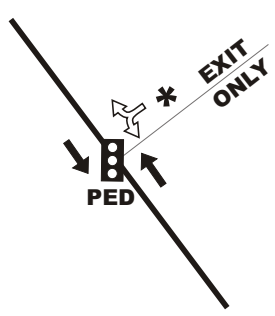
6 Hwy 43 @ Pimlico Dr



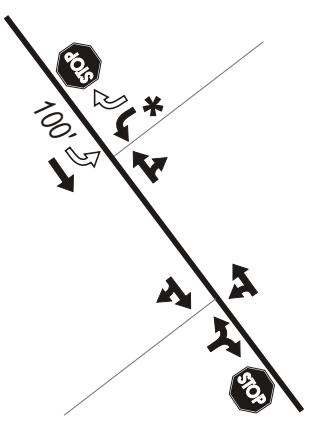
7 Hwy 43 @ West A St



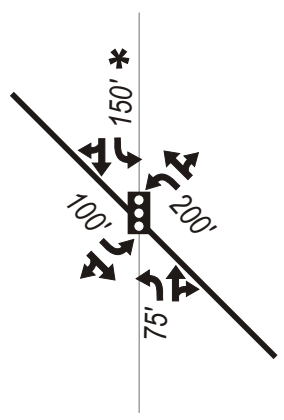
8 Hwy 43 @ Holmes St



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

NO SCALE

Figure 1

PROPOSED LANE CONFIGURATION AND STORAGE LENGTHS

Comment from ODOT Preliminary Design	Response from Consultant
Miscellaneous	
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).
Chow Mein Lane and Mary S. Young Entrance:	
"...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
HWY. 43 INTERSECTION DRAWINGS	
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.	Given the very limited scope and budget, the emphasis at this stage is Conceptual and not Design.
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.	Change would be corrected at the time of PE.
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.	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.

Comment from ODOT Preliminary Design	Response from Consultant
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.	
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.	Change would be corrected at the time of PE.
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?	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.
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.	It is a residential driveway, which has full access today. It could be moved to line up better with White Tail, potentially.
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)?	Good question to revisit during PE.
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.	No on-street parking is proposed.

Comment from ODOT Preliminary Design	Response from Consultant
McKILLICAN: Can the northerly approach (HOOD) be narrowed down? It looks wide. Is it for (big) truck right turn off the highway?	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.