Chapter 3
No Build Case Operational Analysis

The purpose of this chapter is to analyze future operating conditions in 2026 through the study corridor assuming only currently committed transportation improvements are in place. This effort will require forecasting future traffic volumes using the Junction City transportation demand model created by LCOG and using them along with operational and geometric data collected for existing conditions to assess operations on OR 99 at the study intersections. This analysis will be used in later stages of the project to identify needed improvements and to develop an implementation strategy.

Future Traffic Volumes

To develop design hour volumes for the year 2026, LCOG created a transportation demand model for Junction City that included a base year scenario for the year 2006 and a future year scenario for the year 2026. Using the volume assignments from these two scenarios, a post-processing technique recommended in NCHRP Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design*[1] was employed to forecast design hour volumes. In essence, this methodology applies the growth found to occur between base year and future year scenarios and applies a portion of it to actual traffic count data, accounting for time that has already passed between the base year scenario and the date of the collected counts. Because in this case the base year of the model is the same as the year of the actual traffic counts taken (plus one year of growth that was previously added), the entire increment of growth between the base and future scenarios could be applied.

The degree of growth experienced on study area streets is illustrated in Figure 3-1, which displays a model plot of the difference in forecasted traffic volumes between the base year (2006) scenario and the future year (2026) scenario, with red links showing positive growth and green links showing negative growth. It should be noted when looking at this plot that the fat green links seen do not represent negative growth, but are actually locations where links that were present in the base year scenario were removed or relocated in the future year scenario.

[1] *Highway Traffic Data for Urbanized Area Project Planning and Design*, National Cooperative Highway Research Program, Report 255, TRB, Washington D.C., 1982.

OR 99

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FIGURE 3-1

Junction City Model Difference Plot (2026-2006)

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By taking the growth found to occur between the base year and future year scenarios on each turning movement at study intersections and applying it to the 2006 30th highest hour volumes previously developed, design hour volumes for the year 2026 were obtained. In a few cases where volumes decreased, it was assumed the primary cause was related to trip shifts due to system capacity improvements or changes in land use between the base and future years. Therefore, to keep a conservative forecast, these movements were assumed to experience no growth rather than negative growth. These volumes are displayed in Figure 3-2.

Compared to the 30th highest hour volumes under existing conditions, most of the growth on OR 99 through the study area occurs at the northern and southern ends of the city. To the north of 18th Avenue, OR 99W and OR 99E grow 49% and 53%, respectively. Then from 18th Avenue to Prairie Road, growth drops to approximately 34%. South of Prairie Road, growth on OR 99 increases again to approximately 55%.

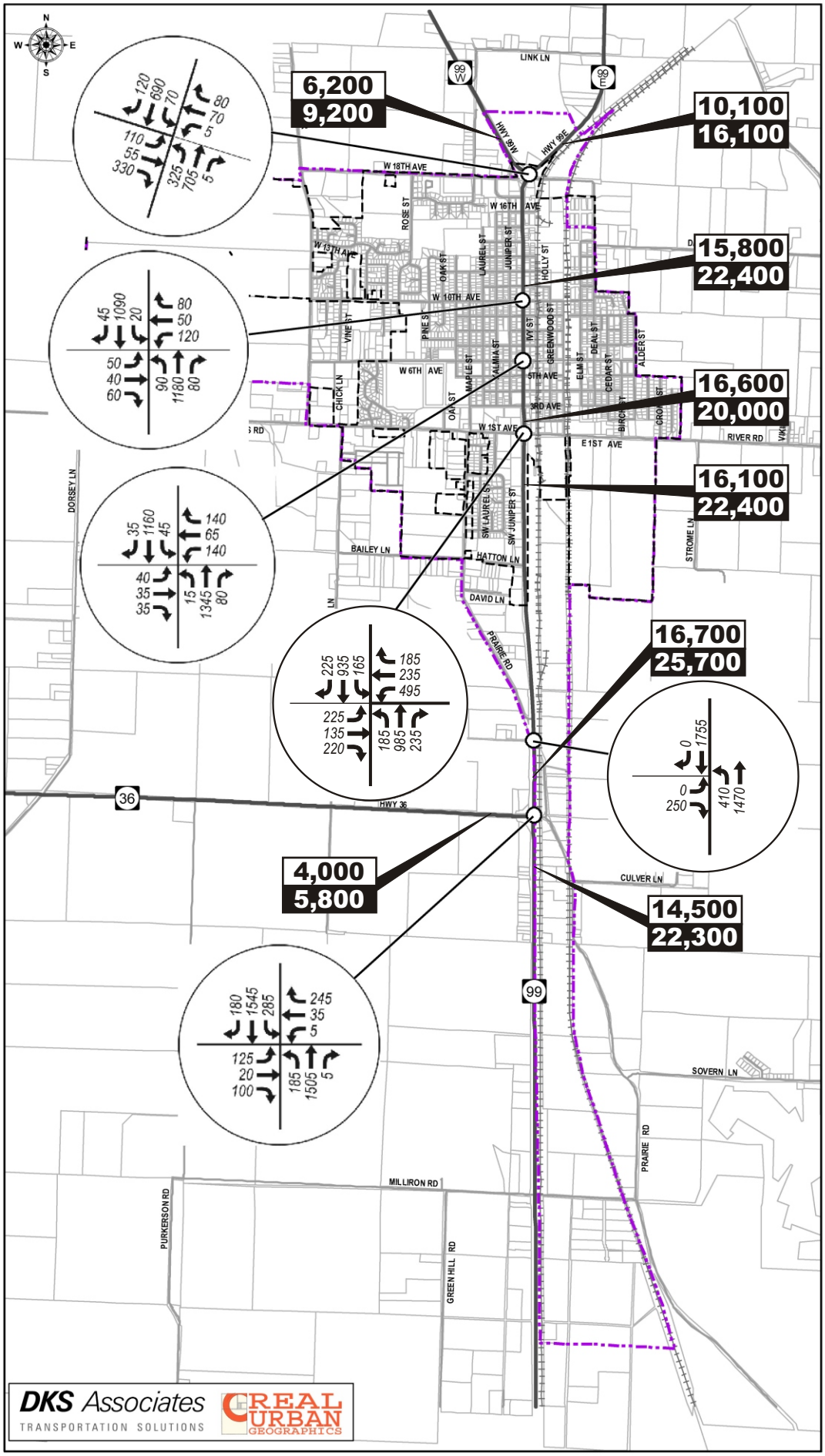
Using the model developed by LCOG, trips along OR 99 through Junction City were tracked to determine the percentage of highway users that are only passing through versus those that begin or end their trip somewhere within the city. From this analysis it was found that in 2026, approximately 38% of the traffic on OR 99 through Junction City will be through traffic. Furthermore, it is anticipated that approximately 75% of the through trips will arrive from or depart to OR 99E, with the remaining 25% using OR 99W.

Future Traffic Operations

Intersection Capacity

Using the 2026 design hour volumes developed, study intersections were analyzed to evaluate future operating conditions. Because there are no planned transportation improvements along OR 99 through the study area, the same Synchro model that was used to analyze existing conditions was used for this analysis, with no modifications made to signal timing or phasing or to intersection geometry. The results of this analysis are summarized in Table 3-1, which compares key measures of effectiveness including delay, level of service (LOS), and volume-to-capacity (v/c) ratios for each intersection under 2006 and 2026 conditions. Because the analysis of future conditions assumes a no-build condition, the mobility standards from the 1999 Oregon Highway Plan, which were applicable to existing conditions, continue to be the appropriate means for determining adequacy of operations.

As shown in Table 3-1, the growth in traffic volumes through the OR 99 corridor will increase congestion at all intersections, with four of the six study intersections failing to meet mobility standards and the intersections at 1st Avenue and OR 36 operating over capacity.



OR 99

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FIGURE 3-2

2026 Design Hour Traffic Volumes

Legend

- HIGHWAY
- ROAD
- CITY LIMITS
- URBAN GROWTH BOUNDARY
- TAX LOTS
- RAILROAD
- STREAM

000 — 2006 Average Daily Traffic
000 — 2026 Average Daily Traffic

0 1,000 2,000 4,000 Feet

Table 3-1: 2026 Design Hour Operations - No Build Condition

Study Intersection	2006 Performance			2026 Performance			Mobility Standard
	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	v/c
Traffic Signal Control							
OR 99W & OR 99E	15.9	B	0.59	21.9	C	0.74	0.85
OR 99 & 10th Ave.	11.9	B	0.71	13.5	B	**0.87**	0.85
OR 99 & 6th Ave.	11.3	B	0.64	11.9	B	0.73	0.85
OR 99 & 1st Ave.	33.4	C	**0.88**	>80.0	F	**>1.0**	0.85
OR 99 & OR 36	23.3	C	0.72	58.2	E	**>1.0**	0.85
Stop Sign Control							
OR 99 & Prairie Rd.	16.6	B/C	0.17*	>60.0	C/F	**0.96****	0.90

Notes: LOS (Level of Service)

"A/A" refers to level of service of left turning traffic from major street and the average level of service of traffic turning from the minor street onto the major street.

Delay: Average vehicle delay in seconds for all movements at signalized and four-way stop intersections. Minor street delay in seconds at unsignalized intersections.

v/c: Volume to capacity ratio of the intersection.

* critical v/c for OR 99/Prairie Rd in 2006 is on northbound left turn.

** critical v/c for OR 99/Prairie Rd in 2026 is on eastbound right turn.

Black background and bold type indicates mobility standard is not met.

To gauge the approximate duration of congestion that would be experienced in 2026, traffic volume profiles over a 16-hour period were created using counts collected under existing conditions. To project future volumes for all hours in this profile, the growth found to occur between the future design hour and the same hour under existing conditions was applied to volumes measured during all hours under existing conditions. For this evaluation, the point on OR 99 at 1st Avenue was selected, as it maintains some of the highest traffic volumes in the study corridor and represents a key bottleneck in the system.

Figures 3-3 and 3-4 present the hourly volume profiles on OR 99 under both existing and future conditions for the northbound and southbound directions of travel, respectively. To indicate when congested conditions would occur, a capacity ceiling was overlaid on these charts using adjusted (not ideal) saturation flow rates and actuated green times from the capacity analysis of the OR 99 intersection at 1st Avenue during the 2026 design hour (representing a v/c = 1.0). It should be recognized when considering this information that when traffic volumes exceed capacity the actual duration of congestion may be longer than shown because of the time needed for the system to recover from the "breakdown" that has occurred.

Figure 3-3: OR 99 Congestion Profile - Northbound

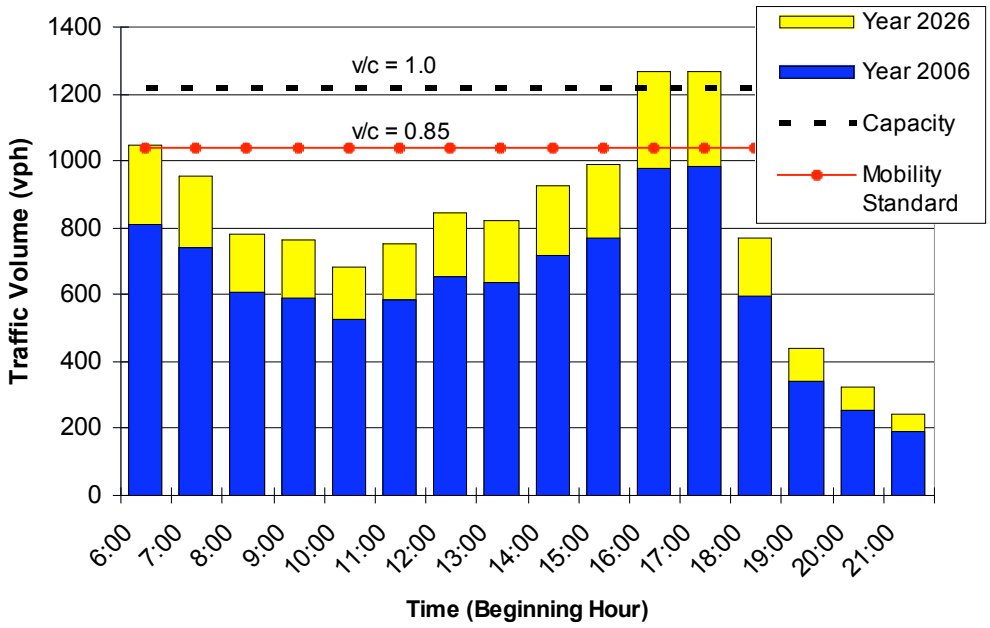
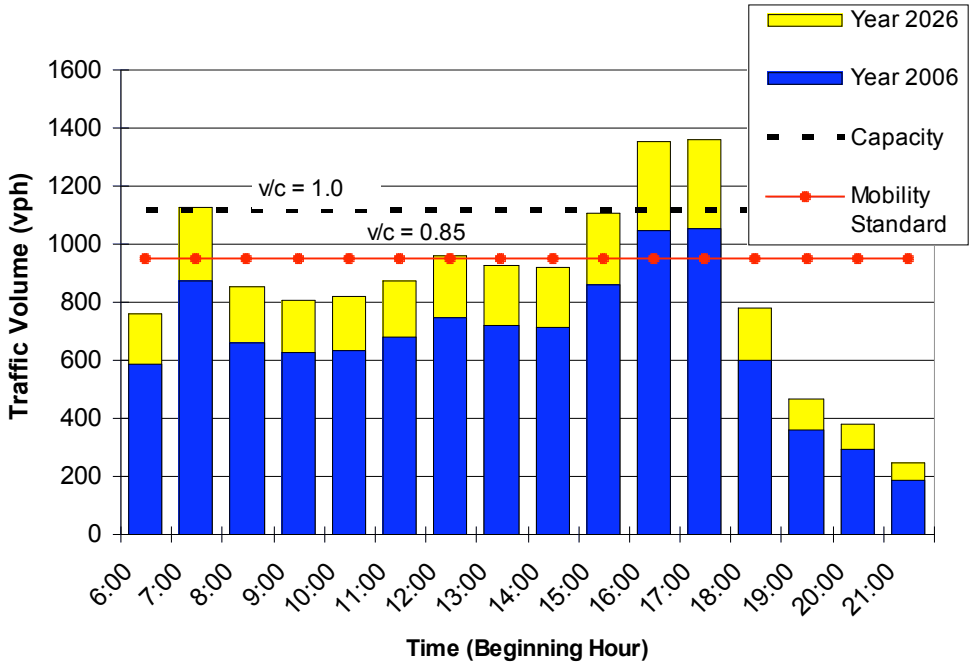


Figure 3-4: OR 99 Congestion Profile - Southbound



As shown in these figures, in both directions of travel the p.m. peak period currently experiences higher traffic volumes than the a.m. peak period, with two continuous hours between 4:00 and 6:00 p.m. where volumes are nearly identical. Assuming this trend continues through 2026, there will be at least a two-hour period, beginning at approximately 4:00 p.m., where traffic demands will exceed system capacity (v/c > 1.0). Also of note is that in the southbound direction, the a.m. peak hour volume will also exceed capacity, although only by a small degree.

An additional line was overlaid on these charts to also indicate approximately how many hours of the day would experience conditions that failed to meet ODOT's mobility standards. From Figure 3-4 is it seen that the peak hour that was previously identified as failing to meet mobility standards under existing conditions may actually be two hours long or more. However, in the future, there will be at least 3 hours during the p.m. period where conditions fail to meet mobility standards and potentially 2 hours in the a.m. period, in addition to several midday hours approaching the standard as well.

Vehicle Queuing

Under congested conditions, long vehicle queues will form along the highway. Between 15th Avenue and 3rd Avenue, OR 99 would be particularly sensitive to this because no separate turn lanes are present to move turning vehicles out of the way of through traffic. To get a better understanding of future traffic operations in 2026, an analysis of vehicle queues at study intersection approaches was performed to supplement the capacity analysis. Because of the level of congestion forecast to occur, SimTraffic was used to calculate vehicle queues rather than relying on Synchro. Figure 3-5 presents the calculated 95th percentile vehicle queues for each intersection movement and compares it to the amount of available queue storage, with movements experiencing queues that can not be contained within available storage highlighted.

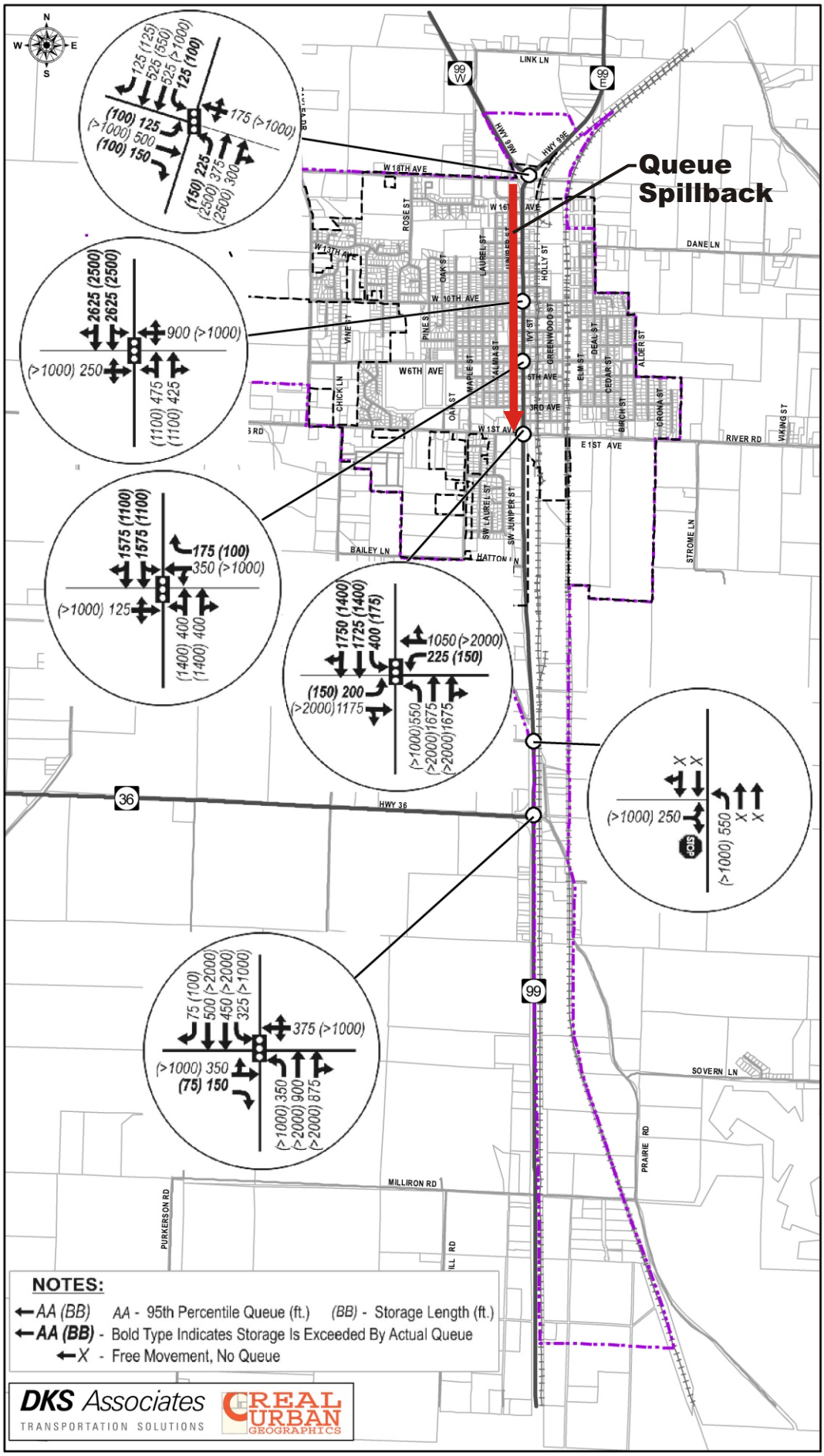
To support the information presented in Figure 3-5, further descriptions of areas where excessive queues were found are provided below.

OR 99W at OR 99E

- The eastbound through queue on OR 99W spills back through the intersection with Juniper Street.

OR 99 at 10th Avenue

- The southbound queue on OR 99 spills back through the intersection with OR 99W/OR 99E.
- The westbound queue on 10th Avenue spills back beyond the UPRR tracks.
- The eastbound queue on 10th Avenue spills back through the intersection with Juniper Street.
- The northbound queue on OR 99 spills back through the intersection with 9th Avenue.



OR 99
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FIGURE 3-5

2026 No Build
95th-Percentile
Vehicle Queues

Legend

- HIGHWAY
- ROAD
- CITY LIMITS
- URBAN GROWTH BOUNDARY
- TAX LOTS
- RAILROAD
- STREAM

0 1,000 2,000 4,000 Feet

NOTES:

←AA (BB) AA - 95th Percentile Queue (ft.) (BB) - Storage Length (ft.)

←**AA (BB)** - Bold Type Indicates Storage Is Exceeded By Actual Queue

←X - Free Movement, No Queue

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REAL URBAN GEOGRAPHICS

OR 99 at 6th Avenue

- The southbound queue on OR 99 spills back through the intersection with 10th Avenue.
- The westbound queue on 6th Avenue spills back through the intersection with Holly Street.
- The northbound queue on OR 99 spills back through the intersection with 5th Avenue.

OR 99 at 1st Avenue

- The southbound queue on OR 99 spills back through the intersection with 6th Avenue.
- The westbound queue on 1st Avenue spills back beyond the UPRR tracks.
- The eastbound queue on 1st Avenue spills back through the intersection with Prairie Road.

OR 99 at OR 36

- The westbound queue on Prairie Road spills back beyond the BNSF tracks.

Traffic Progression

Under the signal timing plans currently in use at the study intersections, only the traffic signals at 10th Avenue, 6th Avenue, and 1st Avenue are maintaining common cycle lengths and are running in coordination, providing a bandwidth of 32 seconds in the northbound direction and 23 seconds in the southbound direction. With the intersections of OR 99W at OR 99E and OR 99 at OR 36 being approximately ½ mile and 1 ½ miles away, respectively, including them as part of this coordinated system of signals may provide little benefit. Time-space diagrams have been included in the appendix.

Chapter 4
Problem Statement, Evaluation Criteria, and Technical Rating Methods

The purpose of this chapter is to define the problem statement for the project to focus alternatives development, as well as evaluation criteria and technical rating methods to use for alternatives screening.

Problem Statement

Through the analysis of existing and future (2026) conditions through the OR 99 corridor, a number of deficiencies were identified, as well as constraints that must be addressed when developing improvement alternatives. Through the 20-year planning period, OR 99 will experience a significantly higher traffic demand than the current infrastructure can handle. With no capacity enhancements made, high levels of congestion will be experienced for at least 3 hours during the weekday p.m. peak period, including vehicle queues in the southbound direction that will block intersections from 1st Avenue through the OR 99W/OR 99E split. Over a third of this demand will only be passing through with no origin or destination within the City.

The increased congestion experienced in 2026 will also intensify problems noted under existing conditions, such as the need for bike lanes along OR 99 and improved pedestrian crossing opportunities in the section between OR 99W and 10th Avenue and the section between 1st Avenue and OR 36. Furthermore, it is anticipated that the already high crash frequency potentially related to the high access density and lack of turn lanes will continue to rise.

Providing the needed capacity to meet future demands will be difficult to achieve within the existing highway corridor. There is not enough right of way in the constrained section between the Flat Creek Bridge and 1st Avenue to accommodate all modes of travel and provide needed turning lanes. However, due to the presence of many buildings that have been constructed very near the highway right of way, widening this section would be very expensive and would have significant impacts on the downtown area. Furthermore, the presence of the railroad tracks to the east of OR 99 will limit opportunities to develop improvement alternatives in that direction, as it is possible that no new at-grade crossings would be allowed.

Accessibility of industrial lands in the south end of the City will also be a challenge, as railroads bound this area to the east and west. Because few rail crossings will be allowed, a comprehensive plan to provide access to all properties within this area will be needed to allow for development to occur in an orderly manner.

Evaluation Criteria and Technical Rating Methods

To rank potential improvement alternatives that will be developed to address the problems discussed above, evaluation criteria were created that are focused on compliance with state and local plans and policies, engineering design requirements, and a desire to minimize environmental and private property impacts. The criteria developed are described below.

Evaluation Criterion	Rating Method	
Meets HDM Mobility Standards The effectiveness of new state facilities constructed will be evaluated according to the mobility standards in the Highway Design Manual. Because alternatives that do not meet these standards, but may provide remarkable improvement, could be deemed acceptable, using a pass/fail rating method would not be desirable.	**+ / ✓ / -**	
	+	Meets HDM mobility standard.
	✓	No effect on mobility.
	-	Mobility is worsened.
Reduces Corridor Through Travel Time Because over one third of all travel along OR 99 will be associated with through travel only and this highway has been designated as a freight route, improving the ability to move traffic through the study area is important. Alternatives that do not improve through travel time should be rated lower.	**+ / ✓ / -**	
	+	Reduces through travel time.
	✓	No effect on through travel time.
	-	Through travel time is worsened.
Reduces OR 99 intersection queue blockage Under No Build conditions, queue spillback from downstream intersections prohibits many intersections from functioning properly. When queues block upstream intersections, adequate operations can not be achieved. All alternatives considered must be able to manage vehicle queues along OR 99 better than the No Build condition.	**+ / ✓ / -**	
	+	Major reduction in queue spillback.
	✓	Minor reduction in queue spillback.
	-	No reduction in queue spillback.
Able to meet Design Standards While it is important that proposed alternatives would be able to meet adopted design standards (from the Highway Design Manual for state facilities), there may be situations where the standards can not be met, but it is reasonable to assume a design exception could be obtained. Therefore, using a pass/fail rating method would not be desirable.	**+ / ✓ / -**	
	+	Meets design standards.
	✓	May require design exception.
	-	Would require significant design exception(s).

Facilitates Pedestrian Crossing of OR 99 Under current conditions, OR 99 acts as a barrier between the east and west sides of town and does not have adequate pedestrian crossing opportunities in some areas of the corridor. Improvement alternatives should address the need to facilitate pedestrian travel.	**+ / ✓ / -**	
	+	Improves pedestrian crossings.
	✓	No effect on pedestrian crossings.
	-	Degrades pedestrian crossings.
Improves Bicycle Travel There are currently no bike lanes on OR 99 for a considerable distance, forcing bikes to ride in the motor vehicle lanes or discouraging bike travel altogether. Proposed alternatives need to provide for bicycle travel to enhance corridor safety and encourage alternate travel mode use.	**+ / ✓ / -**	
	+	Improves bicycle travel.
	✓	No effect on bicycle travel.
	-	Degrades bicycle travel.
Reduces Direct Highway Access The high access density along OR 99 should be reduced to help alleviate the current safety problems in the corridor, to provide an environment where traffic can move efficiently, and to make the area more attractive to walking and biking.	**+ / ✓ / -**	
	+	Reduces access density.
	✓	No effect on access density.
	-	Increases access density.
Reduces Vehicle Conflicts Under current conditions, the high access density and lack of turn lanes between the Flat Creek Bridge and 1st Avenue provide an environment that results in a substantial number of vehicular conflicts that degrade safety and mobility. Reductions in conflicts through access management techniques (reducing the number of driveways, adding turn lanes, installing median barrier, etc...) or other means is essential for achieving adequate operations.	**+ / ✓ / -**	
	+	Reduces vehicle conflicts.
	✓	No effect on vehicle conflicts.
	-	Increases vehicle conflicts.
Potential Environmental Impacts Environmental impacts, including impacts to natural resources, socioeconomics, and visual impacts should be avoided where possible. While such impacts will not be studied in detail as part of this project, alternatives will be reviewed for potential impacts to known areas of environmental sensitivity (wetlands, haz-mat, parks, cultural/historic resources, etc…).	**+ / ✓ / -**	
	+	No known impacts.
	✓	Potential for minor impacts.
	-	Significant impacts.

No new at-grade RR crossings Obtaining approval for new at-grade railroad crossings is generally very difficult and commonly requires the simultaneous closure of other existing at-grade crossings. The feasibility of advancing any alternatives that show new at-grade railroad crossings would therefore be questionable.	**+ / ✓ / -**	
	+	Reduces number of at-grade RR crossings.
	✓	No change in number of at-grade RR crossings.
	-	Increases number of at-grade RR crossings.
Feasible Construction/ Implementation Alternatives that can be constructed or implemented with little impact to traffic flow should be rated higher than those that would require the elimination of travel lanes during construction. Also, alternatives with elements that may not be constructible or implementable should not be pursued.	**+ / ✓ / -**	
	+	No phasing required.
	✓	Constructible in phases.
	-	Not constructible.
Private Property Impacts Alternatives with no private property impacts would be the most desirable. While private property impacts should be minimized where feasible, impacts that would not require purchasing the entire property and would allow current development to continue operating are preferable.	**+ / ✓ / -**	
	+	No impacts.
	✓	Requires partial property takes.
	-	Requires total property takes.
Cost-effectiveness Some alternatives may have higher costs associated with them, but may also provide the most improvement for traffic operations. Therefore, the cost alone should not be used to determine if an alternative is desirable from a financial standpoint.	**+ / ✓ / -**	
	+	Very cost-effective.
	✓	Moderately cost-effective.
	-	Not cost-effective.
Consistent with City Comp Plan/ TSP Alternatives considered should not conflict with adopted policies or planned improvements in the City's Comprehensive Plan or Transportation System Plan (TSP) unless it is reasonable to assume that adopted plans would be amended by the City to remove such conflicts.	**+ / ✓ / -**	
	+	Consistent with adopted plans.
	✓	Conflicts exist, but could be resolved by City through amendments.
	-	Conflicts exist and City will not amend plans to resolve them.

Consistent with Junction City Downtown Plan Alternatives considered should not conflict with the objectives and strategies in Junction City's adopted Downtown Plan. Specifically, alternatives should provide improved automobile, pedestrian, and bicycle access and safety throughout the downtown.	**+ / ✓ / -**	
	+	Consistent with and compliments Downtown Plan.
	✓	Does not compliment Downtown Plan, but is or would be made consistent.
	-	Would conflict with Downtown Plan.