

# FROG POND EAST & SOUTH MASTER PLAN



## TECHNICAL APPENDIX



APPROVED BY WILSONVILLE CITY COUNCIL  
DECEMBER 19 2022

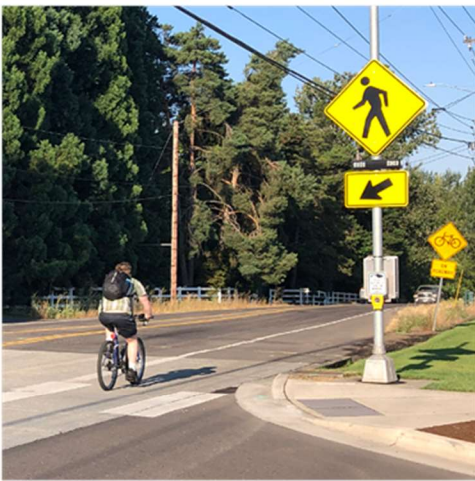
# APPENDIX I: TRANSPORTATION ANALYSIS: EXISTING AND FUTURE CONDITIONS

FROG POND EAST & SOUTH MASTER PLAN

# TRANSPORTATION ANALYSIS: EXISTING AND FUTURE CONDITIONS

## FINAL REPORT

DECEMBER 2022



**EAST & SOUTH**  
MASTER PLAN

**PREPARED FOR THE CITY OF WILSONVILLE**



**PREPARED BY DKS ASSOCIATES**



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This report documents the traffic analysis performed in association with the Frog Pond East & South Master Plan in Wilsonville, Oregon. This report provides a more refined evaluation of the East and South land use as compared to the Frog Pond Area Plan,<sup>1</sup> which was adopted in 2015, and builds on the work of the Frog Pond West Master Plan,<sup>2</sup> which was adopted in 2017.

An executive summary of this transportation analysis is provided below. The following sections of this memorandum document the existing traffic conditions (2022), future baseline and build traffic conditions (2040), and a list of resulting transportation projects. The year 2040 was selected for future analysis to be consistent with the Metro Regional Transportation Plan (RTP) and Wilsonville Travel Demand Model's horizon year.

## EXECUTIVE SUMMARY

To determine existing and future transportation conditions for the Frog Pond East and South neighborhoods, a comprehensive traffic analysis was performed. The analysis focused on the major intersections both within the project vicinity and within Wilsonville at large, including the two I-5 interchange areas (i.e., Wilsonville Road and Elligsen Road). The study area includes 15 total intersections, including 4 key gateway intersections to the neighborhoods.

### Analysis Scenarios

The existing conditions analysis was based on recent 2021 and 2022 traffic counts and existing intersection geometries, while the future analysis was based on traffic forecasts for the 2040 horizon year and improved intersection geometries associated with all High Priority Projects included in Wilsonville's Transportation System Plan (TSP). The future analysis consisted of two scenarios: 2040 Baseline and 2040 Build. The future land use assumptions are consistent with the Metro model, which was used to update the travel demand model for the Build scenario. The 2040 Baseline scenario assumes no additional growth beyond what is currently assumed in the 2040 model and the 2040 Build scenario represents the likely build-out of the study area, which includes up to 1,800 housing units and up to 44,000 square feet of commercial space within the East and South neighborhoods.

The City has also identified a hypothetical higher-density alternative which calls for approximately 2,400 total units in the combined East and South neighborhoods. This higher dwelling unit amount reflects 20 units per net acre, which is a density prescribed in one of the compliance options in State administrative rules for new urban areas to comply with House Bill 2001 middle housing law. A separate report has been provided on the findings of the analysis of the higher-density alternative.

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<sup>1</sup> Frog Pond West Master Plan, City of Wilsonville, July 17, 2017.

<sup>2</sup> Frog Pond Area Plan, City of Wilsonville, November 16, 2015.

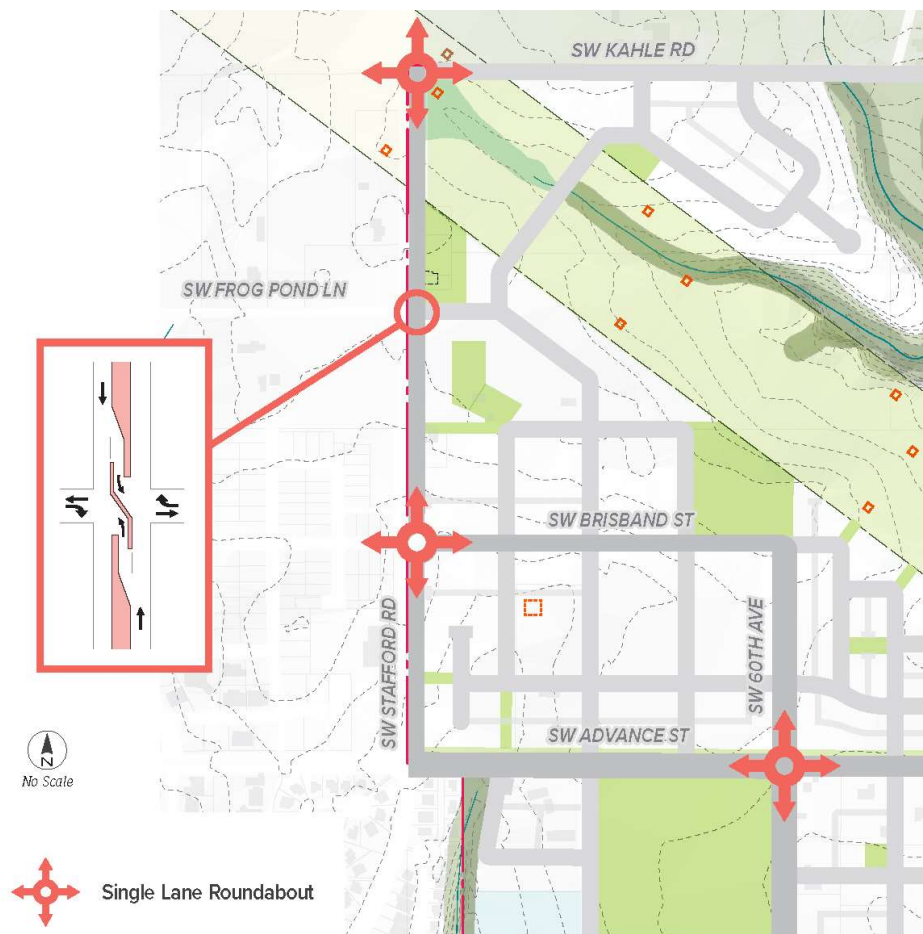


## Analysis Findings & Recommended Improvement Projects

Intersection traffic operations were analyzed for the weekday PM peak hour under the existing and both future scenarios to evaluate if the study intersections meet desired performance levels as required by the City of Wilsonville, Clackamas County, and Oregon Department of Transportation (ODOT). All intersections except the Stafford Road/65<sup>th</sup> Avenue intersection currently meet operating standards and targets. Additional coordination between Clackamas County and City of Wilsonville is recommended regarding the necessary improvements to that intersection to accommodate future Frog Pond development.

In the future 2040 scenarios, all but three of the study intersections are expected to continue to meet standards and targets in the future assuming the completion of the High Priority Projects identified in the TSP. Those three intersections are located along Stafford Road and are the gateway intersections to the Frog Pond East neighborhood and were analyzed as stop controlled intersections. The following transportation improvements are recommended for these intersections.

- **Stafford Road/Kahle Road:** Install a single-lane roundabout
- **Stafford Road/Frog Pond Lane:** Install a raised median to prohibit minor street through and left turns and install an enhanced pedestrian crossing with a center refuge median.
- **Stafford Road/Brisband Street:** Install a single-lane roundabout

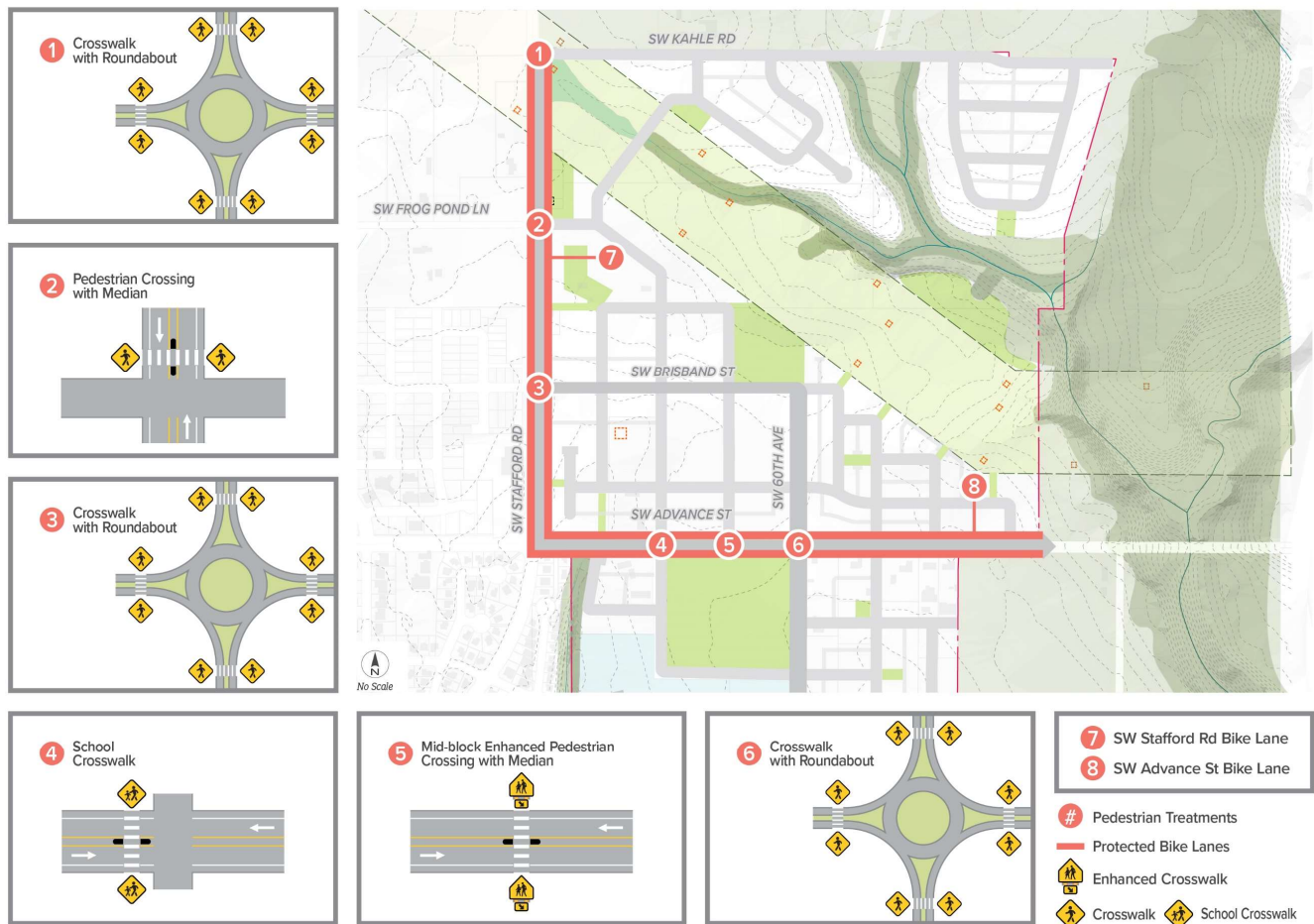


**FIGURE 1: RECOMMENDED INTERSECTION IMPROVEMENTS**



Additional transportation projects were identified for the East and South neighborhood to enhance safety, which are listed below and shown in Figure 2.

- **Advance Road/60<sup>th</sup> Avenue:** Install a single-lane roundabout. The installation of a roundabout at this location will create a gateway between the high-speed rural traffic and the new desired slower urban speeds. The roundabout will also provide for slower speeds and improved access to the Frog Pond neighborhoods.
- **Frog Pond Lane/Stafford Road:** Install a crosswalk with median at this intersection. A Rectangular Rapid Flashing Beacon (RRFB) should be considered at this location.
- **Advance Road at 63<sup>rd</sup> Avenue:** Install a marked school crosswalk. An RRFB should be considered at this location.
- **Advance Road Between 60<sup>th</sup> Avenue and 63<sup>rd</sup> Avenue:** Install a mid-block crossing to facilitate safe crossings between the future park and East neighborhood. An RRFB should be considered at this location.



**FIGURE 2: RECOMMENDED PEDESTRIAN, BICYCLE, AND TRAIL IMPROVEMENTS**



## EXISTING TRAFFIC CONDITIONS (2022)

Existing traffic conditions were evaluated for the study area and include traffic volumes; intersection operations; and bike, pedestrian, and trail conditions.

### EXISTING TRAFFIC VOLUMES

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Traffic counts were collected for the PM peak period (4:00 to 6:00 p.m.) at the following study intersections.<sup>3</sup> The PM peak hour traffic volumes (i.e., the highest hourly volumes during the peak period) are shown in Figure 3 and the traffic counts are provided in the appendix.

- Elligsen Road/I-5 Southbound Ramp
- Elligsen Road/I-5 Northbound Ramp
- Elligsen Road/Parkway Avenue
- Elligsen Road/Parkway Center Drive
- Stafford Road/65<sup>th</sup> Avenue
- Boeckman Road/Parkway Avenue
- Boeckman Road/Canyon Creek Road
- Boeckman Road-Advance Road/Stafford Road-Wilsonville Road
- Advance Road/60<sup>th</sup> Avenue
- Stafford Road/Brisband Street
- Stafford Road/Frog Pond Lane
- Stafford Road/Kahle Road
- Wilsonville Road/I-5 Southbound Ramp
- Wilsonville Road/I-5 Northbound Ramp
- Wilsonville Road/Town Center Loop West

### INTERSECTION PERFORMANCE MEASURES

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Agency mobility standards often require intersections to meet level of service (LOS) or volume-to-capacity (v/c) intersection operation thresholds. Additional operational details are provided in the appendix.

- The intersection 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 operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.
- The volume-to-capacity (v/c) ratio represents the level of saturation of the intersection or individual movement. It is determined by dividing the peak hour traffic volume by the maximum hourly capacity of an intersection or turn movement. When the V/C ratio

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<sup>3</sup> The counts were collected on September 22, 2021; September 30, 2021; March 30, 2022; May 18, 2022; and June 7, 2022.



approaches 0.95, operations become unstable and small disruptions can cause the traffic flow to break down, resulting in the formation of excessive queues.

The City of Wilsonville requires all intersections to meet its minimum acceptable level of service (LOS) standard of LOS D for the PM peak period.<sup>4</sup>

Clackamas County requires that, for intersections outside of city limits, signalized and roundabout intersections must meet the volume-to-capacity ratio (v/c) of 0.90 or less and unsignalized intersections must meet the minimum LOS standard of LOS E during the PM peak period.<sup>5</sup>

ODOT specifies a typical mobility target for interchange ramps of a volume-to-capacity ratio (v/c) of 0.85. However, when the interchange vicinity is fully developed and adequate storage is available on the interchange ramp to prevent queues from backing up on the main line, then the target can be increased to a 0.90 v/c ratio.<sup>6</sup> This is the case for both of the I-5 interchange areas in Wilsonville.

## EXISTING INTERSECTION OPERATIONS

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Intersection operations were analyzed for the PM peak hour to evaluate whether the transportation network currently operates within desired performance levels as required by the City of Wilsonville, Clackamas County, and ODOT. Intersections are the focus of the analysis because they are the controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is nearly always diminished in their vicinity.

The existing PM peak hour intersection operations at the study intersection were determined based on the 6<sup>th</sup> Edition Highway Capacity Manual methodology.<sup>7</sup> Table 1 lists the estimated average delay (in seconds), level of service (LOS), and volume to capacity (v/c) ratio for each study intersection. As shown, all intersections currently meet operating standards and targets with exception of Stafford Road/65th Avenue, which is within Clackamas County's jurisdiction. Additional coordination between Clackamas County and City of Wilsonville is recommended regarding the necessary improvements at this intersection to accommodate future Frog Pond development.

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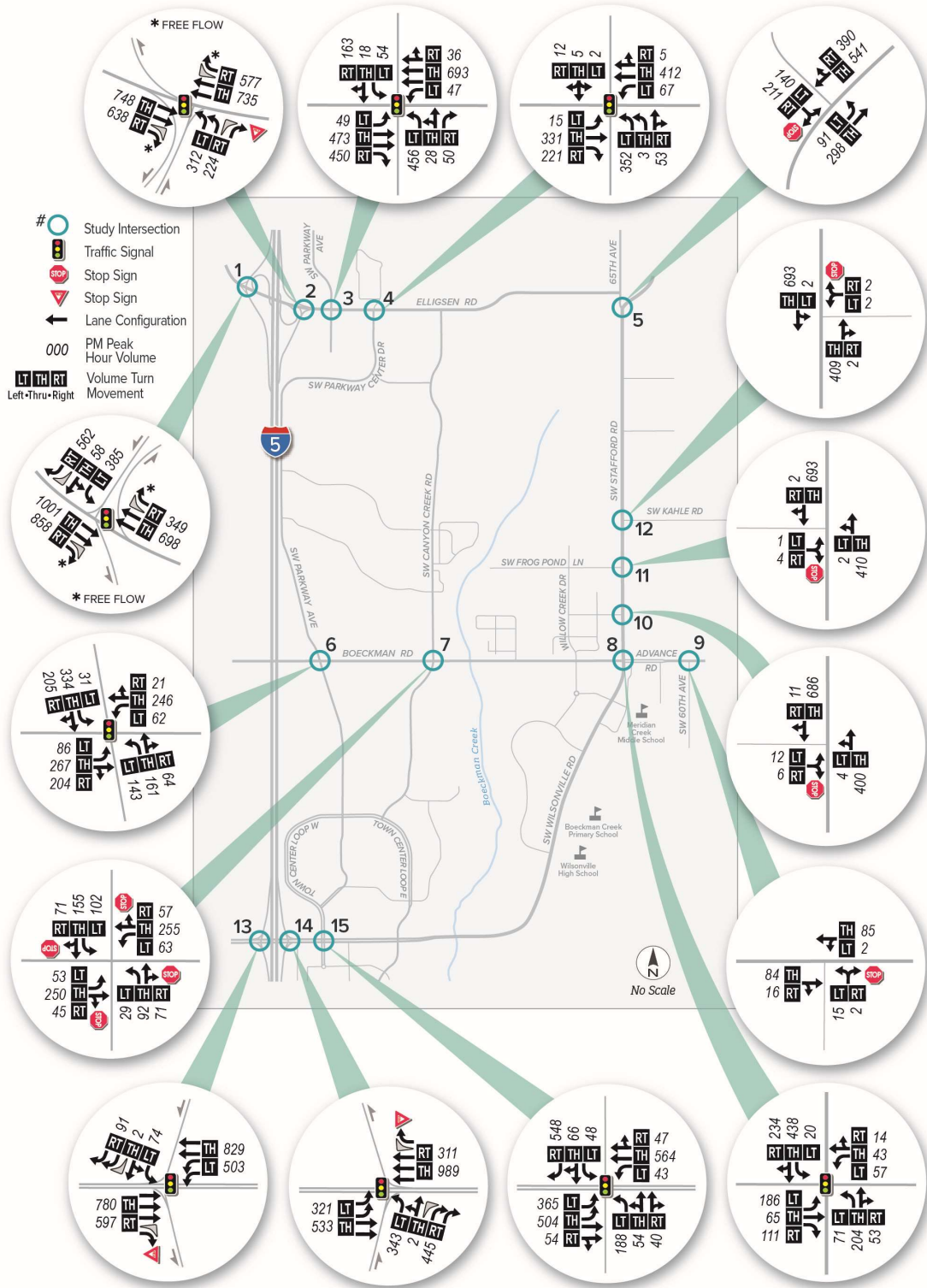
<sup>4</sup> Policy 5, Wilsonville Transportation System Plan, Amended November 16, 2020.

<sup>5</sup> System Performance Policies, Chapter 5: Transportation System Plan, Clackamas County Comprehensive Plan, Amended January 1, 2022.

<sup>6</sup> Oregon Highway Plan, Action 1F.1, Oregon Department Of Transportation, Amended May 2015.

<sup>7</sup> Highway Capacity Manual, 6th Edition, Transportation Research Board, 2017.





**FIGURE 3: EXISTING 2022 TRAFFIC VOLUMES, LANE GEOMETRIES, AND TRAFFIC CONTROL**



**TABLE 1: EXISTING (2022) INTERSECTION OPERATIONS**

INTERSECTION	OPERATING STANDARD	PM PEAK HOUR		
		V/C	DELAY	LOS
<b>SIGNALIZED</b>				
ELLIGSEN RD/I-5 SB RAMPS	v/c ≤ 0.90	0.74	19.5	B
ELLIGSEN RD/I-5 NB RAMPS	v/c ≤ 0.90	0.34	8.4	A
ELLIGSEN RD/PARKWAY AVE	LOS D	0.32	15.9	B
ELLIGSEN RD/PARKWAY CENTER DR	LOS D	0.40	14.9	B
BOECKMAN RD/PARKWAY AVE	LOS D	0.84	25.6	C
STAFFORD RD-WILSONVILLE RD /BOECKMAN RD-ADVANCE RD	LOS D	0.65	17.0	B
WILSONVILLE RD/I-5 SB RAMPS	v/c ≤ 0.90	0.38	19.3	B
WILSONVILLE RD/I-5 NB RAMPS	v/c ≤ 0.90	0.44	16.2	B
WILSONVILLE RD/TOWN CENTER LP WEST	LOS D	0.38	28.1	C
<b>TWO-WAY STOP-CONTROLLED</b>				
STAFFORD RD/65 <sup>TH</sup> AVE	LOS E	>1.20	<b>&gt;120</b>	<b>B/F</b>
ADVANCE RD/60 <sup>TH</sup> AVE	LOS D	0.03	9.8	A/A
STAFFORD RD/BRISBAND ST	LOS D	0.08	20.9	A/C
STAFFORD RD/FROG POND LN	LOS D	0.02	15.7	A/C
STAFFORD RD/KAHLE RD	LOS D	0.01	16.9	A/C
<b>ALL-WAY STOP-CONTROLLED</b>				
BOECKMAN RD/CANYON CREEK RD	LOS D	0.71	20.3	C

**SIGNALIZED INTERSECTION:**  
 Delay = Average Intersection Delay (secs)  
 v/c = Total Volume-to-Capacity Ratio  
 LOS = Total Level of Service

**TWO-WAY STOP-CONTROLLED INTERSECTION:**  
 Delay = Critical Movement Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Critical Levels of Service (Major/Minor Road)

**ALL-WAY STOP CONTROLLED INTERSECTION:**  
 Delay = Average Intersection Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Total Level of Service



## BICYCLE, PEDESTRIAN, AND TRAIL NEEDS

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Bicycle, pedestrian, transit, and trail conditions and needs were considered for the study area, with particular emphasis on connectivity to the rest of Wilsonville's neighborhoods, trails, parks, and schools.

The Wilsonville TSP identifies various multimodal improvement projects that are intended to address the deficiencies. Projects within the vicinity of the Frog Pond Area include urban upgrades to Boeckman Road and Stafford Road, which include bike lanes, sidewalks, and transit stop improvements/additions. The TSP also includes a project for new trails through the Frog Pond East and South neighborhoods.

### ADVANCE ROAD NEEDS

Additional school safety improvements should be considered on Advance Road near Meridian Creek Middle School. An increase in pedestrian and bicycle traffic to and from the school can be expected with the buildout of the East and South neighborhoods, necessitating pedestrian crossing enhancements on Advance Road.

The urban upgrade improvements on Boeckman Road are currently in the design phase and a separated multi-use path, cycle track, or protected bike lanes are being considered along Boeckman Road. It is desired by the City to extend the identified multimodal improvements on Boeckman Road to the west of Stafford Road along Advance Road fronting the Frog Pond development.

### STAFFORD ROAD NEEDS

Pedestrian crossing enhancements on Stafford Road will be needed as the East neighborhood is built out. A significant increase in pedestrian and bicycle trips are expected across Stafford Road between the existing Frog Pond West neighborhood and the planned primary school (in Frog Pond West) to housing and commercial uses in the East neighborhood. Key locations for crossing enhancements would be at Frog Pond Lane and Brisband Street. A signalized crossing already exists at the Stafford Road-Wilsonville Road/Boeckman Road-Advance Road intersection.

Separated pedestrian and bicycle facilities are also desired along Stafford Road since it is a higher speed, higher volume facility. A separated multi-use path, cycle track, or protected bike lanes should be considered along Stafford Road fronting the Frog Pond development on either the west or east side. Given that the majority of the west side of Stafford Road has already gone through development review, the east side of Stafford Road would be the preferred location for a separated pedestrian and bicycle facility.

Recommendations for bicycle and pedestrian projects are listed on page 18 of this memo.



## FUTURE BASELINE CONDITIONS (2040)

Future baseline (2040) traffic conditions were evaluated for the study area and include the forecasted baseline traffic volumes and intersection operations. For analysis purposes, the East and South neighborhoods are assumed to experience full build-out by the year 2040.

### FUTURE BASELINE TRAFFIC VOLUMES

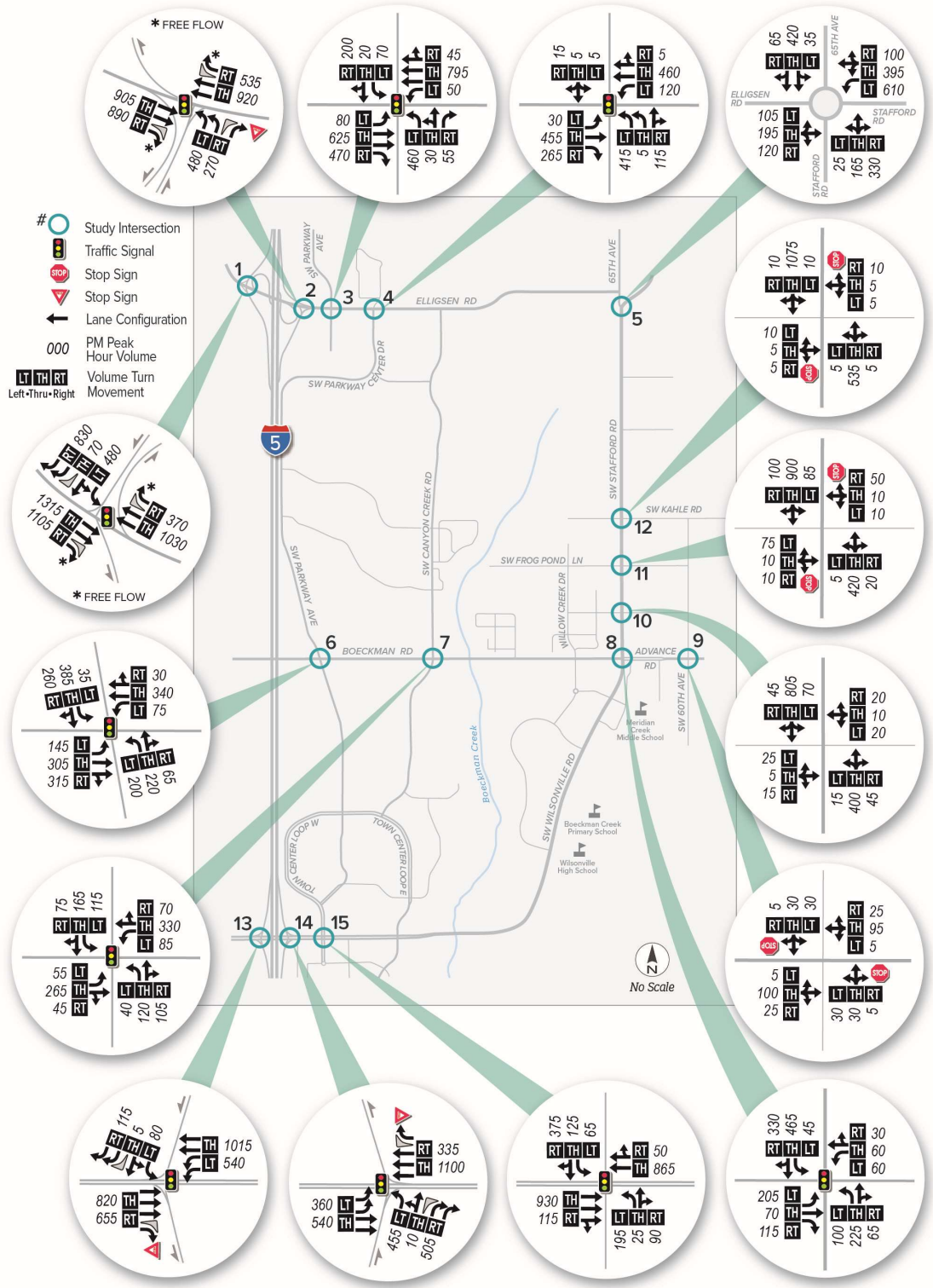
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Future traffic volumes were forecasted for the study intersections using the recently updated travel forecast models developed specifically for Wilsonville. The models apply trip generation and trip distribution data directly taken from the Metro regional travel demand forecast models but add additional detail to better represent local travel conditions and routing within Wilsonville.

Figure 4 shows the PM peak hour traffic volumes for the study intersections based on the Metro model assumptions. As the forecasts are consistent with the current Metro land use assumptions, this scenario is referred to as the 2040 Baseline scenario. This scenario already accounts for some existing homes in the West neighborhood and contains land use assumptions (housing and some employment) in the East and South neighborhoods in 2040.

It should be noted that the Metro model was used for this study because it represents the latest regionally approved land use for Wilsonville and the Region. This model was completed by Metro, in collaboration with the City, after the City's TSP was approved and includes additional land use and transportation network assumptions adopted by Metro after the TSP was adopted.





**FIGURE 4: BASELINE (2040) TRAFFIC VOLUMES, LANE GEOMETRIES, AND TRAFFIC CONTROL**





## FUTURE HIGH-PRIORITY TSP PROJECTS

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The future baseline scenario assumed improved intersection geometries associated with all High Priority Projects included in Wilsonville's TSP. The High Priority Projects applicable to the Frog Pond study area include the following:

- Addition of a second southbound right turn lane on the I-5 Southbound Off-Ramp at Elligsen Road (SI-07).
- Addition of dual eastbound and westbound through lanes at Boeckman Road/Parkway Avenue intersection (RW-01).
- Installation of traffic signal at Boeckman Road/Canyon Creek Road (UU-01). The City of Wilsonville is currently in the conceptual design phase for this intersection and a roundabout is also under consideration.
- Intersection modifications at Wilsonville Road/Town Center Loop West which including eliminating westbound and eastbound left turns, addition of an eastbound through "trap" lane, and reduction of the northbound and southbound approaches to a left turn lane and shared through-right turn lane (SI-09).
- Installation of a roundabout and combination of the existing intersections of Elligsen Road/65th Avenue and Stafford Road/65th Avenue (SI-03). This intersection is located within Clackamas County and is identified in their TSP but is also referenced in the Wilsonville TSP. For this analysis, the roundabout was evaluated as a partial dual-lane roundabout.

## FUTURE BASELINE INTERSECTION OPERATIONS

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Intersection traffic operations under the future 2040 Baseline scenario were analyzed for the PM peak hour to evaluate whether the transportation network is expected to remain within desired performance levels as required by the City of Wilsonville, Clackamas County, and ODOT.

Table 2 lists the estimated average delay (in seconds), level of service (LOS), and volume to capacity (v/c) ratio that each study intersection and future access is expected to experience.

As shown, all intersections are expected to meet operating standards and targets under Baseline conditions with exception of the Stafford Road/Kahle Road, Stafford Road/Frog Pond Lane, and Stafford Road/Brisband Street intersections, which were analyzed as key gateways to the Frog Pond East neighborhood.



**TABLE 2: FUTURE BASELINE (2040) INTERSECTION OPERATIONS**

INTERSECTION	OPERATING STANDARD	PM PEAK HOUR		
		V/C	DELAY	LOS
<b>SIGNALIZED</b>				
ELLIGSEN RD/I-5 SB RAMPS	v/c ≤ 0.90	0.73	18.1	B
ELLIGSEN RD/I-5 NB RAMPS	v/c ≤ 0.90	0.45	9.3	A
ELLIGSEN RD/PARKWAY AVE	LOS D	0.52	24.4	C
ELLIGSEN RD/PARKWAY CENTER DR	LOS D	0.55	16.9	B
BOECKMAN RD/PARKWAY AVE	LOS D	0.82	23.5	C
BOECKMAN RD/CANYON CREEK RD	LOS D	0.57	15.2	B
STAFFORD RD-WILSONVILLE RD /BOECKMAN RD-ADVANCE RD	LOS D	0.79	22.5	C
WILSONVILLE RD/I-5 SB RAMPS	v/c ≤ 0.90	0.40	14.0	B
WILSONVILLE RD/I-5 NB RAMPS	v/c ≤ 0.90	0.52	22.2	C
WILSONVILLE RD/TOWN CENTER LP WEST	LOS D	0.82	44.3	D
<b>TWO-WAY STOP-CONTROLLED</b>				
ADVANCE RD/60 <sup>TH</sup> AVE	LOS D	0.11	11.4	A/B
STAFFORD RD/BRISBAND ST	LOS D	0.49	<b>72.6</b>	<b>A/F</b>
STAFFORD RD/FROG POND LN	LOS D	>1.20	<b>&gt;120</b>	<b>B/F</b>
STAFFORD RD/KAHLE RD	LOS D	0.29	<b>70.3</b>	<b>B/F</b>
<b>ROUNDBOUT</b>				
STAFFORD RD/65 <sup>TH</sup> AVE/ELLIGSEN RD	v/c ≤ 0.90	0.84	17.9	B

**SIGNALIZED INTERSECTION:**  
 Delay = Average Intersection Delay (secs)  
 v/c = Total Volume-to-Capacity Ratio  
 LOS = Total Level of Service

**TWO-WAY STOP-CONTROLLED INTERSECTION:**  
 Delay = Critical Movement Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Critical Levels of Service (Major/Minor Road)

**ROUNDBOUT INTERSECTION:**  
 Delay = Average Intersection Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Total Level of Service



## ANTICIPATED BUILD CONDITIONS (2040)

Anticipated build (2040) traffic conditions were evaluated for the study area and include the land use assumptions, anticipated build traffic volumes and intersection operations, and identified transportation improvements.

### LAND USE ASSUMPTIONS AND ADJUSTMENTS

As mentioned previously, the 2040 Wilsonville Travel Demand model currently contains housing and job land use assumptions for the Frog Pond East and South neighborhoods. Now that the East and South neighborhood layouts have been further refined, the assumed quantity of housing units and commercial space have been estimated. To best analyze the impact of the estimated full buildout of the East and South neighborhoods, DKS adjusted the Wilsonville Travel Demand Model assumptions for the transportation analysis zones (TAZs) that comprise the Frog Pond East and South neighborhoods to account for a higher number of housing units than what is currently assumed.

Table 3 lists the land use adjustments that were applied to the 2040 Travel Demand Model to emulate the anticipated land use generation for Frog Pond (Build scenario). As shown below, the number of household units for both neighborhoods was increased by 136% and 0 jobs were increased.

**TABLE 3: TRAVEL DEMAND MODEL ADJUSTMENTS**

	HOUSEHOLDS	JOBS
<b>EAST NEIGHBORHOOD</b>	Increase by 103%	No Change 0%
<b>SOUTH NEIGHBORHOOD</b>	Increase by 225%	No Change 0%
<b>TOTAL</b>	<b>Increase by 130%</b>	<b>No Change 0%</b>

### ANTICIPATED BUILD TRAFFIC VOLUMES

The future 2040 Build traffic volumes were forecasted for the study area using the Wilsonville travel forecast model with the adjustments as previously discussed. Intersection operations were then evaluated to determine how sufficiently the City’s future transportation system would support the long-term estimated build-out of the Frog Pond East and South neighborhoods, therefore determining what improvements might be needed. The PM peak hour traffic volumes, lane geometries, and intersection operating conditions are shown in Figure 5.



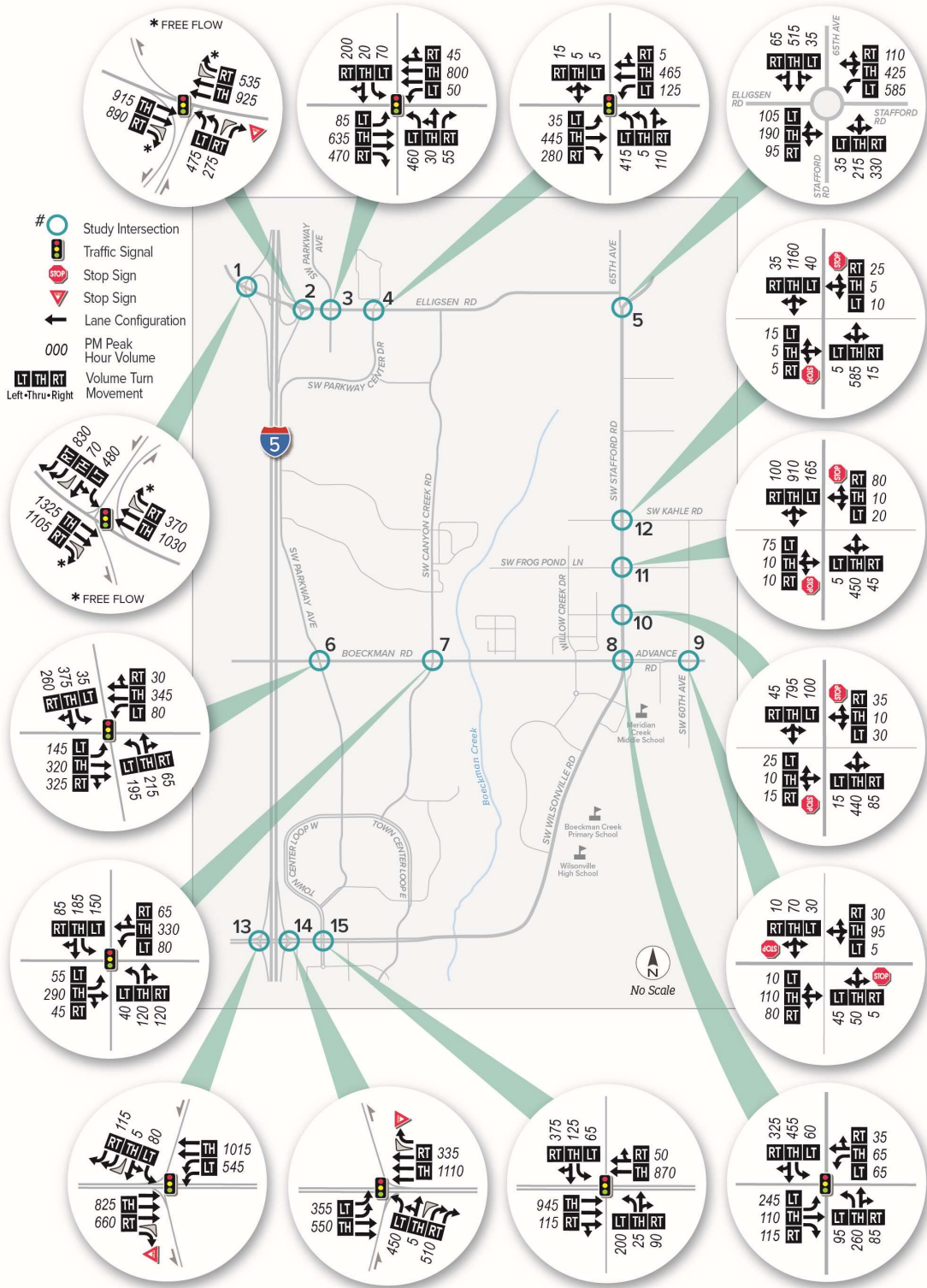


FIGURE 5: BUILD (2040) TRAFFIC VOLUMES, LANE GEOMETRIES, AND TRAFFIC CONTROL



## ANTICIPATED BUILD INTERSECTION OPERATIONS

Intersection traffic operations under the future 2040 Build scenario were analyzed for the PM peak hour with the same intersection geometries that were assumed in the Baseline scenario. Table 4 the estimated average delay (in seconds), level of service (LOS), and volume to capacity (v/c) ratio for each study intersection.

**TABLE 4: ANTICIPATED BUILD (2040) INTERSECTION OPERATIONS**

INTERSECTION	OPERATING STANDARD	PM PEAK HOUR		
		V/C	DELAY	LOS
<b>SIGNALIZED</b>				
ELLIGSEN RD/I-5 SB RAMPS	v/c ≤ 0.90	0.73	18.2	B
ELLIGSEN RD/I-5 NB RAMPS	v/c ≤ 0.90	0.45	9.2	A
ELLIGSEN RD/PARKWAY AVE	LOS D	0.53	24.5	C
ELLIGSEN RD/PARKWAY CENTER DR	LOS D	0.54	16.8	B
BOECKMAN RD/PARKWAY AVE	LOS D	0.81	23.3	C
BOECKMAN RD/CANYON CREEK RD	LOS D	0.60	15.9	B
BOECKMAN RD-ADVANCE RD/ STAFFORD RD-WILSONVILLE RD	LOS D	0.81	22.6	C
WILSONVILLE RD/I-5 SB RAMPS	v/c ≤ 0.90	0.40	14.0	B
WILSONVILLE RD/I-5 NB RAMPS	v/c ≤ 0.90	0.52	22.1	C
WILSONVILLE RD/TOWN CENTER LP WEST	LOS D	0.82	44.1	D
<b>TWO-WAY STOP-CONTROLLED</b>				
ADVANCE RD/60 <sup>TH</sup> AVE	LOS D	0.20	13.2	A/B
STAFFORD RD/BRISBAND ST	LOS D	0.85	>120	A/F
STAFFORD RD/FROG POND LN	LOS D	>1.20	>120	B/F
STAFFORD RD/KAHLE RD	LOS D	0.65	>120	B/F
<b>ROUNDBOUT</b>				
STAFFORD RD/65 <sup>TH</sup> AVE/ ELLIGSEN RD	v/c ≤ 0.90	0.85	21.0	C

**SIGNALIZED INTERSECTION:**

Delay = Average Intersection Delay (secs)  
 v/c = Total Volume-to-Capacity Ratio  
 LOS = Total Level of Service

**TWO-WAY STOP-CONTROLLED INTERSECTION:**

Delay = Critical Movement Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Critical Levels of Service (Major/Minor Road)

**ROUNDBOUT INTERSECTION:**

Delay = Average Intersection Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Total Level of Service



As shown, the unsignalized intersections/accesses along Stafford Road (Kahle Road, Frog Pond Lane, and Brisband Street) are expected to exceed the City's LOS D performance standard. The primary reason is the high through volumes that influence delay experienced by side street vehicles attempting to turn left.

## RECOMMENDED TRANSPORTATION IMPROVEMENTS

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The three intersections along Stafford Road are located approximately within 800–900 feet from one another. Therefore, the interaction of all improvements at these intersections must be carefully considered due to their proximity. The following projects have therefore been identified to improve the three gateway intersections along Stafford Road to meet the City's level of service D performance standard.

Due to the planned location of the commercial uses off Brisband Street, it is desirable to allow all vehicle turning movements at the Brisband Street intersection to provide full access and connectivity to those land uses. It is also desirable to have a full-access gateway intersection at the far north end of the housing development to function as a gateway between the rural higher speed traffic and urban slower speed traffic and provide safe access to the Frog Pond development. There is a strong desire to preserve the historic Grange building on the northeast corner of Stafford Road/Frog Pond Lane intersection. Turn restrictions could be implemented at the Stafford Road/Frog Pond Lane intersection (restrict minor street through and left turns) to allow access to safe movements (left in, right in and right out). A full access roundabout at Frog Pond Lane would likely require the removal or relocation of the historic Grange building due to the required footprint of the improvement.

If two intersections are improved with roundabouts with a limited access between the two full-access locations, it is likely that many of the residents and drivers familiar with the area would choose to turn left or go through at those improved intersections during the peak periods, particularly with good Collector/Local Street connectivity. Local street connections in both the East and West neighborhoods are planned that would allow sufficient connectivity for vehicles to access the proposed roundabouts Kahle Road or Brisband Street to cross Stafford Road or turn left onto Stafford Road. A discussion on the advantages and disadvantages of roundabouts are provided in a subsequent section.

The recommended improvements are highlighted below.

### KAHLE ROAD/STAFFORD ROAD

**At this intersection, install a single-lane roundabout with pedestrian island.** In addition to meeting capacity needs, the proposed roundabout would improve safety and provide a distinct transition between the rural and urban land use and traffic speeds in the area. The roundabout should include pedestrian medians for enhanced pedestrian crossings.

### FROG POND LANE/STAFFORD ROAD

**At this intersection, install a raised center median and traffic separator that allows northbound and southbound right and left turns from Stafford Road and minor street**



**right turns but restricts minor street eastbound and westbound through and left turn movements to and from Frog Pond West and East.** The restriction is needed to facilitate safe vehicle and pedestrian/bicycle movements at the intersection and to meet the City’s LOS standard. This intersection should include enhanced pedestrian crossings with median breaks for safe and improved pedestrian connectivity.

**BRISBAND STREET/STAFFORD ROAD**

**At this intersection, install a single-lane roundabout.** This will require a slight shift of Stafford Road to the east to accommodate the necessary right-of-way. The roundabout should include pedestrian medians for enhanced pedestrian crossings.

**60<sup>TH</sup> AVENUE/ADVANCE ROAD**

**At this intersection, install a single-lane roundabout.** While not a necessary improvement for traffic operating conditions, the proposed roundabout would improve safety and provide a distinct transition between the rural land use with high-speed traffic and urban land use with slower vehicle speeds and the need for multimodal safety in the area.

**IMPROVED OPERATING CONDITIONS**

The table below shows the intersection operations for the four intersections with the identified transportation improvements in place. As shown, all four intersections will meet the City LOS standard while providing safe multimodal improvements for pedestrian and bicycles.

**TABLE 5: ANTICIPATED BUILD (2040) INTERSECTION OPERATIONS - IMPROVEMENTS**

INTERSECTION	IMPROVEMENT	OPERATING STANDARD	PM PEAK HOUR		
			V/C	DELAY	LOS
ADVANCE RD/ 60 <sup>TH</sup> AVE	Roundabout	LOS D	0.19	4.3	A
STAFFORD RD/ BRISBAND ST	Roundabout	LOS D	0.78	12.7	B
STAFFORD RD/ FROG POND LN	Two-Way Stop-Controlled with Minor Street Turn Restrictions	LOS D	0.04	18.5	B/C
STAFFORD RD/ KAHLE RD	Roundabout	LOS D	0.99	29.6	D

**TWO-WAY STOP-CONTROLLED INTERSECTION:**  
 Delay = Critical Movement Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Critical Levels of Service (Major/Minor Road)

**ROUNDAOBT INTERSECTION:**  
 Delay = Average Intersection Delay (secs)  
 v/c = Critical Movement Volume-to-Capacity Ratio  
 LOS = Total Level of Service



### **Advantages of Installing a Roundabout**

- Roundabouts can reduce delay for side street traffic because no approach is given more priority than another. Therefore, the Kahle Road and Brisband Street intersections would no longer be anticipated to operate at LOS F in the future scenarios.
- Roundabouts can help to slow traffic speeds on the roadway. Typical circulating speeds for a roundabout are 15 – 20 miles per hour (mph), which would help to calm traffic in the vicinity of the Frog Pond development area.
- Converting a stop-controlled intersection to a single-lane roundabout can reduce fatal and injury crashes by 82%.
- Roundabouts reduce the number of conflict points between vehicles and between vehicles and pedestrians/bicycles.
- Roundabouts at Stafford Road/Kahle Road and Advance Road/60<sup>th</sup> Avenue would provide clear gateways between the rural and urban environments. The Stafford Road/Kahle Road location is under the BPA power line easement and would have underutilized land available to accommodate the larger footprint that roundabouts require.

### **Disadvantages of Installing a Roundabout**

- Because all approaches are treated the same and must yield to traffic within the roundabout, this would introduce delay for traffic on the major approaches (Stafford Road).
- Roundabouts are more difficult for large trucks and agricultural vehicles to navigate and may result in complaints from the freight community and farmers.
- Roundabouts can be difficult for school aged pedestrians and bicyclists to cross because there is no exclusive stop phase (as is provided with a traffic signal). The lack of straight paths and clear turns can also be difficult for the vision impaired.
- Roundabouts require a larger footprint, which would require additional right-of-way dedication or acquisition.





## IDENTIFIED PROJECTS

The following lists of transportation projects have been identified through the evaluation of the proposed Frog Pond East and South neighborhoods.

### ROADWAY PROJECTS

- Widen Stafford Road to a three-lane cross section (two travel lanes with a center turn lane). Include curb, gutter, sidewalks, landscape strips, and bicycle facilities on both sides. The final cross-section will be determined by the City Engineer. Additionally, plan setbacks to accommodate potential future road widening.
- Widen Advance Road to a three-lane cross section (two travel lanes with a center turn lane). Include curb, gutter, sidewalks, landscape strips, and bicycle facilities on both sides. The final cross-section will be determined by the City Engineer.
- Construct Local And Neighborhood Collector streets through the East and South neighborhoods consistent with the draft master plan to provide connections to the internal land uses.
- Consider potential traffic calming treatments along 60<sup>th</sup> Avenue south of Advance Road to control travel speeds, calm traffic, and improve pedestrian safety. Treatments could include center medians at mid-block locations and at intersections as well as speed feedback signs and school speed zones (20 mph) adjacent to the middle school.

### INTERSECTION PROJECTS

- Install a single-lane roundabout at Stafford Road/Kahle Road.
- Install a median that restricts minor street left turn and through movements at Stafford Road/Frog Pond Lane.
- Install a single-lane roundabout at Stafford Road/Brisband Street.
- Install a single-lane roundabout at Advance Road/60<sup>th</sup> Avenue. Because of its proximity to a school, the crosswalk ramps at this location should be clear of vegetation to allow sufficient visibility of pedestrians.

### PEDESTRIAN, BICYCLE, AND TRAIL PROJECTS

- Install a mid-block crossing on Advance Road between 60<sup>th</sup> Avenue and 63<sup>rd</sup> Avenue to facilitate safe crossings between the future park and East neighborhood. A Rectangular Rapid Flashing Beacon (RRFB) should be considered at this location once Safe Routes to School are identified.
- Install a marked school crosswalk at the intersection of Advance Road/63<sup>rd</sup> Avenue. A Rectangular Rapid Flashing Beacon (RRFB) should be considered at this location once Safe Routes to School are identified.



- Install a crosswalk with median at the Frog Pond Lane/Stafford Road. Additional safe and accessible bicycle and pedestrian crossings will be provided via the identified roundabouts at Kahle Road/Stafford Road and Brisband Street/Stafford Road as well.
- Extend the planned pedestrian and bicycle facility improvements on Boeckman Road to Advance Road east of Stafford Road. The desired cross section for Boeckman Road includes protected bike lanes on both sides of the road.
- Construct protected bike lanes along the both sides of Stafford Road.
- Construct pedestrian and bicycle trails through the East and South neighborhoods consistent with the master plan to provide connections to existing local and regional trails in Wilsonville

