



# FROG POND EAST AND SOUTH INFRASTRUCTURE FUNDING PLAN: COMPLIANCE FINDINGS REPORT FOR MINIMUM INTERSECTION IMPROVEMENTS

These findings address particular public improvements required by the City of Wilsonville (“City”) as part of planned future development in Frog Pond East and South, which are more particularly described in Appendix I of the Frog Pond East and South Master Plan (“Master Plan”).

Wilsonville Code (WC) requires that, when development occurs, the applicant must construct roads fronting the site to meet current, applicable City standards, which are established through the City’s Transportation System Plan (“TSP”). The TSP provides the required improvements and necessary steps for development (See Figure 2). Further, the Master Plan Transportation Analysis<sup>1</sup> (“Transportation Analysis”) provides data and standards to ensure the City meets its goals of providing a safe and efficient transportation system to the Wilsonville community. These standards are clearly supported and necessary for safe, functioning streets in the community.

Among other improvements, the Master Plan identifies three (3) intersection improvements that are needed to develop Frog Pond East and South:

- Roundabout Construction at SW Kahle Road/SW Stafford Road
- Roundabout Construction at SW Brisband Street/SW Stafford Road
- Roundabout Construction at SW 60<sup>th</sup> Avenue/SW Advance Road

When, as is the case here, the City TSP requires construction of roundabouts, it is the developer responsibility to meet city standards for safety and neighborhood cohesion in all construction projects. These Findings establish the “essential nexus” between the city’s governmental interests and these three (3) intersection improvements.

As will be explained more fully below, federal and state case law explain that, when a government requires a property owner to dedicate property or construct off-site public improvements as a condition of development, those requirements must have an “essential nexus” to a legitimate government interest for the government to then impose certain requirements on development. This concept is referred to as *Nollan* findings based on the US Supreme Court case from which it is derived. See *Nollan v. California Coastal Commission*, 483 US 825 (1987).

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<sup>1</sup> See Appendix I to the Frog Pond East & South Master Plan, “Transportation Analysis: Existing and Future Conditions” (December 2022).



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To demonstrate essential nexus between legitimate government interests and the intersection improvements, these Findings are laid out as follows: (1) existing conditions of SW Stafford Road and SW Advance Road and adjacent land uses; (2) safety and effectiveness of roundabouts; and (3) the essential nexus between the City's legitimate governmental interests and the three proposed roundabouts in Frog Pond East and South.

### Section 1 Existing Conditions

For the Frog Pond East and South development to occur, roadways and intersections must be constructed or reconstructed to connect the neighborhood to the larger Wilsonville transportation network. Figure 1 below provides the required intersection improvements in Frog Pond East and South.

**Figure 1: Frog Pond East and South Intersection Improvements, *Transportation Analysis*, p. 2.**



#### A. Existing Traffic and Transportation System

SW Stafford Road and SW Advance Road were previously under the jurisdiction of Clackamas County and built to county standards; that is, they each have two travel lanes,



no dedicated bicycle lanes, and no sidewalks for pedestrians. They currently have a speed designation of 45 mph. Anyone turning off of or onto these streets faces vehicle traffic traveling at high rates of speed with no intersection enhancements to reduce speed or potential vehicle crashes.

SW Stafford Road is designated a Major Arterial in the TSP (p. 3-5). Major arterials represent the City's largest roadway cross-section of the four road classifications. They generally have four or more travel lanes, bicycle lanes, and limited direct access. As identified below and in the Transportation Analysis, the significant multimodal traffic concerns regarding SW Stafford Road are expected and understandable because it is a Major Arterial that transitions traffic from a rural to urban setting and is currently built to rural county standards.

The City has received direct resident complaints about the intersections at both Stafford Road and Frog Pond Lane and Stafford Road and Brisband Street becoming more difficult and dangerous. Residents note long delays when turning onto Stafford Road and have further emailed the City about "near misses," almost resulting in collisions. Questions about traffic flow have been brought to the City Council, and residents have demanded improved safety along Stafford Road.

Residents' concerns are supported by the data – the Transportation Analysis examined existing road conditions and traffic flow during peak roadway conditions. The Transportation Analysis predicts increased traffic delays by 2040.<sup>2</sup> With planned development in Frog Pond East and South, two-way stop controlled intersections along the length of SW Stafford Road at SW Kahle Road, SW Frog Pond Lane, and SW Brisband Street will fall below Level of Service D if no improvements are made.<sup>3</sup> Thus, enhanced intersection treatments are needed to meet the minimum level of service (LOS D) required in the City.<sup>4</sup>

SW Advance Road is designated a Collector in the TSP (p. 3-5). Collectors provide traffic circulation within residential, commercial, and industrial areas and serve to funnel traffic from neighborhoods to the arterial street network. They have two or three travel lanes, bicycle lanes, and consolidated access to larger developed areas and neighborhoods. Like SW Stafford Road, SW Advance Road is currently built to county standards, which do not provide multimodal safety enhancements that are appropriate for an urban setting, particularly considering the surrounding land uses, such as two nearby schools.

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<sup>2</sup> The Transportation Analysis compares Metro's regional travel demand forecast that is based on current Metro land use assumptions through 2040 (the "2040 Baseline scenario") to the anticipated additional build in Frog Pond East and South being added to the transportation system by 2040 (the "2040 Build scenario"). See Transportation Analysis, pp. 9-15.

<sup>3</sup> Transportation Analysis, p. 15.

<sup>4</sup> TSP Policy 5, p. 2-4; see also WC 4.140(.09) J. 2.



These two roads are at the rural/urban edge and represent a higher likelihood of vehicle and pedestrian crashes at high speeds due to this transition. In just the last month (October 12, 2024), a fatal crash occurred on SW Advance Road near the SW 60<sup>th</sup> Avenue and SW Advance Road intersection.<sup>5</sup> The City's only other known fatality on one of its roads between 2017 and 2022 occurred on SW Wilsonville Road right at the city limits when a vehicle traveling from outside the city limits struck and killed a pedestrian crossing at a crosswalk to go to an adjacent park.

### **B. Schools**

The Frog Pond area (inclusive of Frog Pond West, East, and South) includes two schools that impact decisions regarding transportation infrastructure. A middle school is located in Frog Pond South adjacent to SW Advance Road and a new primary school in Frog Pond West adjacent to SW Boeckman Road will open in Fall 2025. Thus, students commute by bicycle and walking across a busy and underdeveloped Major Arterial (SW Stafford Road) and Collector (SW Advance Road).

### **C. BPA Easement**

An additional existing condition that impacts intersection treatment at SW Stafford Road and SW Kahle Road is the presence of a Bonneville Power Administration (BPA) easement that contains towers and high-voltage powerlines. The easement restricts the type and height of improvements within the easement area.

As explained in detail below, the anticipated development in Frog Pond East and South will only exacerbate traffic delays and increase risk of crashes given vehicles' rate of speed, the transition from rural to urban, and significant intersections for the new Frog Pond East and South neighborhoods, as the Transportation Analysis predicts that the 2040 Build scenario will see the number households in Frog Pond East and South increase by 130 percent. Transportation Analysis, p. 13. Utilizing roundabouts to address traffic delays and safety concerns is not only prudent, it is supported by data both from existing city roundabouts and national studies.

## **Section 2 Effectiveness of Roundabouts**

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Roundabouts have proven effective at addressing travel delays at failing intersections and providing safe multimodal transportation opportunities. This section examines studies on the efficacy of roundabouts and roundabouts currently existing in the city.

### **A. Studies Demonstrate Roundabouts Are Effective Tools for Safe, Efficient Multimodal Transportation**

Several transportation agencies have studied the effectiveness of roundabouts and found that roundabouts are safer intersection enhancements than traffic signals or stop signs. Roundabouts naturally slow and calm traffic, as opposed to stoplights, which cause traffic

<sup>5</sup> <https://www.clackamas.us/sheriff/2024-10-14-Case-24-021407>



to speed up. The Federal Highway Administration (FHWA), the Oregon Department of Transportation (ODOT), and several other state departments of transportation provide the following data regarding the effectiveness of roundabouts:

- FHWA reported a study by Insurance Institute for Highway Safety and other organizations analyzing 24 intersections from states across the US and found a 39 percent decrease in crashes, 76 percent decrease in injury crashes, and 90 percent reduction in crashes involving fatal or incapacitating injuries. A second study the FHWA noted examined 15 roundabouts in Maryland and discovered a 60 percent decrease in crashes, 82 percent decrease in injury crashes, and 100 decrease in fatal crashes.<sup>6</sup>
- FHWA further reported that roundabouts reduce severe crashes (those resulting in injury or loss of life) by 78-82%.<sup>7</sup>
- The FHWA explains that roundabouts have fewer conflict points, making them safer for multimodal transportation. A single lane roundabout (like the three identified for Frog Pond East and South) has 50% fewer pedestrian-vehicle conflict points than a comparable stop or signal controlled intersection. Conflicts between bicycles and vehicles are reduced as well.<sup>8</sup> Roundabouts require vehicles to travel at lower speeds, which is associated with better yielding rates, reduced vehicle stopping distance, and lower risk of collision injury or fatality.<sup>9</sup>
- Roundabouts also provide shorter crossing distances for pedestrians that other types of intersection enhancements between there is only one direction of traffic.<sup>10</sup>
- The FHWA also notes that roundabouts are a very efficient type of intersection enhancement because they do not require the same stop-and-go conditions as traditional intersections.<sup>11</sup>
- Roundabouts are particularly impactful along rural roads, like SW Stafford Road and SW Advance Road, where the roads are transitioning from rural to urban settings. The FHWA reviewed a previous stop-controlled intersection in Wisconsin that was reconstructed to a roundabout. Thirty crashes occurred in the five years before the improvement (17 injuries and one fatality), and only 11 total crashes

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<sup>6</sup> US Department of Transportation, Federal Highway Administration Priority, Market Ready Technologies and Innovations, Roundabouts, (2006), available at <https://highways.dot.gov/media/9206#:~:text=demonstrating%20success%20in%20reducing%20crashes&text=The%20study%20revealed%20a%2039,involving%20fatal%20or%20incapacitating%20injuries>

<sup>7</sup> FHWA, "Roundabouts with Pedestrians and Bicycles," available at <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa15016.pdf>

<sup>8</sup> *Id.*

<sup>9</sup> *Id.*

<sup>10</sup> *Id.*

<sup>11</sup> FHWA, "Roundabouts and First Responders," available at <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa14098.pdf>



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- (1 injury and zero fatalities) occurred in the following six years after the improvement.<sup>12</sup>
- The FHWA has further identified the following real-world results of roundabouts<sup>13</sup>:
    - Roundabouts constructed at intersections along high-speed, two-lane rural highways reduced overall crashes by up to 68% and reduced injury crashes by up to 88%.
    - Roundabouts constructed at intersections along high-speed, two-lane rural highways eliminated 83% of angle-type crashes.
    - There were 11 fatal crashes in the 5 year “before” period and zero fatal crashes in the 5 year “after” period at 19 roundabouts constructed along highspeed, two-lane rural highways in six different states (KS, MD, MN, OR, WI, and WA).
    - Researchers compared traffic speeds of approaches to roundabouts and stop-controlled intersections. At one hundred feet before the yield or stop lines, the speed of traffic at the roundabouts was 2.5 mph lower than at the stop-controlled locations.
    - Roundabouts are designed for slower speeds, require entering traffic to yield to vehicles already in the circular roadway, and to eliminate the need to weave or change lanes to exit.
    - Since the late 1990s, an ever-growing number of State DOTs and local road agencies are finding that roundabouts work in their jurisdictions. Their potential for saving lives is too significant to ignore.
  - The FHWA also reported on twenty-six roundabouts installed in Wisconsin due to concerns of traffic conflicts with adjacent schools and the presence of school children. A follow-up study showed that at one of the roundabout locations, the number of vehicles entering the intersection increased from 5,600 per day in 1998 before the roundabout construction to 10,800 per day in 2001, and yet crashes and injuries decreased significantly, from an average of three crashes and five injuries per year during the 1996-1998 period to no reported crashes between August 1999 and October 2001.<sup>14</sup> Importantly, from the installation of roundabouts, a prior policy prohibiting students to walk and bike to school was reversed.<sup>15</sup>
  - The FHWA published a report in 2015 reviewing fatal and serious injury crashes at roundabouts.<sup>16</sup> It made the following findings:

<sup>12</sup> FHWA, “Roundabouts and Rural Highways,” available at <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa14097.pdf>

<sup>13</sup> *Id.*

<sup>14</sup> FHWA, “Wisconsin Roundabouts Calm Traffic, Improve School Zone Safety,” available at <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa11031.pdf>

<sup>15</sup> *Id.*

<sup>16</sup> FHWA, “A Review of Fatal and Severe Injury Crashes at Roundabouts,” (Sept 2015), available at <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa15072.pdf>



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- Fatal roundabout crashes are less likely to involve pedestrians or bicyclists when compared to fatal intersection crashes.<sup>17</sup>
- The FHWA's website contains many additional case studies of the effectiveness of roundabouts for safe and effective multimodal transportation.<sup>18</sup>
- The Minnesota Department of Transportation published a report in 2017 reviewing roundabouts throughout Minnesota.<sup>19</sup> Not only did Minnesota see over an 80 percent reduction in fatal and serious injury crashes, at the time of the report, there still had not been a multi-vehicle fatality in a roundabout in Minnesota. Other key findings included:
  - An 86% reduction in the fatal crash rate at intersections where roundabouts have been installed. This includes all roundabout types (Single Lane, Unbalanced, and full Dual Lane Roundabouts).
  - An 83% reduction in the serious injury crash rate at intersections where roundabouts have been installed.
  - A 69% reduction in the Right Angle crash rate at intersections where Single Lane Roundabout have been installed.
  - An 83% reduction in the Left Turning crash rate at intersections where Single Lane Roundabout have been installed.
  - A 61% reduction in the injury crash rate at intersections where Single Lane Roundabout have been installed.
  - A 42% reduction in the injury crash rate at intersections where Single Lane Roundabout have been installed.<sup>20</sup>

ODOT has also reported why roundabouts are more effective than signalized intersections<sup>21</sup>:

- In rural areas, new traffic signals are associated with a 77 percent reduction in angle crashes, but also a 58 percent increase in rear-end crashes, which can be severe and fatal in high-speed areas.
- Traffic signals do not address speeds at an intersection - roundabouts do reduce speeds. Often drivers accelerate through an intersection to try to make it through before the signal turns red, which is dangerous.

The U.S. Department of Transportation has also studied the effects of speed on roadway fatalities, particularly involving pedestrians.<sup>22</sup> The US DOT found that speeding is a

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<sup>17</sup> *Id.* at p. 12.

<sup>18</sup> See FHWA webpage on Roundabouts, <https://highways.dot.gov/safety/intersection-safety/intersection-types/roundabouts>

<sup>19</sup> Derek Leuer, "A Study of the Traffic Safety at Roundabouts in Minnesota" Office of Traffic, Safety, and Technology, Minnesota Department of Transportation (Oct 30, 2017), available at <https://rosap.ntl.bts.gov/view/dot/35084>

<sup>20</sup> *Id.* at p. 2.

<sup>21</sup> ODOT, "All about roundabouts," (Summer 2021), available at <https://www.bendoregon.gov/home/showpublisheddocument/53080/637885692091270000>

<sup>22</sup> U.S. DOT, "Safer Speeds," available at <https://www.transportation.gov/NRSS/SaferSpeeds>



significant contributor to roadway fatalities and is especially hazardous to pedestrians.<sup>23</sup> To counteract speeding and promote safer speeds, US DOT undertook key actions. One of these action items was to: “Promote safer speeds through improvements to Proven Safety Countermeasures and the Manual on Uniform Traffic Control Devices.”<sup>24</sup> One of the “proven safety countermeasures” identified by US DOT is utilizing roundabouts.<sup>25</sup>

To the extent reports discuss some concerns regarding roundabouts and conflicts with pedestrian or bicycle traffic, those concerns are generally limited to multilane roundabouts. None of the three roundabouts discussed here are planned to be multilane. Rather they are all planned to be single-lane roundabouts. National studies have consistently shown that single-lane roundabouts are safe for multimodal transportation.

## **B. Roundabouts Are Present Throughout the City**

The City of Wilsonville has historically required installing roundabouts throughout the city as the minimum requirement when necessary to ensure multimodal transportation conditions. Roundabouts have been part of a cohesive plan to create safe travel conditions for all travelers in Wilsonville. In other words, requiring roundabouts as the minimum standard for intersection improvements is not new to the City. Currently, the City has six (6) roundabouts located throughout the city, with a seventh under construction at SW Canyon Creek Road and SW Boeckman Road. Five (5) additional roundabouts are planned in the TSP. These findings provide two examples of current roundabouts and their effectiveness.

### **1. Roundabout at Lowrie Primary School**

One of the six current roundabouts in Wilsonville is located near Lowrie Primary School. The City chose to have the developer install a single-lane roundabout at that location particularly because of the school’s presence and safety concerns for students. From the most recent five-year data from ODOT, from 2017 to 2022, the roundabout near Lowrie has only experienced two (2) vehicle crashes<sup>26</sup>. These crashes were property damage only, meaning no injuries or fatalities occurred. Compared to the overall number of

<sup>23</sup> *Id.*

<sup>24</sup> See National Roadway Safety Strategy dashboard, available at [https://explore.dot.gov/views/NRSSDashboard/Dashboard/404b2e9e-1546-438d-bc5c-6187adf13880/d0d14747-2b89-4bba-ba1b-7ae9470069f8?%3Aembed=y&%3AisGuestRedirectFromVizportal=y%3AshowAppBanner&%3Adisplay\\_count=n&%3AshowVizHome=n&%3Aorigin=viz\\_share\\_link&%3Atoolbar=no&%3A%3Aembed=yes](https://explore.dot.gov/views/NRSSDashboard/Dashboard/404b2e9e-1546-438d-bc5c-6187adf13880/d0d14747-2b89-4bba-ba1b-7ae9470069f8?%3Aembed=y&%3AisGuestRedirectFromVizportal=y%3AshowAppBanner&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3Atoolbar=no&%3A%3Aembed=yes)

<sup>25</sup> FHWA, “Roundabouts,” available at <https://highways.dot.gov/safety/intersection-safety/intersection-types/roundabouts>

<sup>26</sup> ODOT crash data, available at <https://tvc.odot.state.or.us/tvc/>





crashes within the Wilsonville city limits, which totaled 1320 during the same time period, the roundabout at Lowrie represents 0.15% of all crashes in Wilsonville.

To ensure student safety, the City worked with the West Linn-Wilsonville School District on an education campaign with students, teachers, and parents on the safe use of roundabouts.

## **2. Roundabout at SW Canyon Creek Road and SW Boeckman Road**

The latest roundabout being constructed in Wilsonville is a single-lane roundabout at the intersection of SW Canyon Creek Road and SW Boeckman Road. This intersection is one of the worst in the city for crashes; in the last 5 years of data (2017-2022), there have been over 16 crashes, including five minor injury crashes and one serious injury crash.<sup>27</sup> Prior to constructing the roundabout, the intersection was a four-way stop intersection. The City undertook an alternatives analysis to examine whether to construct an intersection with traffic signals or as a single-lane roundabout.<sup>28</sup> Ultimately, the alternatives analysis found that a roundabout was the preferred alternative because a traffic signal was found to be more dangerous than a four-way stop or a roundabout: “More than twice as many fatal and injury crashes are expected with a traffic signal compared to an all-way stop-controlled intersection or roundabout.”<sup>29</sup> To reiterate, the alternatives analysis for this intersection found that a signalized intersection would be more dangerous than current conditions.

The alternatives analysis also found that, while initial construction costs would likely be somewhat higher for a roundabout than traffic signals, the overall life-cycle costs, inclusive of construction are lower, with an expectant savings of over \$600,000. *Id.* at 13. Importantly, the analysis estimated that approximately \$14,000 would be spent annually to maintain the traffic signals (lighting and signal maintenance) and \$10,000 would be spent every three years on signal retiming. These expenses are not incurred for roundabouts.

Based on the improved safety and the lower life-cycle cost, the City elected to construct a roundabout at SW Canyon Creek Road and SW Boeckman Road.

## **3. Roundabouts Compared to Overall Transportation System**

In examining the most recent ODOT crash data (2017-2022), the evidence demonstrates that roundabouts are safe intersection enhancements. As noted above, in the five-year reporting period, the City saw 1,320 crashes within the Wilsonville city limits. Only seven (7) of those crashes occurred in an intersection with a roundabout. Of those seven (7)

<sup>27</sup> *Id.*

<sup>28</sup> Attachment 1 to Staff Report, Canyon Creek/Boeckman Intersection Design Update (Dec. 19, 2022), available at: <https://mccmeetings.blob.core.usgovcloudapi.net/wlsnvlleor-pubu/MEET-Packet-86924897ee0f44a9a0683b5a34327a6a.pdf>.

<sup>29</sup> *Id.* at p. 9 of Attachment 1.



crashes, none resulted in significant injuries or fatalities. Only three (3) of the seven (7) included minor injuries.

### Section 3 Roundabouts Needed for Frog Pond East and South

The City's standards requiring roundabouts are located within the TSP and the Master Plan. Wilsonville Code Section 4.236 requires conformity with the TSP. All development within the City must meet the minimum requirements for street improvements in accordance with the TSP. Moreover, the Master Plan emphasizes Principles for the community.<sup>30</sup> "Convenient, Safe and Low-Stress Transportation Options" are a guiding principle of the Master Plan, which identifies:

"A connected network of streets and trails prioritizes the safety and comfort of the most vulnerable road users. Streets will be designed to encourage and prioritize walking, biking, rolling, transit, and other low-carbon modes of travel. Street and block layout make it easy for residents to access schools, parks, and neighborhood services without a car."

These goals can only be attained with the addition of roundabouts. Roundabouts will create safer neighborhood speeds, and better crosswalk access for all residents. Roundabouts slow the speed of traffic with certainty. These established policies demonstrate the essential nexus between the intersection improvements and the City's interest in providing safe, reliable, well-constructed streets, bicycle lanes, and sidewalks.

#### A. Safety

The City has a legitimate governmental interest in providing a safe and efficient multimodal transportation system.

##### 1. Vehicle Safety

The numerous studies cited above conclude that roundabouts are safe intersection enhancements that see the number of crashes significantly decrease. In particular, they are safer than traffic signals. The City's own analysis of one of its most dangerous intersections found that a signalized intersection would likely increase the number of vehicle crashes, as opposed to installing a roundabout. When approaching traffic signals, drivers often speed up to make it through the timing of the signal.<sup>31</sup> While drivers are required by law to stop at a stop sign or stoplight, there is no barrier to keep them from running through a red light or stop sign. Roundabouts force traffic to slow down to continue on the roadway. Drivers must reduce speed when entering a roundabout to

<sup>30</sup> Master Plan, p. 6.9

<sup>31</sup>US Department of Transportation, Federal Highway Administration Priority, Market Ready Technologies and Innovations, Roundabouts (2006), available at <https://highways.dot.gov/media/9206#:~:text=demonstrating%20success%20in%20reducing%20crashes&text=The%20study%20revealed%20a%2039,involving%20fatal%20or%20incapacitating%20injuries.>



navigate the roundabout. Signalized intersections create points of tension between oncoming traffic, such as left turns. Roundabouts do not have the same points of tension because instead traffic flows in a one-directional path. The studies reiterate these safety markers of roundabouts. Typical circulating speeds for a roundabout are 15 – 20 mph, which would help to calm traffic in the vicinity of the Frog Pond development area.<sup>32</sup>

## **2. Bicycle and Pedestrian Safety and Nearby Schools**

Slower speeds mean safer conditions for drivers, bicyclists, and pedestrians, particularly as vehicles transition between the urban and rural settings around Frog Pond. Frog Pond East and South are at the rural/urban edge. Vehicles will be transitioning from 45 mph into urban residential neighborhoods with a middle school and primary school in close proximity. Not only are vehicle crashes of significant concern, pedestrian and bicycle safety are also concerns given the presence of nearby schools. As previously noted, roundabouts reduce the number of conflict points between vehicles and between vehicles and pedestrians or bicycles. Roundabouts also have shorter crossings for pedestrians than signalized intersections.

### **B. Cost and Resiliency**

Currently, the City of Wilsonville spends \$200,000 per year updating and performing maintenance on signalized intersections. Roundabouts do not require the same maintenance costs. The alternatives analysis for SW Canyon Creek Road and SW Boeckman Road bear out this cost differential. While initially more expensive to build, roundabouts have lower overall life-cycle costs than traffic signals.

Furthermore, a stoplight requires electricity, which means increased maintenance, cost, and the possibility of power outages. Power outages do not stop roundabouts from working.<sup>33</sup> Roundabouts are resilient to weather conditions in ways traffic signals are not. They are not vulnerable to high winds, fires, or other natural disasters that can prevent traffic signals from working. In most natural disasters, roundabouts are still operational and navigable. Again, given the rural/urban transition, having reliable and resilient intersection enhancements are necessary for a safe and effective transportation system.

### **C. Particularities for Roundabout at SW Kahle Road and SW Stafford Road**

Not only must the intersection at SW Kahle Road and SW Stafford Road manage the rural/urban transition, but it is also encumbered by the BPA easement. The BPA easement does not allow for the construction of metal poles or other structures within the easement area. Even the top of vegetation must have a 25-foot clearance to the lowest point of any BPA wires. Thus, a signalized intersection is not allowed at SW Kahle Road and SW Stafford Road due to the BPA easement.

<sup>32</sup> Transportation Analysis, p. 18.

<sup>33</sup> US Department of Transportation, Federal Highway Administration Priority, Market Ready Technologies and Innovations, Roundabouts (2006), available at <https://highways.dot.gov/media/9206#:~:text=demonstrating%20success%20in%20reducing%20crashes&text=The%20study%20revealed%20a%2039,involving%20fatal%20or%20incapacitating%20injuries.>



## Section 4 Conclusion

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The City has analyzed whether roundabouts represent an appropriate intersection enhancement for SW Kahle Road/SW Stafford Road, SW Brisband Street/SW Stafford Road, and SW 60<sup>th</sup> Avenue/SW Advance Road due to the intersections along SW Stafford Road falling below LOS D when development in Frog Pond East and South occurs and due to significant safety concerns related to the rural-to-urban transition. The City finds that the roundabouts further the City's legitimate governmental interests by meeting the City's required minimum level of service for the three intersections; increasing vehicle, bicycle, and pedestrian safety; decreasing overall intersection life-cycle costs; ensuring resiliency in the City's transportation system in the event of power outages and weather-related incidents; and complying with the terms of the BPA easement.