

MEMORANDUM #5

Date: July 5, 2023 Project #: 27003.004
To: Project Management Team
From: Jacki Smith, PE; Matt Kittelson, PE; Daniel Bowers
Project: South Madras Refinement Plan
Subject: Technical Memorandum #5 – Future Conditions (Task 4.2)

INTRODUCTION

This memorandum presents the key findings related to the future year 2045 Baseline Needs Analyses (i.e., No-Build Scenario) for the South Madras Refinement Plan (Refinement Plan). The No-Build analysis addresses the “quality of service” anticipated in the future for active modes of travel (i.e., walking, biking, and transit) and the vehicular operational conditions projected to occur along key streets and intersections. Information contained in this memorandum will serve as the basis of the Alternatives Analysis and Concept Development Workshop forthcoming in the refinement planning process.

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EXECUTIVE SUMMARY

The assessment of the future no-build transportation system conditions and the transportation network identified the following:

- ▶ The growth rate was developed from the ODOT future volume tables and the zonal cumulative analysis and resulted in an annual growth on the highways of approximately 2.6%.
- ▶ All US97 side street intersections operate over capacity in the future condition with the existing three lane section, demonstrating the need to facilitate east-west connections and access across US97. The following study intersections are forecasted to exceed mobility targets for the side-street under 2045 conditions:
 - US97 NB (5th Street)/J Street
 - US97 SB (4th Street)/J Street
 - US97/Bard Lane
 - US97/Fairgrounds Road
 - US97/Hall Road
 - US97/Colfax Lane
 - Culver Highway/J Street
- ▶ The following intersections are expected to have 95th percentile queues that exceed available storage or spillback beyond upstream public street intersections under 2045 conditions:
 - US97 NB (5th Street)/J Street
 - US97 SB/J Street
 - US97/Fairgrounds Road
 - US97/Hall Road
 - Culver Highway/J Street
- ▶ Future segment volumes indicated that US97 would operate near capacity in the study area. However, as Madras continues to urbanize, highway throughput capacities will likely decrease due to the need to adequately service side street approaches and result in highway breakdowns. Other areas of Madras, as well as communities in Central Oregon, currently experience travel demand similar to what is forecast for the South Madras area. Long-term forecasted statewide freight and recreational demand on US97 both point to a need for increased segment capacity along the entire US97 mainline, including through the study area.

- ▶ Without improvements to roadways or intersections, the following conditions are expected to remain into the future no-build scenario.
- ▶ Bicycle facilities are provided in the study area through partial bike lanes on segments of US97, Hall Road, and J Street. A shared use path is provided on the north side of Fairgrounds Road. Segments on all roads in the study area except Fairgrounds Road either rely on shoulders for bicycle travel or do not have any shoulders, including:
 - US97 – 6' shoulders are provided between Colfax Lane and Hall Road
 - Culver Highway – 4' shoulders are provided between Colfax Lane and J Street
 - Colfax Lane – no shoulders or bicycle facilities are provided
 - Adams Drive – no shoulders or bicycle facilities are provided
 - Bard Lane – no shoulders or bicycle facilities are provided
 - Hall Road – 6' shoulders are provided east of US97
 - J Street – 10' combined shoulder/parking lane provided between Culver Highway and US97 SB
- ▶ Pedestrian Connectivity – Sidewalks are provided on one or both sides of roadways in the study area with the exception of the following:
 - US97 – disconnected sidewalks or no sidewalks are provided between Colfax Lane and Hall Road
 - Culver Highway – no sidewalks are provided. The nearest sidewalk is north of the study area at Madison Street.
 - Adams Drive – no sidewalks are provided except for the approximately 250-foot segment between Tracie Street and L Street on the north side of the study area
 - J Street – disconnected sidewalks or no sidewalks are provided between Culver Highway and US97 SB
- ▶ Vehicle speeds above the posted speed limit – particularly in areas farther away from the City core. The 85th percentile speed varies between 4 mph to 9 mph faster than the posted speed on US97 and between 3 to 5 mph faster than the posted speed on Culver Highway.
- ▶ Similar crash patterns. The increased volume on the system may increase the volume of crashes. The critical crash rates are exceeded at US97 NB/J Street and US97/Bard Lane in the existing condition; this is anticipated to remain into the future.

PLANNED IMPROVEMENTS

This section summarizes planned improvements in the study area including those identified in the Oregon Department of Transportation (ODOT) Statewide Transportation Improvement Program (STIP), City of Madras Transportation System Plan (TSP) and Jefferson County TSP. As documented in the Existing Conditions Memorandum, ODOT currently has a design contract for the *US97: Earl to Colfax* STIP project to improvement pavement conditions, sidewalk infill, and crossing treatments in Madras. The future STIP and TSP projects within the study area are listed in Table 1. The notes section describes what projects were included in the future 2045 no-build assumptions and what projects will be further evaluated in the alternatives analysis stage. One expected outcome of the South Madras Refinement Plan is the identification of projects for inclusion in updated versions of the ODOT STIP and City/County TSPs.

Table 1. STIP and TSP Projects within the South Madras Refinement Plan Area

Source	Project	Notes ¹
K21 653 US97: Earl-Colfax Project	Enhanced crossing of US97 and lighting at Hall Road N (Love's Driveway)	Funded through STIP project – included in future no-build scenario
Madras TSP	Intersection safety and capacity improvements at US97/Fairgrounds Rd	Intersection will be evaluated through alternatives analysis – not included in future no-build scenario
Madras TSP	Intersection safety and capacity improvements at US97/Hall Rd	Intersection will be evaluated through alternatives analysis – not included in future no-build scenario
Madras TSP	Geometric improvements at Culver Hwy/Fairground Rd	Intersection will be evaluated through alternatives analysis – not included in future no-build scenario
Madras TSP	Hall Road extension from Love's Travel Stop to Culver Hwy	Critical connection for development and a near term priority project for the City – included in future no-build scenario
Madras TSP	Intersection enhancement at Culver Hwy/Hall Rd	Intersection control to be evaluated through alternatives analysis – assumed to be two-way stop control on Hall Rd for future no-build scenario
Madras TSP	Intersection safety and capacity improvements at Culver Hwy/J St	Intersection will be evaluated through alternatives analysis – not included in future no-build scenario
Madras TSP	Construct new roadway between Fairgrounds Rd and 2 nd St	Roadway connection not on City's near term priority list. Development driven – not included in future no-build scenario
Madras TSP	Construct new east-west roadway between Fairgrounds Road and Hall Road west of US97	Roadway connection not on City's near term priority list. Development driven – not included in future no-build scenario
Madras TSP	Construct new north-south roadway between Fairgrounds Rd and Hall Rd	Critical connection for development and a near term priority project for the City – included in future no-build scenario
Madras TSP	Construct new north-south roadway between colfax Ln and Hall Rd	Critical connection for development and a near term priority project for the City – included in future no-build scenario
Madras TSP	Extend Fairgrounds Rd east of US97 to 10 th St	Roadway connection not on City's near term priority list. Development driven – not included in future no-build scenario
Madras TSP	Construct new roadway between Fairgrounds Rd east extension and Hall Rd	Roadway connection not on City's near term priority list. Development driven – not included in future no-build scenario
Jefferson County TSP	Modify intersection approaches at US97/Colfax Ln to encourage slower turning speeds and reduced crossing distance	Intersection will be evaluated through alternatives analysis – not included in future no-build scenario

¹Bolded projects are included in the future no-build scenario

ZONAL CUMULATIVE ANALYSIS

As noted in Technical Memorandum (TM) #3, there is no Travel Demand Model for Jefferson County or the City of Madras. Future traffic volumes were developed for the study intersections in accordance with the **Zonal Cumulative Analysis** methodology described in the Analysis Procedures Manual (APM). This type of analysis combines growth in regional traffic volumes with growth in local traffic volumes associated with household and employment growth in the city. TM#3 provides further details of the methodology behind this analysis.

The traffic volume projection process includes three major steps: trip generation, trip distribution, and trip assignment. The process accounts for the following four categories of vehicle trips:

- ▶ External-External (through trips): vehicles with an origin and destination outside the UGB. An example of an external-external trip is someone traveling from Portland to Redmond or Bend.
- ▶ External-Internal (inbound trips): vehicles with an origin outside the UGB and a destination inside the UGB. An example of an external-internal trip is someone who works in Warm Springs and returns home to Madras during the evening peak hour.
- ▶ Internal-External (outbound trips): vehicles with an origin inside the UGB and a destination outside the UGB. An example of an internal-external trip is someone who works in Madras and returns home to Terrebonne during the evening peak hour.
- ▶ Internal-Internal (local trips): vehicles with an origin and destination inside the study area. An example of an internal-internal trip is someone who travels from their home to the gas station store without leaving the study area.

Using these vehicle trip types, the basic steps for a zonal cumulative analysis are:

- ▶ Develop regional growth rates for highway traffic volumes;
- ▶ Identify where household and employment growth are likely to occur in the community;
- ▶ Develop estimates of the number of vehicle trips associated with household and employment growth, and;
- ▶ Allocate those trips across the city to various growth areas.

An overview of each of these steps is presented below.

REGIONAL TRAFFIC GROWTH

ODOT's Future Volume Tables were used to develop regional growth rates for US97 and OR361 (Culver Highway). Based on the tables, traffic volumes along US97 without the development of the study area are expected to increase by approximately 16.4 percent south of the study area and traffic volumes along Culver Highway are expected to increase by approximately 17.2 percent south of the study area by 2045. This cumulative growth over the 22-year period comes out to approximately 0.75% and 0.78% growth per year for US97 and Culver Highway, respectively. These growth rates were applied to existing traffic volumes along US97 and Culver Highway to estimate growth in regional traffic volumes.

HOUSEHOLD AND EMPLOYMENT GROWTH

Population and employment forecasts were developed for Madras based on state and local data and an assessment of the capacity for additional growth and development within the current Urban Growth Boundary (UGB). The following provides a summary of the forecast. A *detailed summary of the forecast is provided in Attachment A.*

POPULATION FORECAST

Historic and projected population information for Madras was obtained from the Portland State University (PSU) Population Research Center (PRC). The PRC generates coordinated forecasts for Oregon counties and cities every four years. The most recent coordinated population forecast for Jefferson County was released in 2020. The 2020 report includes historic and projected population estimates for Jefferson County and Madras.

According to the report, the base year (2020) population for Madras is 7,964 persons. The population is expected to have an annual average growth rate of 1.4 percent per year between 2020 and 2045. Therefore, the end year (2045) population for Madras is expected to be 12,420 persons.

The household forecast assumes Madras household size will remain the same as the 2020 average household size of 2.9 persons per household throughout the planning horizon. Households were estimated by dividing the population by the average household size. There are an estimated 2,746 households in the base year (2020) and 4,283 households in the end year (2045). The net increase between 2020 and 2045 is 1,537 households.

EMPLOYMENT FORECAST

The most recent industry employment data available for Jefferson County is provided from the Oregon Employment Department Workforce and Economic Research Division industry employment forecast. This data provides a ten-year forecast defined by regions as opposed to cities and organizes employment forecasts by primary industry. The employment forecast analysis assumes that employment growth in Madras will follow similar employment trends as the Oregon Employment industry employment forecast.

The most current employment data available for Madras is provided by the US Census American Community Survey (ACS) 5-year estimates. This data provides employment information by North American Industry Classification System (NAICS) sector. This data is used as the basis for estimating employment growth.

The NAICS data shows that base year (2020) employment for Madras is 2,840 jobs. Employment is expected to increase by an additional 1,051 jobs between 2020 and 2045 per the East Cascades Industry Employment Projections, with higher increases in leisure and hospitality, construction, and professional and business services. Therefore, at the end year (2045) employment for Madras is expected to be 3,891 jobs.

Table 2 summarizes the population, households, and employment data for year 2020 and forecast year 2045 conditions. As shown, employment is expected to grow at a lower rate than the population and households over the 25-year period.

Table 2: Population, Household, and Employment Summary

Land Use	2020	2045	Change	Percent Change
Population	7,964	12,420	4,456	56%
Households	2,746	4,283	1,537	56%
Employment	2,840	3,891	1,051	37%

The population, households, and employment data shown in Table 2 was used to provide context when creating assumptions for the currently vacant or undeveloped land in the South Madras study area.

TRIP GENERATION

The projected household and employment growth can be equated to increases in local traffic volumes by calculating the trip generation of the future uses for vacant or undeveloped land in the study area. The land use assumptions for each TAZ are located in Figure 1. Trip generation estimates were prepared based on information provided in the standard reference, *Trip Generation Manual, 11th Edition*, published by the Institute of Transportation Engineers (ITE). Land use mixes and assumptions were verified with City of Madras staff. *Attachment B* summarizes the total trips by TAZ.

TRANSPORTATION ANALYSIS ZONES

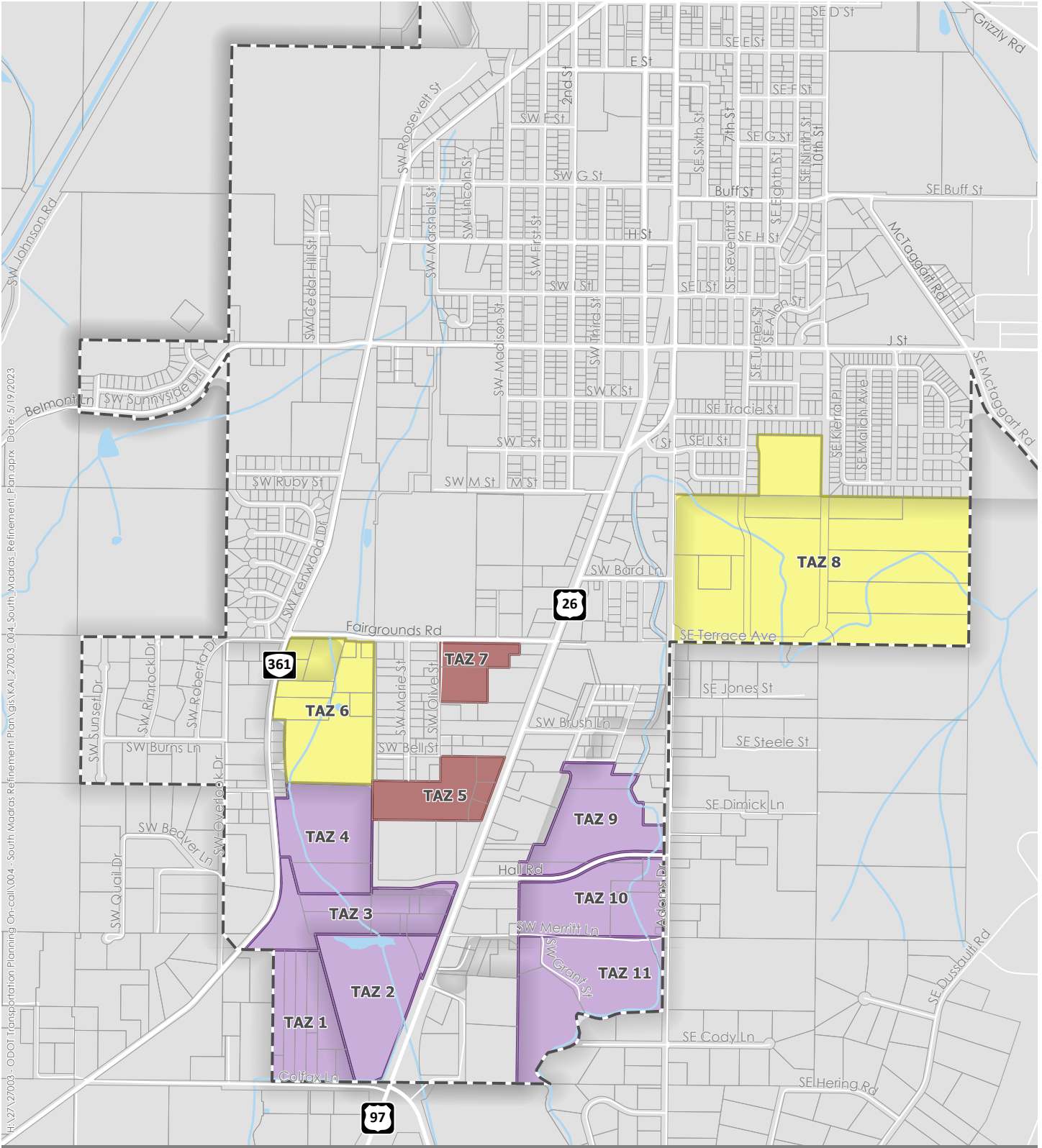
The trips associated with the assumed land use breakdowns for the vacant or undeveloped land were distributed throughout the city based on the type of trips (i.e., external-internal, internal-external, internal-internal) and the location of the transportation analysis zones (TAZ's) developed for the project. *Additional information on the TAZs is provided in Attachment C.*

The TAZ's in the study area are comprised of mainly commercial and industrial land uses. To most accurately model travel demand within the area, the analysis assumes that 75% of traffic originates from or is traveling outside the study area. This assumption was developed based on the primarily commercial planned land uses for the vacant/developable lands and that the majority of residential area in Madras is outside of the study area. Since the connections to external trip generators and attractors primarily utilize the highway, this assumption increases the highway volumes beyond the ODOT future growth rate tables.

In addition, the analysis assumes 1/3 of trips traveling north from TAZ's west of US97 would take Culver Highway up to the signals at D Street and the remaining 2/3 would turn left onto US97. The analysis also assumes that 1/4 of trips traveling north from TAZ's east of the highway will use Adams Drive to Bard Lane and then turn onto US97 northbound and the other trips would

access US97 via Hall Road. Given the assumptions stated, the growth on the highway was adjusted from the ODOT projections of 0.75 and 0.78% annual growth to 2.6% annual growth.

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






 100% Residential	 Urban Growth Boundary	0	0.25 Miles	
 20% Light Industrial, 80% Commercial	 City Limits			
 50% Light Industrial, 50% Commercial	 Taxlots			

Figure 1

FUTURE TRAFFIC OPERATIONS

ANALYSIS MODEL PARAMETERS

The parameters for the existing traffic operations analysis model are described in the Technical Memorandum (TM) #3 – Analysis Methodologies and Assumptions.

PERFORMANCE STANDARDS

The future 2045 condition traffic operations for each intersection were evaluated according to the standards of the agency who has jurisdiction over the intersection. The Methodology Memorandum provides additional information about methodology to establish mobility targets. Table 3 outlines each study intersection control type and mobility target. The following performance measures and information is provided for each of the study intersections, regardless of jurisdictional control:

- Volume-to-capacity (v/c) ratio;
- Level-of-service (LOS);
- Delay;
- 95th Percentile queuing (non-simulation based); and
- Turning movement counts.

Four additional future intersections were added to the analysis, as it was determined that the connections from those planned improvements outlined in the TSP are critical to the development of the vacant land within the study area. The locations of the new intersections are shown in Figures 2, 3, and 4. The performance standards for those intersections were developed according to the methodology noted in the Methodology Memorandum.

ROADWAY SEGMENT ANALYSIS

Table 3 summarizes the collected daily traffic volumes, peak hour, and calculated volume-to-capacity (v/c) ratio for each segment approach. The estimated Average Daily Traffic (ADT) on US97 through the study area is approximately 23,000-28,000 vehicles. Existing traffic volumes on similar segments on the boundary of the UGB in Bend and Redmond experience ADT volumes between 24,000-39,000 daily vehicles¹. The segments near Bend and Redmond are four lane cross sections. As shown in the table below the segments in Maras are not forecast to exceed capacity under the 30th Highest Hour conditions in the future.

¹ Based on 2022 data provided by ODOT's TransGIS database.

Table 3. Study Road Segment Operations

Roadway Segment	Direction	Peak Hour from 2023 Traffic Counts	2045 Peak Hour Traffic Volumes	Capacity Estimate (vphpl)	Calculated V/C Ratio
US97 approx. 600 ft north of Colfax Ln	NB	12:30-1:30pm	939	1,750	0.54
	SB	3:00-4:00pm	1318		0.75
US97 approx. 100 ft north of Fairgrounds Rd	NB	3:45-4:45pm	1361	1,750	0.78
	SB	3:15-4:15pm	1530		0.87
Culver Hwy approx. 100 ft south of Fairgrounds Rd	NB	7:15-8:15am	407	1,750	0.23
	SB	4:30-5:30pm	454		0.26

vphpl = vehicle per hour per lane

INTERSECTION OPERATIONS

Figure 2 shows the lane configurations, traffic control devices, and PM peak hour volumes at the study intersections in the 2045 future no-build scenario. Figure 3 shows the study intersection operational results. Numerous intersections do not meet side street operational mobility targets, as shown in the Figure. These intersections are:

- US97 NB (5th Street)/J Street
- US97 SB (4th Street)/J Street
- US97/Bard Lane
- US97/Fairgrounds Road
- US97/Hall Road
- US97/Colfax Lane
- Culver Highway/J Street

Attachment D contains the future 2045 traffic conditions worksheets.

Figure 4 shows the future condition 95th percentile queues at the study intersections. The following intersections are expected to have 95th percentile queues that exceed available storage or spillback past the upstream public intersections under 2045 conditions:

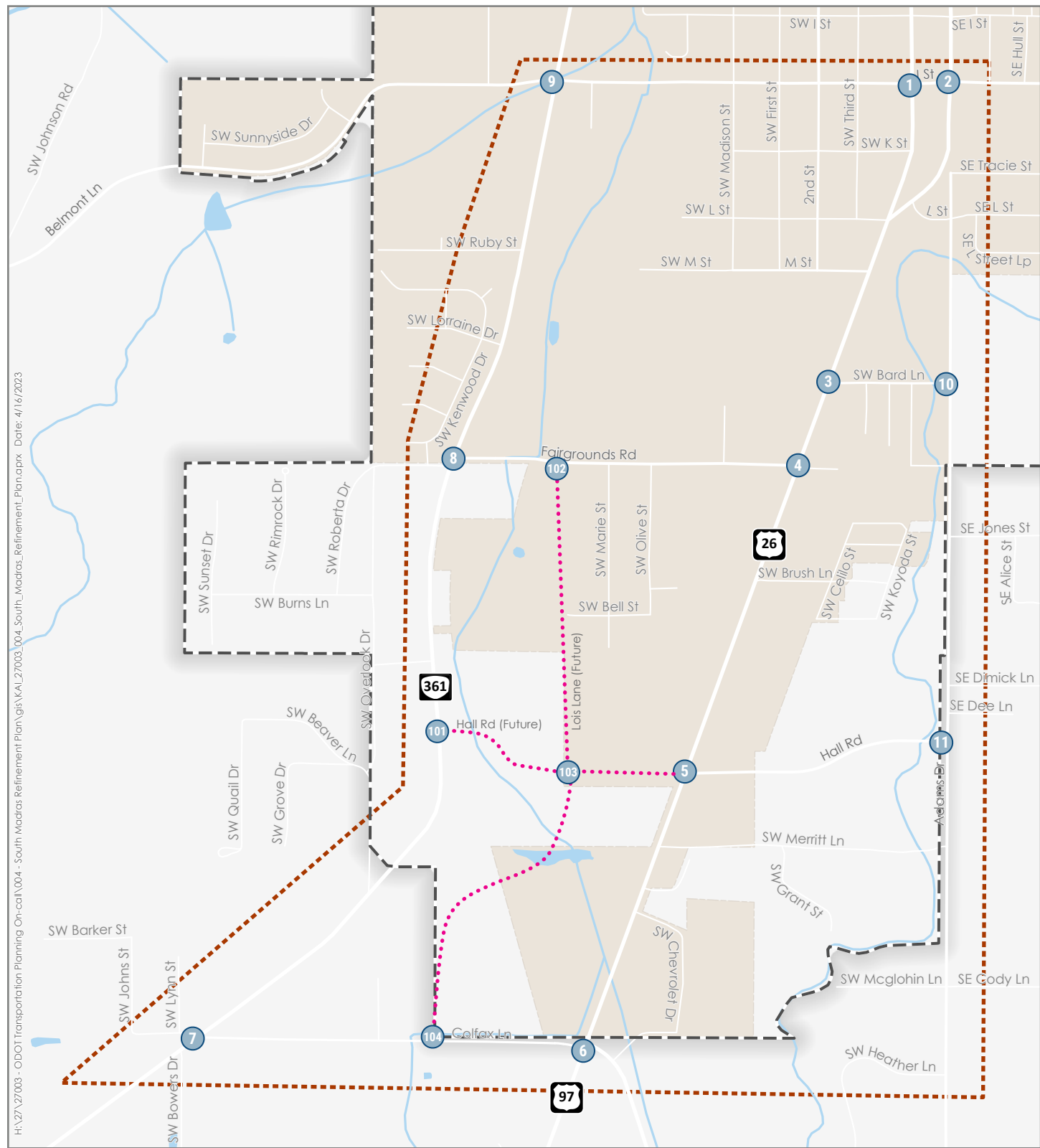
- US97 NB (5th Street)/J Street
- US97 SB (4th Street)/J Street

- US97/Fairgrounds Road
- US97/Hall Road
- Culver Highway/J Street

The US97/Hall Road intersection is shown to have approximate 95th percentile queues at or over 1000 feet for both the eastbound and westbound directions. These queues far exceed storage and are forecasted to impact proposed public and private accesses (notably future intersection 103) related to the future development proposed in the area.

Segment and intersection data are reflective of 30th highest weekday peak hour volumes. Significant northbound queuing on US97 and increased side street delays have been observed during peak summertime weekends today and would be expected to increase in the 2045 no-build condition.

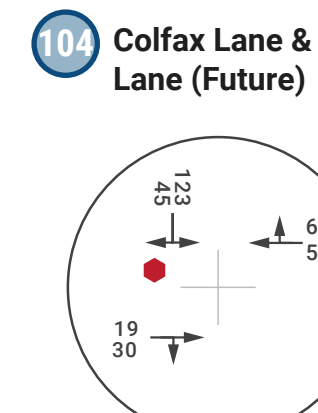
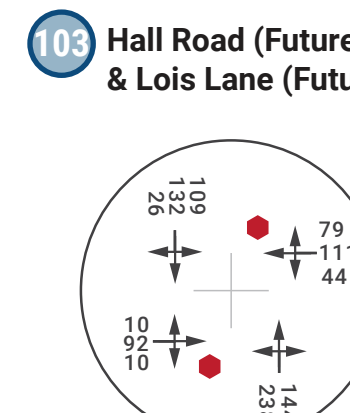
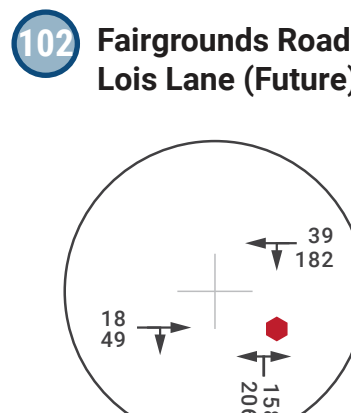
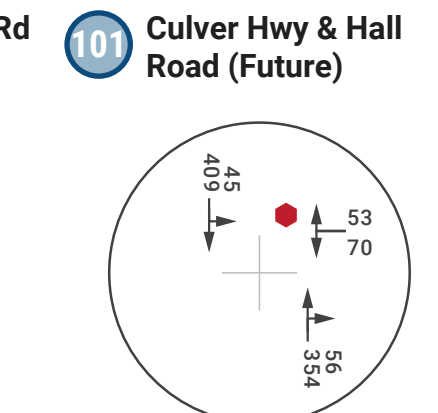
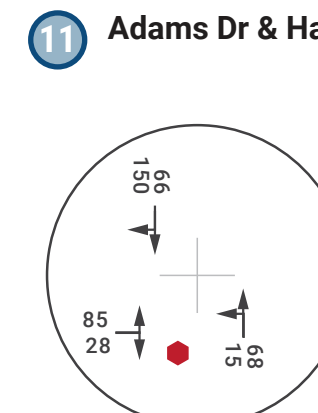
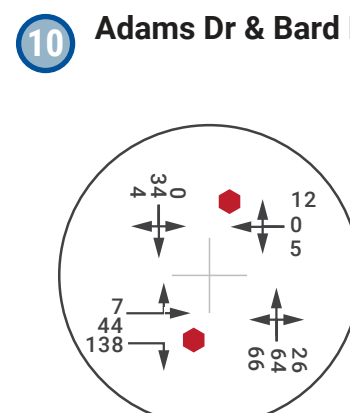
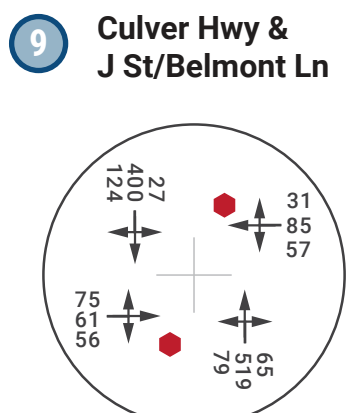
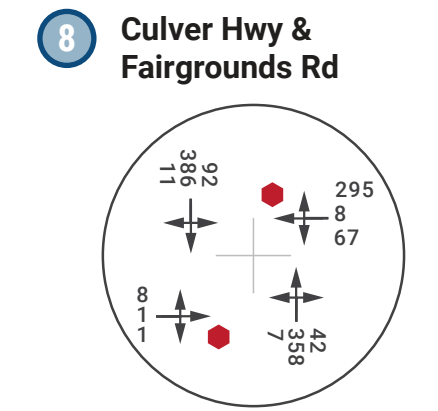
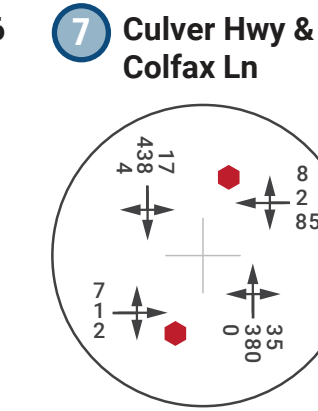
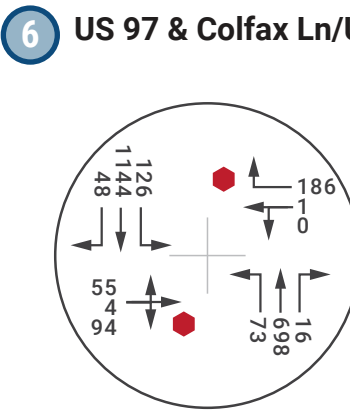
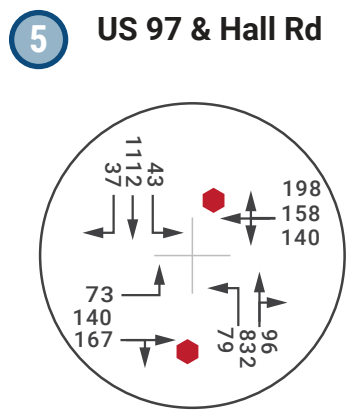
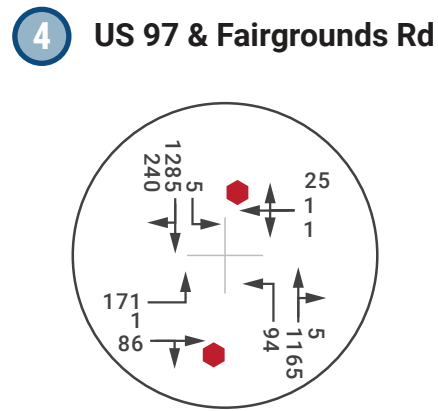
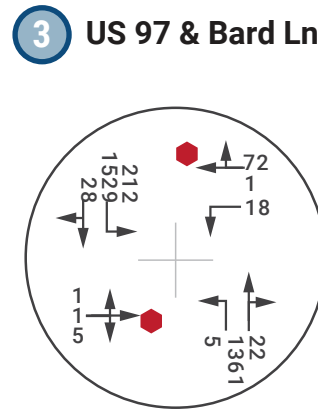
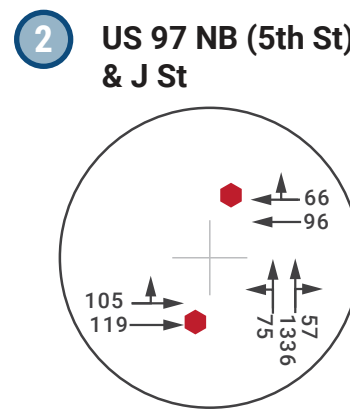
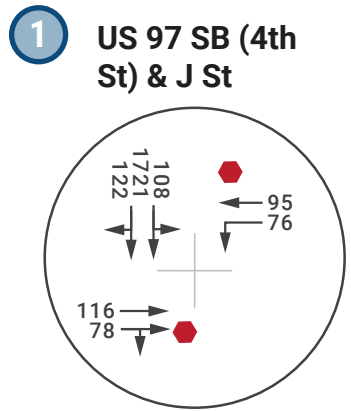
All US97 side street intersections exceed capacity in the future analysis, indicating that uncontrolled intersections at side streets are not sufficient for the future condition. This demonstrates a need for access points to facilitate left-turn and crossing movements onto the highway.

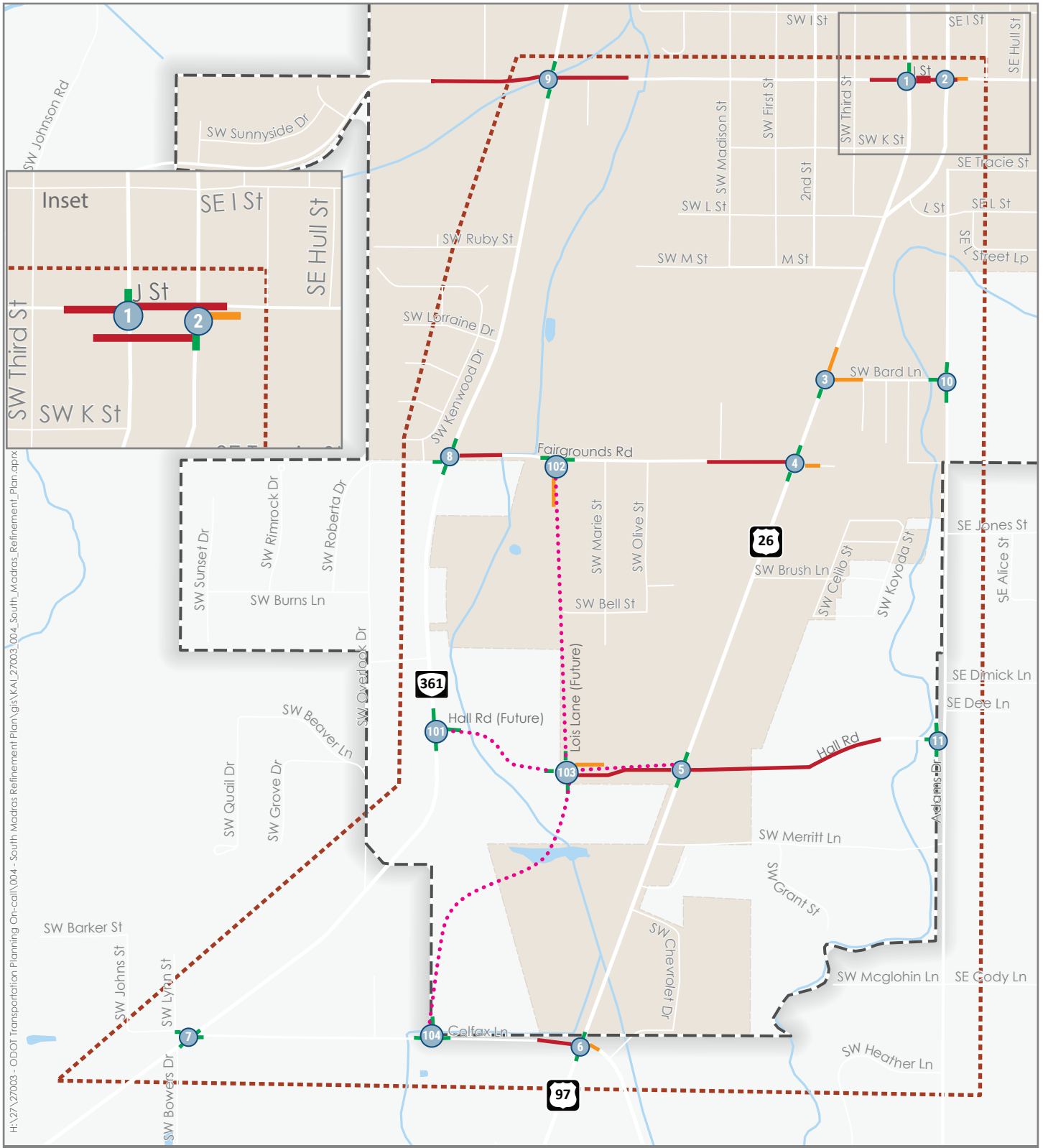


- # Study Intersections
- Study Boundary
- City Limits
- Planned Future Road



FIGURE 2





- # Study Intersections
- ≤50 Feet
- >50 & <200 Feet
- ≥200 Feet
- Planned Future Road



FIGURE 4

FUTURE MULTIMODAL FACILITIES

The prior section on Planned Improvements includes elements in the K21653 US97: Earl-Colfax project that improve multimodal facilities and crossings in the study area. These improvements are included in the 2045 no-build scenario as they are funded and currently in the design process.

GAPS AND DEFICIENCIES

The following section documents gaps and deficiencies in the future pedestrian and bicycle system. A gap is defined as a missing link in the network, such as an identified key walking or biking route is missing sidewalk or designated bicycle facility. A deficiency is defined as a pedestrian or bicycle facility that does not meet the standard or is insufficient to meet the users' needs.

PEDESTRIAN FACILITY GAPS AND DEFICIENCIES

The US97: Earl-Colfax project will fill in the majority of the pedestrian network gaps on US97 north of Fairground Road. It will improve the pedestrian level of stress (PLTS) in areas where there are currently no sidewalks from PLTS 4 to PLTS 1 or 2. All other pedestrian facilities or existing gaps are expected to remain into the future.

BICYCLE FACILITY GAPS AND DEFICIENCIES

As documented in the existing conditions analysis, most bicycle level of traffic stress (BLTS) scores in the study area are between 3 and 4, indicating that these facilities operate with moderate or high stress for people biking. These conditions are expected to remain into the future.

CRASH HISTORY

As documented in the existing conditions memorandum, the crash rate the following intersections exceed the critical crash rate:

- ▶ US97 NB (5th Street)/J Street
- ▶ US97/Bard Lane

These crash rates could potentially increase with the forecasted growth in traffic and increased side street access demand and congestion within the Madras community.

NO BUILD EVALUATION METRICS EVALUATION

The Goals & Objectives Memorandum for the South Madras Refinement Plan established goals, objectives, and evaluation criteria that provide a method for analyzing how project

alternatives promote or detract from the key project goals. The following evaluation uses those criteria to assess the 2045 no-build traffic conditions and transportation system within the City of Madras. Future alternatives will be compared against these results to determine if specific project elements (corridor alignments, intersection improvements, and highway transitions) help the community move towards achieving goals. Table 4 shows the results of this evaluation.

The following evaluation criteria rating have been used to score the 2045 no-build conditions:

Most Desirable: The concept addresses the criterion and/or makes substantial improvements in the criteria category. (+2)

Desirable: The concept addresses the criterion and/or makes improvements in the criteria category. (+1)

No Effect: The criterion does not apply to the concept or the concept has no influence on the criteria. (0)

Less Desirable: The concept does not support the intent of and/or negatively impacts the criteria category. (-1)

Table 4: Comparing the Goals, Objectives, & Evaluation Criteria to Future Conditions

Goal	Objective	Evaluation Criteria	Baseline Scenario	
			Meets?	Comment
		<ul style="list-style-type: none"> Does the project alternative improve traffic circulation within the study area? 	-1	<ul style="list-style-type: none"> No-build condition includes Hall Road extension but does not address east-west connection.
		<ul style="list-style-type: none"> Does the project alternative represent an investment that works toward the long-term solution for the corridor? 	0	<ul style="list-style-type: none"> No improvements are proposed as an investment in the long-term solution for the corridor.
		<ul style="list-style-type: none"> Does the project alternative address mobility and serviceability for local and regional freight activity? 	1	

Goal	Objective	Evaluation Criteria	Baseline Scenario	
			Meets?	Comment
		<ul style="list-style-type: none"> Does the project alternative support business activity in and around the study area? 	0	
Multimodal Users: Provide a multimodal transportation system that permits the safe and efficient transport of people and goods through active modes.		<ul style="list-style-type: none"> Does the proposed project alternative provide enhanced crossing opportunities for multimodal users? 	1	
		<ul style="list-style-type: none"> Is the proposed project alternative consistent with adopted plans? 	0	

SUMMARY OF FINDINGS

The assessment of the future no-build transportation system conditions and the transportation network identified the following:

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 - US97/Hall Road
 - Culver Highway/J Street
- ▶ Future segment volumes indicated that US97 would operate near capacity in the study area. However, as Madras continues to urbanize, highway throughput capacities will likely decrease due to the need to adequately service side street approaches and result in highway breakdowns. Other areas of Madras, as well as communities in Central Oregon, currently experience travel demand similar to what is forecast for the South Madras area. Long-term forecasted statewide freight and recreational demand on US97 both point to a need for increased segment capacity along the entire US97 mainline, including through the study area.

- ▶ Without improvements to roadways or intersections, the following conditions are expected to remain into the future no-build scenario.
- ▶ Bicycle facilities are provided in the study area through partial bike lanes on segments of US97, Hall Road, and J Street. A shared use path is provided on the north side of Fairgrounds Road. Segments on all roads in the study area except Fairgrounds Road either rely on shoulders for bicycle travel or do not have any shoulders, including:
 - US97 – 6' shoulders are provided between Colfax Lane and Hall Road
 - Culver Highway – 4' shoulders are provided between Colfax Lane and J Street
 - Colfax Lane – no shoulders or bicycle facilities are provided
 - Adams Drive – no shoulders or bicycle facilities are provided
 - Bard Lane – no shoulders or bicycle facilities are provided
 - Hall Road – 6' shoulders are provided east of US97
 - J Street – 10' combined shoulder/parking lane provided between Culver Highway and US97 SB
- ▶ Pedestrian Connectivity – Sidewalks are provided on one or both sides of roadways in the study area with the exception of the following:
 - US97 – disconnected sidewalks or no sidewalks are provided between Colfax Lane and Hall Road
 - Culver Highway – no sidewalks are provided. The nearest sidewalk is north of the study area at Madison Street.
 - Adams Drive – no sidewalks are provided except for the approximately 250-foot segment between Tracie Street and L Street on the north side of the study area
 - J Street – disconnected sidewalks or no sidewalks are provided between Culver Highway and US97 SB
- ▶ Vehicle speeds above the posted speed limit – particularly in areas farther away from the City core. The 85th percentile speed varies between 4 mph to 9 mph faster than the posted speed on US97 and between 3 to 5 mph faster than the posted speed on Culver Highway.
- ▶ Similar crash patterns. The increased volume on the system may increase the volume of crashes. The critical crash rates are exceeded at US97 NB/J Street and US97/Bard Lane in the existing condition; this is anticipated to remain into the future.

ATTACHMENTS

Attachment A

Household and Employment Growth

Industry Employment Projections, 2021-2031
Crook, Deschutes, and Jefferson Counties

	2021	2031	Change	% Change
Total employment	108,440	125,240	16,800	15%
Total payroll employment	101,790	118,100	16,310	16%
Total private	88,510	104,200	15,690	18%
Natural resources and mining	1,600	1,750	150	9%
Mining and logging	310	320	10	3%
Construction	8,500	10,190	1,690	20%
Manufacturing	7,620	8,740	1,120	15%
Durable goods	5,080	5,800	720	14%
Wood product manufacturing	1,870	2,030	160	9%
Nondurable goods	2,540	2,940	400	16%
Trade, transportation, and utilities	18,370	20,000	1,630	9%
Wholesale trade	2,770	3,050	280	10%
Retail trade	13,020	14,020	1,000	8%
Transportation, warehousing, and utilities	2,580	2,940	360	14%
Information	2,080	2,390	310	15%
Financial activities	5,860	6,240	380	6%
Professional and business services	10,950	13,100	2,150	20%
Private educational and health services	16,430	19,180	2,750	17%
Health care and social assistance	15,240	17,800	2,560	17%
Health care	12,470	14,600	2,130	17%
Leisure and hospitality	13,430	18,300	4,870	36%
Accommodation and food services	11,350	15,260	3,910	34%
Other services	3,670	4,310	640	17%
Government	13,280	13,900	620	5%
Federal government	1,380	1,400	20	1%
State government	1,380	1,450	70	5%
Local government	10,520	11,050	530	5%
Local education	4,440	4,520	80	2%
Self-employment	6,650	7,140	490	7%

Contact: Sarah Cunningham, Projections Economist, Sarah.E.Cunningham@employ.oregon.gov, (503) 871-0046
Oregon Employment Department, Workforce and Economic Research Division

Published: February 9, 2023

Coordinated Population Forecast



2022

Through

2072

**Jefferson
County**

Urban Growth

Boundaries (UGB)

& Area Outside UGBs

How to Read this Report

This report should be read with reference to the documents listed below, which are downloadable on the Forecast Program website (<https://www.pdx.edu/population-research/population-forecasts>).

- *Methods and Data for Developing Coordinated Population Forecasts*: Provides a detailed description and discussion of the forecast methods employed. This document also describes the assumptions that feed into these methods and determine the forecast output.
- *Forecast Tables*: Provides complete tables of population forecast numbers by county and all sub-areas within each county for each five-year interval of the forecast period (2022-2072).

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Cover Photo Credit: Gary Halvorson, July 2011.

[https://commons.wikimedia.org/wiki/File:Irrigation_Canal_\(Jefferson_County,_Oregon_scenic_images\)_\(_jefDB1619\).jpg](https://commons.wikimedia.org/wiki/File:Irrigation_Canal_(Jefferson_County,_Oregon_scenic_images)_(_jefDB1619).jpg)

**Coordinated Population Forecast for Jefferson County, its Urban
Growth Boundaries (UGB), and Area Outside UGBs**

2022 – 2072

Prepared by

Population Research Center

College of Urban and Public Affairs

Portland State University

June 30, 2022

This project is funded by the State of Oregon through the Department of Land Conservation and Development (DLCD). The contents of this document do not necessarily reflect the views or policies of the State of Oregon.

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1. Methodology

Counties were forecast using the cohort component method. Deaths and survival rates were projected based on historical trends (2000-2020) and based on the methodology published by Clark and Sharrow 2011¹. Mortality rates for the 85+ age group were further divided into 5-year age groups up to 100+ (i.e., 85-89, 90-94, 95-99, and 100+) using the proportion of each age group calculated from the single-year age group data in the 2010 decennial census. Age specific fertility rates were projected based on historical trends up to 2035 and held constant afterwards. The 2021 births data was not included in the projection model for two reasons: 1) the 2021 vital statistics were not finalized at the time of this report, and 2) due to uncertainties related to COVID-19 impacts on births and deaths, incorporating the 2021 births data into births and fertility rate projection may lead to errors such as underestimation. Nonetheless, the 2021 births and deaths numbers are included in Figures 3 and 4 to provide a more consistent visualization. Since the 2020 deaths data may be impacted by COVID-19, deaths were adjusted based on CDC's estimated excess deaths when forecasting future mortality rates to ensure these rates were not affected by short-term pandemic-related deaths.

Annual net migrants were calculated based on published data gathered from the IRS and the U.S. Census Bureau's American Community Survey (ACS) Public Use Microdata Sample (PUMS) and Population Estimates Program (PEP). Historical county level in-, out-, and net migration (domestic and foreign) were obtained from IRS and PEP (1991 – 2020). IRS provides domestic in- and out- while PEP provides domestic and foreign net. Age structures of gross migrants by direction (domestic in- and out- and foreign in-migration) were calculated for ACS Public Use Microdata Areas (PUMAs) which were used for migration to or from constituent counties. Future total net migrants were projected by applying an ARIMA model appropriate for each individual county.

The PRC estimate formed the baseline of the forecast for individual UGBs, with the difference in population between incorporated city and UGB boundaries estimated based on assignment of population in individual census blocks in each county into a UGB area and or city area, or balance of county. Populations in individual UGBs or in the balance of county were forecast by projections of individual components of the housing unit method of population estimation. Historical rates of population and housing unit change since 1990 were used to generate a weighted average annual rate of change. Jurisdiction-level vacancy rates and average household size were held constant from the 2020 decennial census. Population forecasts for sub-areas were then controlled by the county-level forecasts, e.g., sub-area populations were allocated using the county total (top-down approach), and the population summation of the sub-areas does not exceed the county population.

Forecast Program surveys were used to make adjustments to the baseline results for counties and UGB areas. Recent development and plans obtained from surveys were generally implemented in the first 5-10 years of the forecast, except where they indicate a change in long-run outlook. For the immediate period (2022-2030), the development rate derived from the surveys or received reports was applied before 2030. If no planned housing units were reported, recent development rate (2010-2020) or the overall county rate was used. For the later period (2030-2047), housing unit growth was based on either

¹ <https://csss.uw.edu/research/working-papers/contemporary-model-life-tables-developed-countries-application-model-based>

a weighted average or an extrapolation of historic trend (1990-2020). Assumptions were made for individual cities based on knowledge obtained from the general surveys, housing surveys, as well as documentations (e.g., housing needs assessment, comprehensive development plans) received from the cities.

Many uncertainties still remain in understanding the climate change impacts on migration. Thus, specific scenarios of climate change, political unrest, or other shocks were not reflected in the current forecast. The forecast program methodology is described in further detail in an accompanying report available on the Population Research Center's website.

2. County Overview

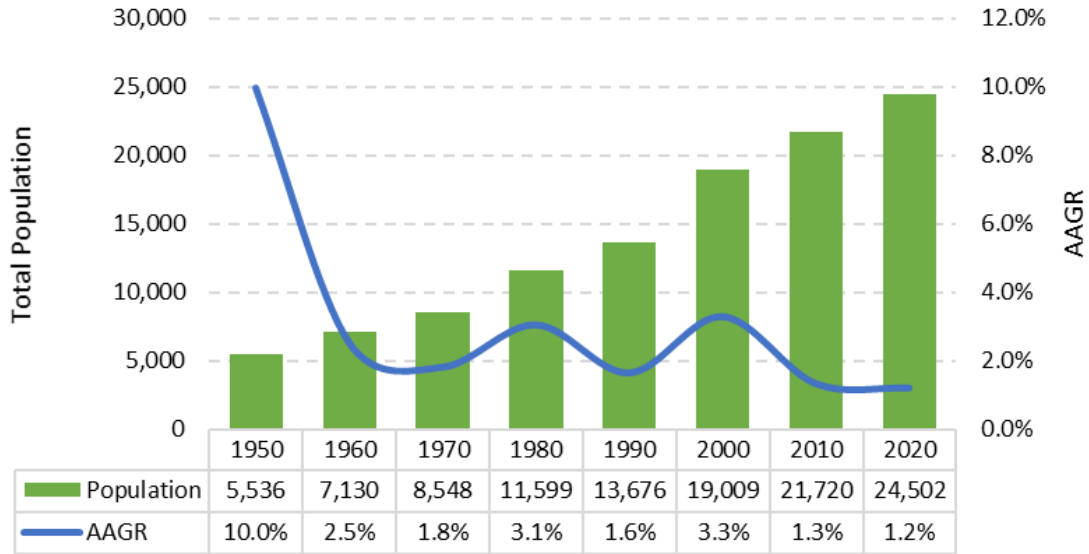
According to the 2020 census, Jefferson County has a population of 24,502. Its county seat, Madras city, has 7,456 people as recorded by the 2020 census. Jefferson County's population has maintained a population AAGR of at least 1% in the last eight censuses. Most recently, the county has an AAGR of 1.2% between the 2010 and 2020 censuses. The county population is projected to continue to grow at AAGRs between 0.7% and 0.8% for the next 50 years. Madras is the county's most populated city and absorbs many people seeking lower housing prices and living expenses. Based on the general survey responses received from Madras, the city has multiple housing projects completed in the past several years and plans to add more construction projects to accommodate people moving from cities with higher housing prices, for instance, Bend and Redmond. Culver city also suggested potential growth with several housing development projects under review.

3. Historical Trend and Population Forecast

3.1 County Population

As illustrated in the Figure 1, Jefferson County experienced a peak growth in the 1950 census in which the AAGR reached 10%. Growth rate has declined since the 1950s but still remain above 1.0% in the past seven decennial censuses. Both the 1980 and 2000 censuses indicated an AAGR of over 3.0%. The 2020 census recorded a county population of 24,502, which indicates a 29% growth from the 2000 census. During the forecast period, the county population is projected to have an AAGR between 0.7% and 0.8%. The county's population is projected to have a slightly higher AAGR in the second half of the 50-year forecast time horizon, which may be associated with future shifts in age structure and changes in components such as the number of births.

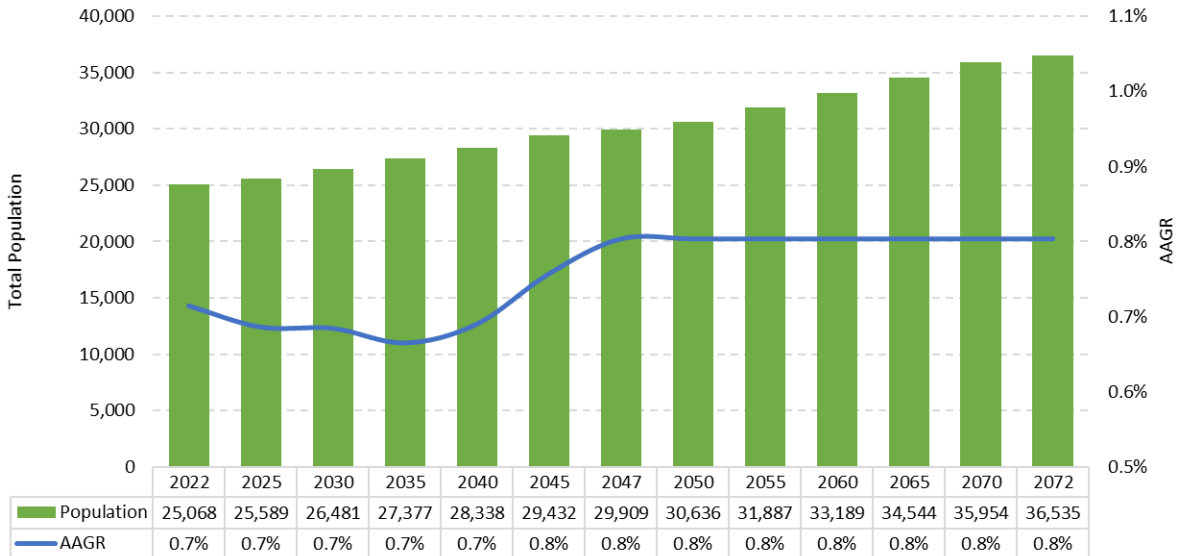
Historical Census Population



Sources: US Census Bureau, 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020 Decennial Census.

Figure 1. Historical total county population and AAGR, 1950-2020.

Population Forecast by year (2022-2072)



Sources: Forecasted by Population Research Center (PRC).

Figure 2. Forecasted total county population and AAGR, 2022-2072.

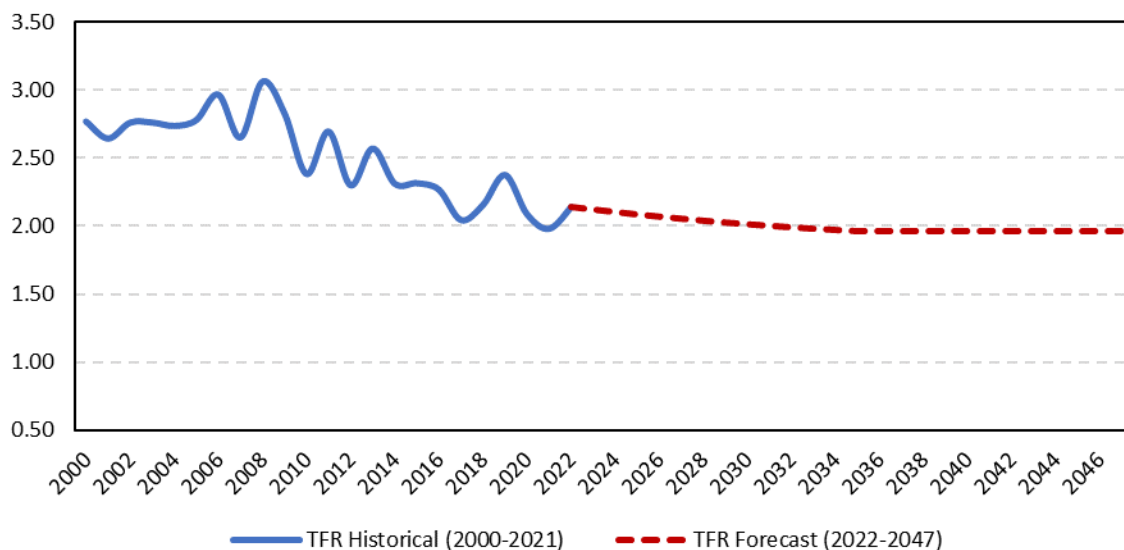
3.2 Births and Deaths

The total fertility rate (TFR) is shown in Figure 3. Jefferson County’s TFR has declined from a high point of 3.1 in 2008 to 2.1 in 2020. Compared to Oregon state, which experienced a TFR drop from 1.7 to 1.4 between 2014 and 2020, Jefferson County’s TFR has been higher than the state average. According to the preliminary 2021 births data, the county’s TFR dropped to 2.0, but it is uncertain whether this drop is associated with COVID-19 or if it was a continuation of the historic pattern of varying TFR shown in the past 20 years. The TFR projection used data up to 2020 and was not significantly affected by any COVID-19. The county TFR is projected to be around 2.0 throughout the forecast.

The actual number of births can follow a different trend than TFR if there are unusually high or low numbers of women of childbearing age in a given year. Figure 4 includes historical and projected births (and deaths) in the county. Annual births in the county has outnumbered annual deaths for most of the past two decades, except in 2020, which may be related to excess deaths associated with COVID-19. Annual births are projected to gradually increase over time, reaching 365 by 2047. Compared to 277 projected in 2022, this is an increase of 78 annual births.

In comparison, annual deaths are projected to grow in a pattern similar to that of births. The sudden increase in deaths shown in the 2021 OHA preliminary data may mainly be associated with excess deaths related to COVID-19. The impacts of COVID-19 was considered to be short-term in our forecast and the county annual deaths are expected to return to continue the pre-pandemic trend. Annual deaths are projected to outnumber annual births around 2030 as the older population increases. Toward the end of the first 25 years of the 50-year forecast time horizon, annual deaths appear to show signs of slower growth. These dynamics are due to aging in the population, with the aging of the large baby boom cohort accounting for most of the increases in death counts during 2020-2040.

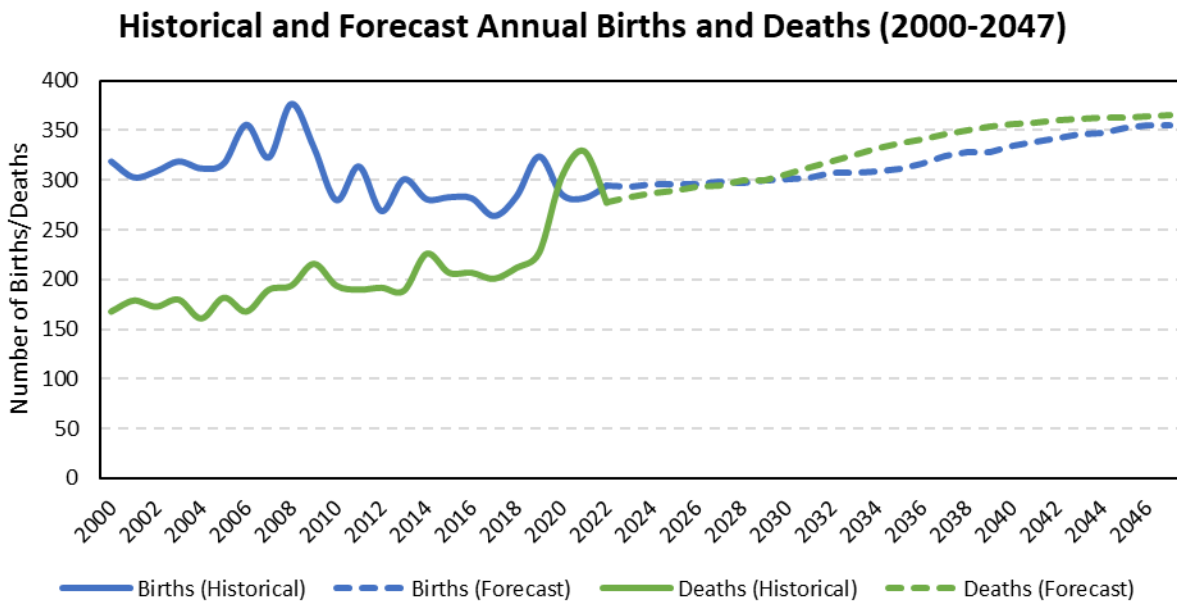
Total Fertility Rate (TFR) for Women Age 15-44



Note: OHA’s vital statistics for 2021 are preliminary at the time of this report.

Sources: Oregon Health Authority (OHA), Center for Health Statistics. Calculations and forecast by Population Research Center (PRC).

Figure 3. Historical and projected total fertility rate (TFR), 2000-2047.



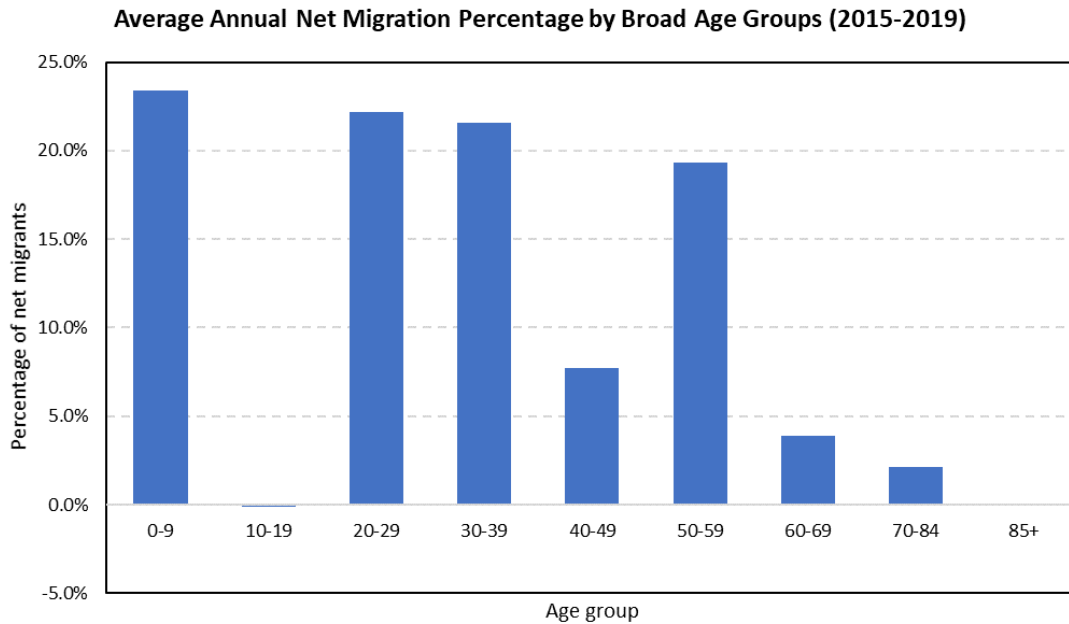
Note: OHA's vital statistics for 2021 are preliminary at the time of this report.

Sources: Oregon Health Authority (OHA), Center for Health Statistics. Calculations and forecast by Population Research Center (PRC).

Figure 4. Historical and projected annual births/deaths trend, 2000-2047.

3.3 Migration

Age-specific migration was estimated based on the 2006-2010, 2011-2015, and 2015-2019 5-year ACS. The age patterns were used from the ACS but controlled to the number of total migrants by direction (in or out) and domestic (inter-state or between counties in Oregon) or foreign. The overall net migrants for each county were adjusted for consistency with annual PRC population estimates. Figure 5 illustrates the percentage each 10-year age group accounts for among total county net migration calculated based on the 2015-2019 ACS migration flow. Most age groups account for a positive share of net migration in the county, with the exception of the 10-19 and 85+ age groups. Many factors can impact the age-specific migration rates. For instance, college-age population may leave the county for education while population in the 20-39 age groups may move to the county with children. Older age groups are less likely to move in or out of the county.

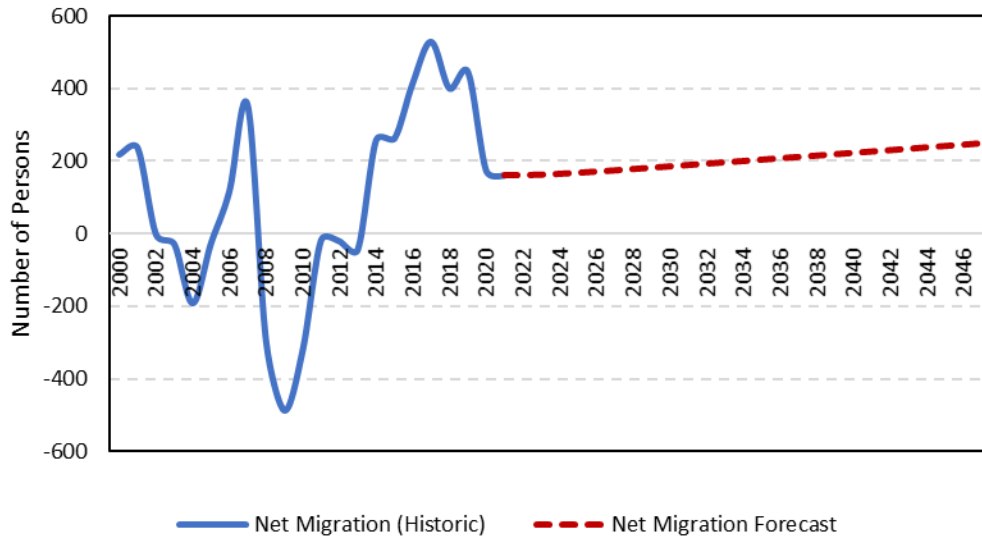


Sources: American Community Survey (ACS); Internal Revenue Services (IRS); US Census Bureau Population Estimated Program (PEP); Calculated by Population Research Center (PRC).

Figure 5. Percentage of net migrations by broad age groups in Jefferson County, 2015-2019.

As shown in Figure 6, the historic annual net migration in Jefferson County varied significantly between 2000 and 2020. County-wide net migration experienced some downturns in the late 2000s and early 2010s, which may be associated with the impacts of the economic recession during that period. The county experienced the highest number of net migrations in 2017, in which the annual net migration reached over 500. Annual net migration is projected to remain in the mid-range compared to historic data and gradually increase over time.

Annual Net Migration (2000-2047)

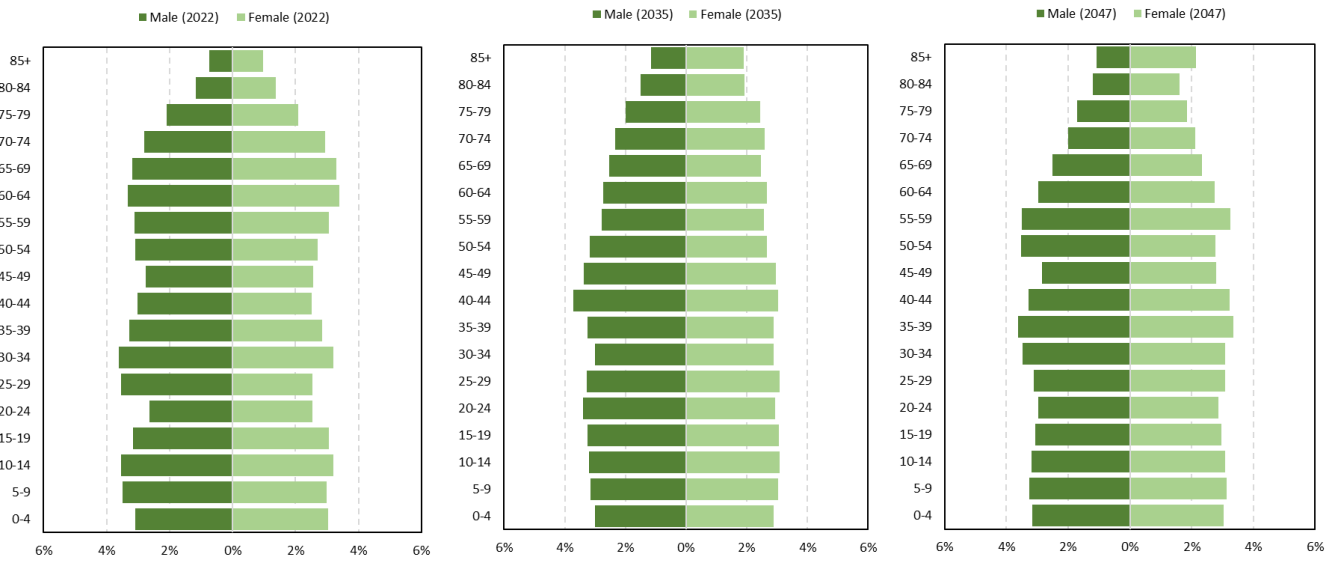
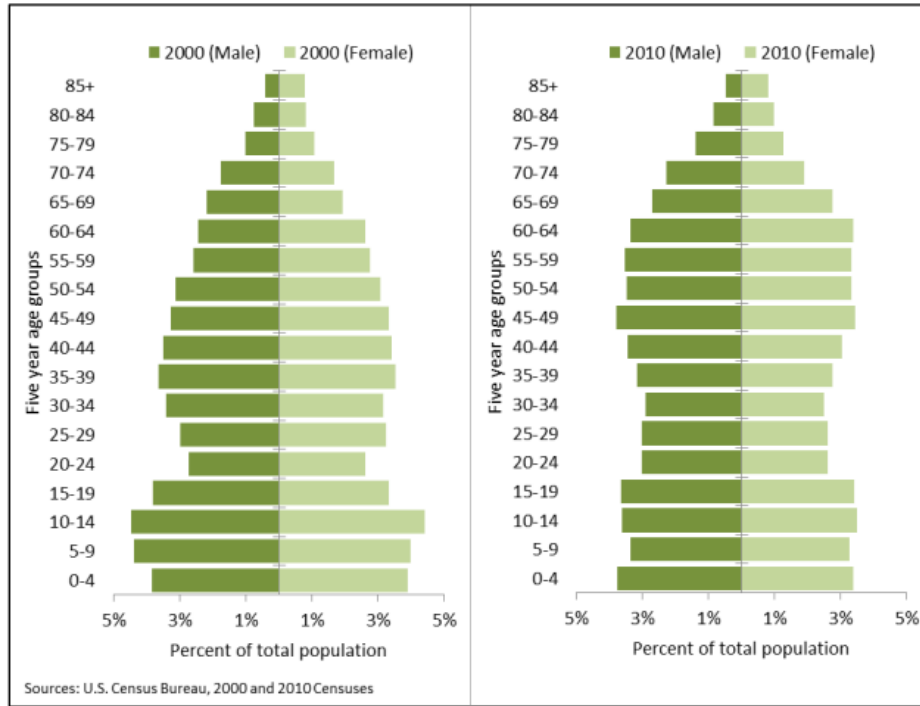


Sources: Internal Revenue Service (IRS) Tax Stats (1990-2020); American Community Survey (ACS); Population Estimates Program (PEP) 1990-2020. Calculations and forecast by Population Research Center (PRC).

Figure 6. Historical and projected total county net migration, 2000-2047.

3.4 Age Structure

As shown in Figure 7, the 2000 and 2010 censuses showed the population aging forward in the 10-year period. Population aged 5-14 accounted for the largest share of population in the 2000 census, which reflected the relatively higher county TFR compared to the state average. In the 2010 census, the share of the 5-14 age group declined along with the 30-44 age group. Among adults, the 45-49 age group accounted for the largest share of population in 2010, which is the 35-39 population aging forward from the 2000 census. In 2022, the share of the 25-34 age group increased compared to the 2010 census, which indicates a possible higher in-migration for that age group. Older age groups also increased their share as the population continued to age forward from 2010. The age pyramids for 2035 and 2047 indicates a shift in age structure as the population share for the middle age groups increase. The county is projected to have more younger populations over time as births number is projected to increase, as indicated in Figure 4.



Sources: Calculations and forecast by Population Research Center (PRC).

Figure 7. Population structure by age and sex, historical (2000 and 2010) and forecast (2022, 2035, and 2047).

3.5 Race/Ethnicity

Table 1 shows the race/ethnicity characteristics in the county from the 2010 and 2020 censuses. Race/ethnicity was not included as a component in the current forecast model but is provided in this report for reference. Population identified as “two or more races” has the most relative gain compared to other race/ethnicity groups, followed by population of some other races alone. Among non-Hispanic and non-White alone populations, population identified as “Native Hawaiian and Other Pacific Islander alone” in the 2020 census experienced the highest percent loss. Hispanic or Latino remains as the largest non-white alone population in the county.

Table 1. County population by race/ethnicity.

Hispanic or Latino and Race	2010		2020		Absolute Change	Relative Change
Total Population	21,720		24,502		2,782	12.8%
Hispanic or Latino (of any race)	4,195	19.3%	5,002	20.4%	807	19.2%
Not Hispanic or Latino	17,525	80.7%	19,500	79.6%	1,975	11.3%
White alone	13,429	61.8%	15,005	61.2%	1,576	11.7%
Black or African American alone	117	0.5%	134	0.5%	17	14.5%
American Indian and Alaska Native alone	3,360	15.5%	2,981	12.2%	-379	-11.3%
Asian alone	83	0.4%	131	0.5%	48	57.8%
Native Hawaiian and Other Pacific Islander alone	23	0.1%	18	0.1%	-5	-21.7%
Some Other Race alone	34	0.2%	66	0.3%	32	94.1%
Two or More Races	479	2.2%	1,165	4.8%	686	143.2%

Sources: US Census Bureau, 2010 and 2020 Decennial Census. Calculated by PRC.

3.6 Component of Change

The component of population changes up to 2072 is shown in Figure 8. The darker blue shade indicates the natural increase/decrease, while the lighter blue shade indicates the net migration. At the county level, natural decrease is expected to occur as annual deaths outnumber annual births around 2030. Natural decrease is projected to continue afterwards for the rest of the forecast period. In the meantime, positive net migration is projected to continue and gradually increase over time, which promotes population growth in the forecast. Higher positive migration shown in 2020 reflects an average calculated from the 2016-2020 data, however, net migration is not projected to maintain the same level throughout the forecast period, which is why lower net migration is shown after 2020.

Components of Population Change by 5-year Intervals (2015-2072)

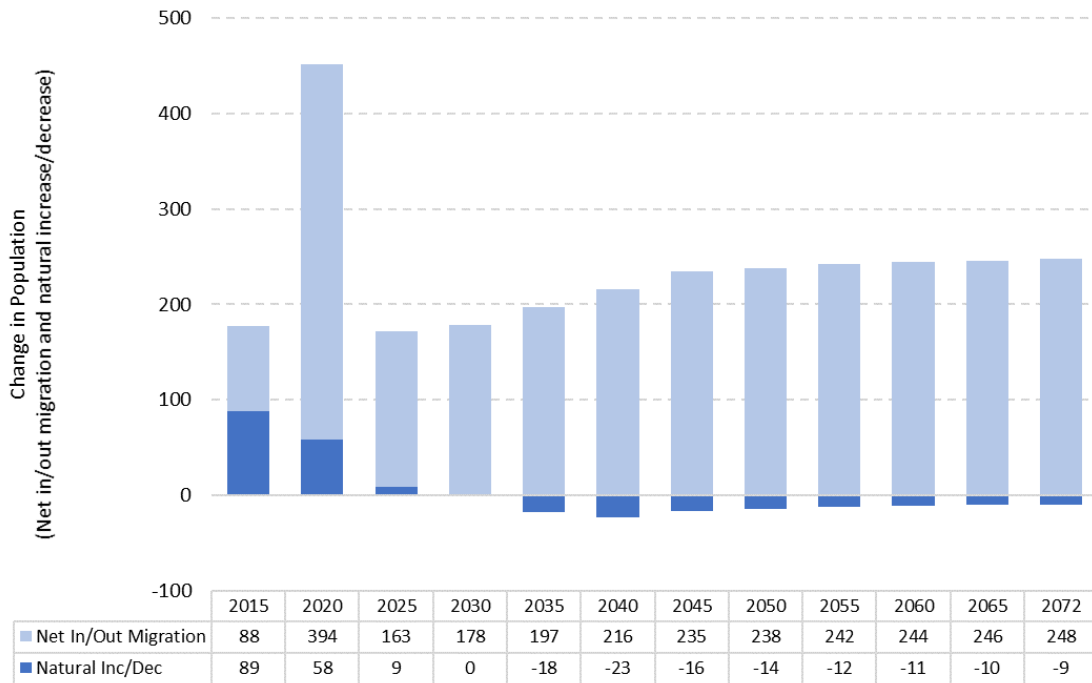


Figure 8. Historical and forecast components of population change, 2015-2072.

3.7 Sub-Area Population

Sub-area populations within and outside the urban growth boundaries (UGBs) are forecasted using the housing unit method, and then adjusted to be consistent with the county level forecast. As shown in Table 2, Jefferson County has three UGBs, Culver, Madras, and Metolius. Among all UGBs, Madras has the largest population, followed by the Culver UGB. The 2010 and 2020 censuses showed that the smallest UGB, Metolius, experienced the highest AAGR in the 2010s. Other sub-areas, including the area outside of UGBs, have also experienced at least 1.0% AAGR between 2010 and 2020. As the largest UGB in the county, Madras is projected to maintain an AAGR similar to the 2010-2020 rate throughout the forecast period. In comparison, population outside of UGBs is expected to grow at a slower rate in the next 50 years.

Table 2. Historical and forecasted population and AAGR in Jefferson County and its sub-areas.

	Historical			Forecast				
	2010	2020	AAGR (2010-2020)	2022	2047	2072	AAGR (2022-2047)	AAGR (2047-2072)
Jefferson County	21,720	24,502	1.2%	25,068	29,909	36,535	0.7%	0.8%
Culver	1,361	1,602	1.6%	1,664	2,128	2,632	1.0%	0.9%
Madras	7,000	7,964	1.3%	9,069	12,776	17,150	1.4%	1.2%
Metolius	732	1,015	3.3%	1,050	1,498	2,090	1.4%	1.3%
Outside UGBs	12,627	13,921	1.0%	13,284	13,506	14,662	0.1%	0.3%

Sources: U.S. Census Bureau; Forecast by Population Research Center (PRC)

3.7.1 UGBs Shares

As shown in Table 3, the Madras UGB continues to account for most of the population shares among all UGBs, reaching 46.9% of the county population by 2072. The two smaller UGBs, Culver and Metolius, are also projected to increase their population share over time, especially Metolius, which increases its share by 1.5 percent points between 2022 and 2072. Toward the end of the forecast period, the Madras UGB is expected to replace non-UGB area as the most populated sub-area in the county. The larger population shares projected for the UGBs imply that more people are likely to move to the cities from rural areas.

Table 3. Population forecast for larger sub-areas and their shares of county population.

	Population			Share of County Population		
	2022	2047	2072	2022	2047	2072
Jefferson County	25,068	29,909	36,535			
Culver	1,664	2,128	2,632	6.6%	7.1%	7.2%
Madras	9,069	12,776	17,150	36.2%	42.7%	46.9%
Metolius	1,050	1,498	2,090	4.2%	5.0%	5.7%
Outside UGBs	13,284	13,506	14,662	53.0%	45.2%	40.1%

Sources: Forecast by Population Research Center (PRC)

4. Glossary of Key Terms

Average Annual Growth Rate (AAGR): The average rate of growth over a specific period of time. The AAGR is calculated using natural logarithm of the end-year value and the starting-year value, divided by the number of years.

Cohort-Component Method: A method used to forecast future populations based on a baseline or starting population, and cumulative changes in births, deaths, and migration.

Coordinated population forecast: A population forecast prepared for the county and sub-county jurisdictions including urban growth boundary (UGB) areas and all non-UGB area in the balance of county.

Group quarters: The US Census Bureau defines group quarters as places where “people live or stay in a group living arrangement that is owned or managed by an organization providing housing and/or services for the residents”. Examples of a group quarter may include college dorms, skilled nursing facilities, groups homes, prison, etc.

Housing unit: A house, apartment, mobile home or trailer, group of rooms, or single room that is occupied or is intended for occupancy.

Housing-Unit Method: A method used to estimate current populations or forecast future populations based on changes in housing units, vacancy rates, the average numbers of persons per household (PPH), and group quarters population counts.

Persons per household (PPH): The average household size (i.e., the average number of persons per occupied housing unit).

Total Fertility Rate (TFR): The number of children a woman would have by the end of a defined childbearing age. In this report, child-bearing age is from 15 to 44.

5. Appendix A: General Survey for Oregon Forecast Program

Each year, the jurisdictions in the region that is to be forecast is surveyed. The following are transcripts of what was received from jurisdictions who responded to the OPFP survey.

County	Jefferson
Date Time	11.05.21
Jurisdiction	City of Culver
Name and Title	Donna McCormack, City Recorder/Manager
Observations about Population (e.g. birth rates, aging, immigration, racial and ethnic change)	We have a near zero vacancy rate. Any current vacancy is a result of one renter leaving and another preparing to move in.
Observations about Housing (Vacancy rates, seasonal occupancy, demolitions, renovations)	A 159 lot subdivision has been submitted and is in the review process. They are proposing single family homes.
Planned Housing Developments or Group Quarters Facilities (including number of units, occupancy, and estimated year of completion)	No significant changes have been obvious.
Economic Development (e.g. new employers or facilities, including number of jobs and est. year of completion)	No significant differences, the businesses are operating and we have no vacant store fronts.
Infrastructure Projects (e.g. transportation and utilities)	There are ongoing projects with the majority currently focusing on street repairs and park improvements.
Other Factors Promoting Population or Housing Growth	Culver is a "bedroom" community reflecting the growth of all of Central Oregon.
Other Factors Hindering Population or Housing Growth	None I am aware of.
8a. Summary of current or proposed policies affection growth in your jurisdiction.	
8b. Findings related to growth or population change from studies conducted in you jurisdiction.	
8c. The effects of wildfires or other disasters in your jurisdiction on	None, the wildfires created smoke but no direct impact to the city.

housing, employment/economics, and infrastructure.	
8d. The effects of the COVID-19 pandemic and policy measure on employment and current and planned developments.	Again, no direct impact to the community was noted.
9. For representatives from counties only: we invite you to provide tax lot data if available. These may be sent via email to askprc@pdx.edu	
Comments?	

County	Jefferson
Date Time	11.29.21
Jurisdiction	City of Madras
Name and Title	Nicholas Snead, Community Development Director
Observations about Population (e.g. birth rates, aging, immigration, racial and ethnic change)	There is a very low vacancy rate. There is a housing shortage. New housing units are being constructed. Monthly lease rates are increasing as a result of the shortage.
Observations about Housing (Vacancy rates, seasonal occupancy, demolitions, renovations)	GIS shapefile will be provide with this information.
Planned Housing Developments or Group Quarters Facilities (including number of units, occupancy, and estimated year of completion)	I have no basis for such observations other than the 2020 Census.
Economic Development (e.g. new employers or facilities, including number of jobs and est. year of completion)	Erickson Aero Tanker (existing business) is looking to hire 12 new people, Daimler Trucks North America is making significant facility improvements which will result in additional truck testing and thereby 5-10 additional employees.
Infrastructure Projects (e.g. transportation and utilities)	3 very large City sewer projects are being designed and constructed to accommodate the Sun Ridge, Park Place, Juniper Crossings, and Willow Heights residential developments.
Other Factors Promoting Population or Housing Growth	The City has enacted: 1) SDC reductions for housing; 2) a TIF Housing Urban Renewal District for key residential lands; 3) made significant Development Code changes to accommodate needed housing.
Other Factors Hindering Population or Housing Growth	
8a. Summary of current or proposed policies affection growth in your jurisdiction.	
8b. Findings related to growth or population change from studies conducted in you jurisdiction.	
8c. The effects of wildfires or other disasters in your jurisdiction on	

<p>housing, employment/economics, and infrastructure.</p>	
<p>8d. The effects of the COVID-19 pandemic and policy measure on employment and current and planned developments.</p>	<p>1) people fleeing urban areas to live in areas with a higher quality of life (Madras has a urban/rural lifestyle); 2) Retirees! They are a budget conscious group. Most want to retire in a desirable place, that is cost-effective, and near family and medical. Madras has that. Housing costs here are low relatively to larger markets in Bend, Redmond, and Portland.</p>
<p>9. For representatives from counties only: we invite you to provide tax lot data if available. These may be sent via email to askprc@pdx.edu</p>	
<p>Comments?</p>	

County	Jefferson
Date Time	11.22.21
Jurisdiction	Jefferson County
Name and Title	County Administrative Officer
Observations about Population (e.g. birth rates, aging, immigration, racial and ethnic change)	
Observations about Housing (Vacancy rates, seasonal occupancy, demolitions, renovations)	
Planned Housing Developments or Group Quarters Facilities (including number of units, occupancy, and estimated year of completion)	Census Block 9400 (Warm Springs) indicates a 500 person drop. Seems that would be impossible. (about 3,100 to 2,600??)
Economic Development (e.g. new employers or facilities, including number of jobs and est. year of completion)	
Infrastructure Projects (e.g. transportation and utilities)	
Other Factors Promoting Population or Housing Growth	City of Madras' Housing Urban Renewal District (HURD)
Other Factors Hindering Population or Housing Growth	
8a. Summary of current or proposed policies affection growth in your jurisdiction.	
8b. Findings related to growth or population change from studies conducted in you jurisdiction.	
8c. The effects of wildfires or other disasters in your jurisdiction on housing, employment/economics, and infrastructure.	

<p>8d. The effects of the COVID-19 pandemic and policy measure on employment and current and planned developments.</p>	<p>More relocation into county from larger jurisdictions to remote work.</p>
<p>9. For representatives from counties only: we invite you to provide tax lot data if available. These may be sent via email to askprc@pdx.edu</p>	
<p>Comments?</p>	

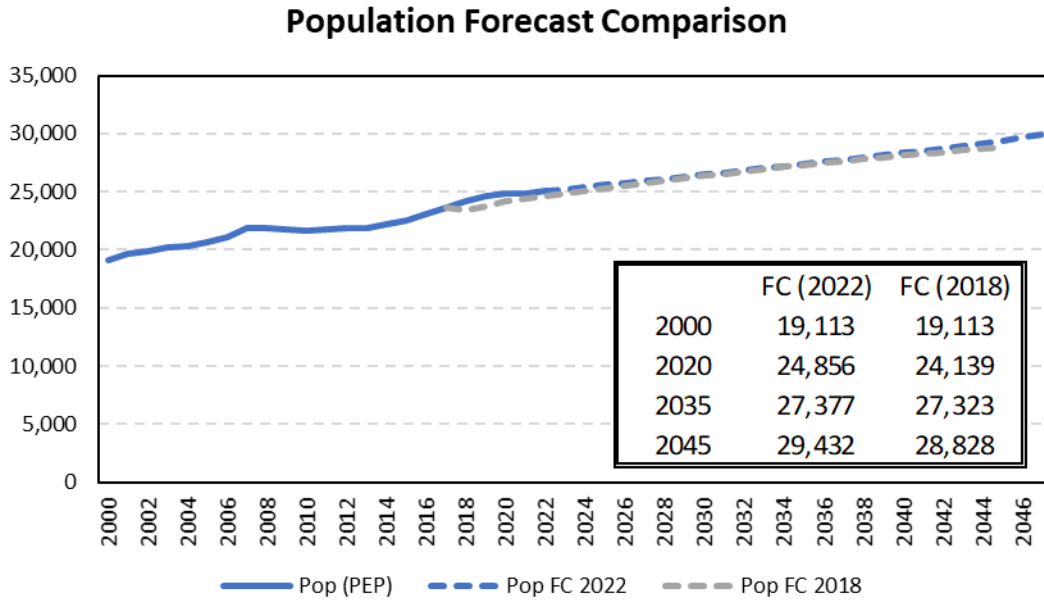
6. Appendix B: Detail Population Forecast Results

Age	2021	2022	2025	2030	2035	2040	2045	2047
0-4	1,527	1,532	1,528	1,552	1,602	1,700	1,803	1,835
5-9	1,639	1,622	1,640	1,641	1,676	1,738	1,848	1,896
10-14	1,646	1,688	1,723	1,702	1,709	1,751	1,819	1,859
15-19	1,516	1,559	1,636	1,732	1,713	1,722	1,765	1,791
20-24	1,325	1,294	1,395	1,629	1,725	1,706	1,715	1,729
25-29	1,545	1,524	1,447	1,488	1,731	1,838	1,831	1,836
30-34	1,656	1,708	1,708	1,553	1,606	1,861	1,979	1,948
35-39	1,524	1,537	1,678	1,807	1,664	1,727	1,992	2,066
40-44	1,344	1,388	1,507	1,705	1,837	1,699	1,767	1,936
45-49	1,362	1,336	1,325	1,525	1,725	1,859	1,726	1,674
50-54	1,429	1,449	1,445	1,391	1,597	1,804	1,944	1,871
55-59	1,594	1,550	1,473	1,506	1,465	1,676	1,888	2,015
60-64	1,701	1,684	1,585	1,446	1,483	1,446	1,652	1,713
65-69	1,620	1,630	1,603	1,509	1,383	1,420	1,387	1,466
70-74	1,464	1,444	1,456	1,455	1,374	1,260	1,293	1,260
75-79	974	1,052	1,199	1,240	1,247	1,177	1,079	1,103
80-84	617	639	725	927	968	976	922	886
85+	406	432	513	673	870	978	1,021	1,025

Source: PRC Estimates, 2021; Forecast by Population Research Center (PRC).

7. Appendix C: Comparison of Current and Previous Forecast

To provide a better understanding of the changes since the last round of forecast for the Region 1 counties, this section compares the current 2022 total county population forecast to the population forecast published by the Population Research Center in 2018.



Attachment B

Total Trips by TAZ

TAZ	Total		
	Total	In	Out
1	263	99	164
2	342	128	214
3	294	110	184
4	294	110	184
5	271	109	162
6	32	20	12
7	158	64	94
8	116	71	45
9	278	105	173
10	215	82	133
11	437	163	274
Total	2,700	1,061	1,639

Attachment C

TAZ Information

ACRES

TAZ	GL Ind	WareHs	Office	Shopping Ctr	Hotel	Inst		LI	COM
1	1.125	0.75	0.75	0.75	0.1875	0.1875	50% LI, 50% Commercial	0.5	0.5
2	1.5	1.00	1	1	0.25	0.25	50% LI, 50% Commercial	0.5	0.5
3	1.275	0.85	0.85	0.85	0.2125	0.2125	50% LI, 50% Commercial	0.5	0.5
4	1.275	0.85	0.85	0.85	0.2125	0.2125	50% LI, 50% Commercial	0.5	0.5
5	0.33	0.22	0.88	0.88	0.22	0.22	80% Commercial, 20% LI	0.2	0.8
6							100% Residential		
7	0.18	0.12	0.48	0.48	0.12	0.12	80% Commercial, 20% LI	0.2	0.8
8							100% Residential		
9	1.2	0.80	0.8	0.8	0.2	0.2	50% LI, 50% Commercial	0.5	0.5
10	0.9	0.60	0.6	0.6	0.15	0.15	50% LI, 50% Commercial	0.5	0.5
11	1.95	1.30	1.3	1.3	0.325	0.325	50% LI, 50% Commercial	0.5	0.5
TOTAL	9.735	6.49	7.51	7.51	1.8775	1.8775			

35

Industrial	%s	Gen Light	60%
		Warehousing	40%
Commercial	%s	Office	40%
		Shopping Ctr	40%
		Hotel	10%
		Institutional	10%

0.25 assumed FAR

TAZ	NEW SFD Ac	NEW SFA Ac	NEW MF Ac
1			
2			
3			
4			
5			
6	3.6	2.1	0.3
7			
8	13.05	7.6125	1.0875
9			
10			
11			
TOTAL	16.65	9.7125	1.3875

assumed FAR 0.25

Attachment D

Future 2045 Traffic Conditions Worksheets

Intersection Level Of Service Report

Intersection 1: US97 SB/J St

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 795.1
 Level Of Service: F
 Volume to Capacity (v/c): 2.323

Intersection Setup

Name	Northbound			US97 SB			J St			J St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration				⇌			⇌			⇌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	200.00	100.00	100.00	200.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	1000.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			25.00			30.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			No			Yes		

Volumes

Name	Northbound			US97 SB			J St			J St		
Base Volume Input [veh/h]	0	0	0	108	1185	122	0	116	71	76	95	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	1.00	7.00	2.00	2.00	2.00	33.00	6.00	3.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	536	0	0	125	7	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	-125	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	108	1721	122	0	116	78	76	95	0
Peak Hour Factor	0.8500	0.8500	0.8500	0.9500	0.9500	0.9500	1.0000	0.9000	0.9000	0.9000	0.9000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	28	453	32	0	32	22	21	26	0
Total Analysis Volume [veh/h]	0	0	0	114	1812	128	0	129	87	84	106	0
Pedestrian Volume [ped/h]	0			3			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00	0.00	2.54	0.43	0.00	2.32	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	605.09	96.54	5.13	795.10	0.00
Movement LOS				A	A	A		F	F	A	F	
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.05	5.23	0.01	11.12	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	201.36	130.73	0.23	278.01	0.00
d_A, Approach Delay [s/veh]	0.00			0.00			400.26			445.85		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	69.58											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: US97 NB / J St

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 10,000.0
 Level Of Service: F
 Volume to Capacity (v/c): 25.502

Intersection Setup

Name	Northbound			Southbound			J St Eastbound			J St Westbound		
Approach												
Lane Configuration	↑↑						↑↑			↑↑		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00
Speed [mph]	30.00			30.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Northbound			Southbound			J St Eastbound			J St Westbound		
Base Volume Input [veh/h]	75	831	57	0	0	0	105	119	0	0	96	66
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	9.00	11.00	0.00	2.00	2.00	2.00	0.00	2.00	2.00	2.00	1.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	505	0	0	0	0	125	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	-125	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	75	1336	57	0	0	0	105	119	0	0	96	66
Peak Hour Factor	0.9500	0.9500	0.9500	1.0000	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	352	15	0	0	0	29	32	0	0	26	18
Total Analysis Volume [veh/h]	79	1406	60	0	0	0	114	129	0	0	104	72
Pedestrian Volume [ped/h]	0			2			0			1		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.00	0.00	0.00	25.50	1.28	0.00	0.00	0.98	0.20
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	0.00	10000.	10000.	0.00	0.00	107.17	22.50
Movement LOS	A	A	A				F	F			F	C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	17.24	12.69	0.00	0.00	3.10	1.50
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	430.92	317.22	0.00	0.00	77.54	37.60
d_A, Approach Delay [s/veh]	0.00			0.00			10000.00			72.53		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	1243.77											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 3: US97/Bard Ln

Control Type: Two-way stop
Analysis Method: HCM 7th Edition
Analysis Period: 15 minutes

Delay (sec / veh): 3,885.6
Level Of Service: F
Volume to Capacity (v/c): 0.946

Intersection Setup

Name	US97								Bard Ln			
Approach	Northbound				Southbound				Westbound			
Lane Configuration												
Turning Movement	Left	Thru	Thru	Right	Left2	Left	Thru	Right	Left	Right	Right	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	0	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00				30.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name	US97								Bard Ln			
Base Volume Input [veh/h]	5	0	910	12	0	45	1153	28	6	0	0	18
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	25.00	2.00	0.00	0.00	0.00	3.00	7.00	13.00	0.00	2.00	2.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	451	10	0	167	376	0	12	0	0	54
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	1361	22	0	212	1529	28	18	0	0	72
Peak Hour Factor	0.9500	1.0000	0.9500	0.9500	1.0000	0.9500	0.9500	0.9500	0.9000	1.0000	1.0000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	358	6	0	56	402	7	5	0	0	20
Total Analysis Volume [veh/h]	5	0	1433	23	0	223	1609	29	20	0	0	80
Pedestrian Volume [ped/h]	1				0				5			

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			Yes
Number of Storage Spaces in Median	0	0	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.00	0.00	0.49	0.02	0.00	1.45	0.00	0.00	0.29
d_M, Delay for Movement [s/veh]	15.79	0.00	0.00	0.00	0.00	20.14	0.00	0.00	792.02	0.00	0.00	23.20
Movement LOS	C		A	A		C	A	A	F			C
95th-Percentile Queue Length [veh/ln]	0.04	0.00	0.00	0.00	0.00	2.62	0.00	0.00	3.15	0.00	0.00	1.16
95th-Percentile Queue Length [ft/ln]	1.12	0.00	0.00	0.00	0.00	65.53	0.00	0.00	78.84	0.00	0.00	29.10
d_A, Approach Delay [s/veh]	0.05				2.41				176.96			
Approach LOS	A				A				F			
d_I, Intersection Delay [s/veh]	8.52											
Intersection LOS	F											

Intersection Setup

Name	Southwestbound				Southeastbound			
Approach	Southwestbound				Southeastbound			
Lane Configuration					Y			
Turning Movement	Left	Thru	Right	Right	Left2	Left	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name	Southwestbound				Southeastbound			
Base Volume Input [veh/h]	0	0	0	0	0	1	0	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	0	0	1	0	5
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	0.8500	1.0000	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	1
Total Analysis Volume [veh/h]	0	0	0	0	0	1	0	6
Pedestrian Volume [ped/h]	0				0			

Intersection Settings

Priority Scheme	Stop	Stop
Flared Lane		No
Storage Area [veh]	0	0
Two-Stage Gap Acceptance		No
Number of Storage Spaces in Median	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.05
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	3885.59	0.00	509.75
Movement LOS						F		F
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	1.62	0.00	1.62
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	40.43	0.00	40.43
d_A, Approach Delay [s/veh]	0.00					992.02		
Approach LOS	A					F		
d_I, Intersection Delay [s/veh]	8.52							
Intersection LOS	F							

**Intersection Level Of Service Report
Intersection 4: US97/Fairgrounds Rd**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 1,556.2
 Level Of Service: F
 Volume to Capacity (v/c): 0.411

Intersection Setup

Name	US97			US97			Fairgrounds Rd			Terrace Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	125.00	100.00	100.00	200.00	100.00	100.00	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			35.00			30.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US97			US97			Fairgrounds Rd			Terrace Ave		
Base Volume Input [veh/h]	56	849	5	5	1058	79	25	0	74	1	1	25
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	11.00	0.00	0.00	8.00	3.00	0.00	2.00	5.00	0.00	0.00	38.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	38	316	0	0	227	161	146	0	12	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	94	1165	5	5	1285	240	171	0	86	1	1	25
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9300	1.0000	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	307	1	1	338	63	46	0	23	0	0	7
Total Analysis Volume [veh/h]	99	1226	5	5	1353	253	184	0	92	1	1	27
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.24	0.01	0.00	0.01	0.01	0.00	3.18	0.00	0.61	0.41	0.02	0.15
d_M, Delay for Movement [s/veh]	16.67	0.00	0.00	11.34	0.00	0.00	1130.5	0.00	59.77	1556.1	158.29	96.98
Movement LOS	C	A	A	B	A	A	F		F	F	F	F
95th-Percentile Queue Length [veh/ln]	0.94	0.00	0.00	0.03	0.00	0.00	19.33	0.00	3.22	2.24	2.24	2.24
95th-Percentile Queue Length [ft/ln]	23.54	0.00	0.00	0.66	0.00	0.00	483.27	0.00	80.62	56.00	56.00	56.00
d_A, Approach Delay [s/veh]	1.24			0.04			773.63			149.41		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	67.64											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 5: US97/Hall Rd

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 1,920.3
 Level Of Service: F
 Volume to Capacity (v/c): 2.375

Intersection Setup

Name	US97			US97			Hall Road (Future)			Hall Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	200.00	100.00	80.00	85.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	US97			US97			Hall Road (Future)			Hall Rd		
Base Volume Input [veh/h]	39	723	8	29	879	23	19	0	50	4	1	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	66.00	12.00	0.00	4.00	10.00	53.00	56.00	0.00	34.00	0.00	0.00	5.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	40	109	88	14	233	14	54	140	117	136	157	175
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	79	832	96	43	1112	37	73	140	167	140	158	198
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	219	25	11	293	10	20	39	46	39	44	55
Total Analysis Volume [veh/h]	83	876	101	45	1171	39	81	156	186	156	176	220
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.21	0.01	0.00	0.06	0.01	0.00	1.13	1.54	0.92	2.37	1.99	0.68
d_M, Delay for Movement [s/veh]	16.30	0.00	0.00	10.51	0.00	0.00	248.07	738.87	721.15	1920.2	1906.1	1876.6
Movement LOS	C	A	A	B	A	A	F	F	F	F	F	F
95th-Percentile Queue Length [veh/ln]	0.77	0.00	0.00	0.21	0.00	0.00	6.14	29.70	29.70	58.84	58.84	58.84
95th-Percentile Queue Length [ft/ln]	19.19	0.00	0.00	5.15	0.00	0.00	153.39	742.38	742.38	1471.0	1471.0	1471.0
d_A, Approach Delay [s/veh]	1.28			0.38			637.10			1898.39		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	400.98											
Intersection LOS	F											

**Intersection Level Of Service Report
Intersection 6: US97/Colfax Ln**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 4,149.3
 Level Of Service: F
 Volume to Capacity (v/c): 8.477

Intersection Setup

Name	US97			US97			Colfax Ln			Colfax Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	0	0	0	0	0	1
Entry Pocket Length [ft]	400.00	100.00	400.00	400.00	100.00	400.00	100.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	55.00			55.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	US97			US97			Colfax Ln			Colfax Ln		
Base Volume Input [veh/h]	4	508	16	126	768	35	8	4	18	0	1	186
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	8.00	8.00	5.00	11.00	7.00	0.00	0.00	13.00	0.00	0.00	21.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	69	190	0	0	376	13	47	0	76	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	73	698	16	126	1144	48	55	4	94	0	1	186
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	184	4	33	301	13	15	1	26	0	0	51
Total Analysis Volume [veh/h]	77	735	17	133	1204	51	60	4	102	0	1	202
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	
Storage Area [veh]	0	0	2	1
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.14	0.01	0.00	0.16	0.01	0.00	8.48	0.16	0.48	0.00	0.04	0.52
d_M, Delay for Movement [s/veh]	12.43	0.00	0.00	10.06	0.00	0.00	4149.3	3781.9	3657.5	502.84	159.79	23.76
Movement LOS	B	A	A	B	A	A	F	F	F	F	F	C
95th-Percentile Queue Length [veh/ln]	0.47	0.00	0.00	0.56	0.00	0.00	21.27	21.27	21.27	0.12	0.12	2.88
95th-Percentile Queue Length [ft/ln]	11.84	0.00	0.00	13.94	0.00	0.00	531.83	531.83	531.83	3.09	3.09	71.89
d_A, Approach Delay [s/veh]	1.15			0.96			3838.32			24.43		
Approach LOS	A			A			F			C		
d_I, Intersection Delay [s/veh]	249.19											
Intersection LOS	F											

**Intersection Level Of Service Report
Intersection 7: Culver Hwy/Colfax Ln**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 28.6
 Level Of Service: D
 Volume to Capacity (v/c): 0.381

Intersection Setup

Name	Culver Hwy			Culver Hwy			Colfax Ln			Colfax Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Culver Hwy			Culver Hwy			Colfax Ln			Colfax Ln		
Base Volume Input [veh/h]	0	294	16	17	334	4	7	1	2	27	2	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	4.00	8.00	7.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	86	19	0	104	0	0	0	0	58	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	380	35	17	438	4	7	1	2	85	2	8
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	100	9	4	115	1	2	0	1	24	1	2
Total Analysis Volume [veh/h]	0	400	37	18	461	4	8	1	2	94	2	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.38	0.01	0.01
d_M, Delay for Movement [s/veh]	8.25	0.00	0.00	8.30	0.00	0.00	20.46	19.33	11.52	28.61	27.49	19.65
Movement LOS	A	A	A	A	A	A	C	C	B	D	D	C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.03	0.03	0.03	0.13	0.13	0.13	1.85	1.85	1.85
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.76	0.76	0.76	3.13	3.13	3.13	46.20	46.20	46.20
d_A, Approach Delay [s/veh]	0.00			0.31			18.73			27.82		
Approach LOS	A			A			C			D		
d_I, Intersection Delay [s/veh]	3.16											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 8: Culver Hwy/Fairgrounds Rd

Control Type:	Two-way stop	Delay (sec / veh):	72.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.147

Intersection Setup

Name	Culver Hwy			Culver Hwy			Fairgrounds Rd			Fairgrounds Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⊕			⊕			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00			30.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Culver Hwy			Culver Hwy			Fairgrounds Rd			Fairgrounds Rd		
Base Volume Input [veh/h]	7	288	29	45	308	11	8	1	1	66	8	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	4.00	0.00	5.00	5.00	0.00	29.00	0.00	0.00	2.00	0.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	70	13	47	78	0	0	0	0	1	0	219
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	358	42	92	386	11	8	1	1	67	8	295
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	94	11	24	102	3	2	0	0	19	2	82
Total Analysis Volume [veh/h]	7	377	44	97	406	12	9	1	1	74	9	328
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.09	0.00	0.00	0.15	0.00	0.00	0.39	0.04	0.50
d_M, Delay for Movement [s/veh]	8.13	0.00	0.00	8.32	0.00	0.00	72.62	31.52	19.47	71.28	69.42	57.68
Movement LOS	A	A	A	A	A	A	F	D	C	F	F	F
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.01	0.17	0.17	0.17	0.51	0.51	0.51	10.89	10.89	10.89
95th-Percentile Queue Length [ft/ln]	0.30	0.30	0.30	4.29	4.29	4.29	12.73	12.73	12.73	272.37	272.37	272.37
d_A, Approach Delay [s/veh]	0.13			1.57			64.05			60.39		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	19.33											
Intersection LOS	F											

**Intersection Level Of Service Report
Intersection 9: Culver Hwy/J St**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 2,279.9
 Level Of Service: F
 Volume to Capacity (v/c): 4.708

Intersection Setup

Name	Culver Hwy			Culver Hwy			Belmont Ln			J St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⊕			⊕			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Culver Hwy			Culver Hwy			Belmont Ln			J St		
Base Volume Input [veh/h]	79	230	65	30	275	124	75	61	56	57	85	31
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	25.00	2.00	12.00	18.00	6.00	0.00	20.00	0.00	0.00	8.00	7.00	8.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	164	125	7	125	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	125	-125	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	79	519	65	37	400	124	75	61	56	57	85	31
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	137	17	10	105	33	21	17	16	16	24	9
Total Analysis Volume [veh/h]	83	546	68	39	421	131	83	68	62	63	94	34
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.00	0.04	0.00	0.00	4.71	0.55	0.11	1.47	0.82	0.07
d_M, Delay for Movement [s/veh]	9.05	0.00	0.00	9.08	0.00	0.00	2279.8	2104.9	2081.8	769.72	717.46	693.04
Movement LOS	A	A	A	A	A	A	F	F	F	F	F	F
95th-Percentile Queue Length [veh/ln]	0.15	0.15	0.15	0.07	0.07	0.07	24.87	24.87	24.87	17.78	17.78	17.78
95th-Percentile Queue Length [ft/ln]	3.71	3.71	3.71	1.74	1.74	1.74	621.87	621.87	621.87	444.56	444.56	444.56
d_A, Approach Delay [s/veh]	1.08			0.60			2166.37			730.35		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	355.81											
Intersection LOS	F											

**Intersection Level Of Service Report
Intersection 10: Adams Dr/Bard Ln**

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 13.5
 Level Of Service: B
 Volume to Capacity (v/c): 0.014

Intersection Setup

Name	Adams Dr			Adams Dr			Bard Ln					
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			Yes		

Volumes

Name	Adams Dr			Adams Dr			Bard Ln					
Base Volume Input [veh/h]	12	64	0	0	34	4	7	0	5	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	10.00	4.00	0.00	0.00	0.00	33.00	17.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	54	0	26	0	0	0	0	44	133	5	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	64	26	0	34	4	7	44	138	5	12	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	18	7	0	9	1	2	12	38	1	3	0
Total Analysis Volume [veh/h]	73	71	29	0	38	4	8	49	153	6	13	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results




V/C, Movement V/C Ratio	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.15	0.01	0.02	0.00
d_M, Delay for Movement [s/veh]	7.47	0.00	0.00	7.39	0.00	0.00	12.34	12.39	9.81	13.46	11.20	8.92
Movement LOS	A	A	A	A	A	A	B	B	A	B	B	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.13	0.00	0.00	0.00	0.95	0.95	0.95	0.11	0.11	0.11
95th-Percentile Queue Length [ft/ln]	3.36	3.36	3.36	0.00	0.00	0.00	23.83	23.83	23.83	2.73	2.73	2.73
d_A, Approach Delay [s/veh]	3.15			0.00			10.51			11.91		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	6.71											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 11: Adams Dr/Bard Ln

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 11.3
 Level Of Service: B
 Volume to Capacity (v/c): 0.131

Intersection Setup

Name	Adams Dr		Adams Dr		Hall Rd	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Adams Dr		Adams Dr		Hall Rd	
Base Volume Input [veh/h]	15	68	66	12	5	28
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	2.00	0.00	25.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	138	80	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	68	66	150	85	28
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	18	17	39	22	7
Total Analysis Volume [veh/h]	16	72	69	158	89	29
Pedestrian Volume [ped/h]	0		0		1	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.13	0.03
d_M, Delay for Movement [s/veh]	7.68	0.00	0.00	0.00	11.27	9.96
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.03	0.03	0.00	0.00	0.58	0.58
95th-Percentile Queue Length [ft/ln]	0.67	0.67	0.00	0.00	14.51	14.51
d_A, Approach Delay [s/veh]	1.40		0.00		10.95	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	3.27					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 101: Culver Hwy / Hall Road

Control Type:	Two-way stop	Delay (sec / veh):	23.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.277

Intersection Setup

Name	Culver Hwy		Culver Hwy		Hall Road (Future)	
Approach	Northbound		Southbound		Westbound	
Lane Configuration	↷		↶		↵	
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	50.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Culver Hwy		Culver Hwy		Hall Road (Future)	
Base Volume Input [veh/h]	324	0	0	375	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	30	56	45	34	70	53
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	354	56	45	409	70	53
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	93	15	12	108	19	15
Total Analysis Volume [veh/h]	373	59	47	431	78	59
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.28	0.09
d_M, Delay for Movement [s/veh]	0.00	0.00	8.25	0.00	23.33	16.09
Movement LOS	A	A	A	A	C	C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.08	0.08	1.66	1.66
95th-Percentile Queue Length [ft/ln]	0.00	0.00	2.01	2.01	41.40	41.40
d_A, Approach Delay [s/veh]	0.00		0.81		20.21	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	3.02					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 102: Lois Lane (Future) / Fairgrounds Road

Control Type:	Two-way stop	Delay (sec / veh):	19.2
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.411

Intersection Setup

Name	Lois Lane (Future)		Fairgrounds Rd		Fairgrounds Rd	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration	← T		T →		← T	
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Lois Lane (Future)		Fairgrounds Rd		Fairgrounds Rd	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	185	142	16	44	164	35
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	185	142	16	44	164	35
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	51	39	4	12	46	10
Total Analysis Volume [veh/h]	206	158	18	49	182	39
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.41	0.15	0.00	0.00	0.12	0.00
d_M, Delay for Movement [s/veh]	19.18	15.50	0.00	0.00	7.57	0.00
Movement LOS	C	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.54	3.54	0.00	0.00	0.34	0.34
95th-Percentile Queue Length [ft/ln]	88.40	88.40	0.00	0.00	8.42	8.42
d_A, Approach Delay [s/veh]	17.58		0.00		6.23	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	11.93					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 103: Lois Lane (Future) / Hall Road (Future)

Control Type:	Two-way stop	Delay (sec / veh):	37.6
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.201

Intersection Setup

Name	Lois Lane (Future)			Lois Lane (Future)			Hall Road (Future)			Hall Road (Future)		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	⊕			⊕			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lois Lane (Future)			Lois Lane (Future)			Hall Road (Future)			Hall Road (Future)		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	214	130	98	119	23	9	83	9	40	100	71
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	214	130	98	119	23	9	83	9	40	100	71
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	59	36	27	33	6	3	23	3	11	28	20
Total Analysis Volume [veh/h]	0	238	144	109	132	26	10	92	10	44	111	79
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.09	0.00	0.00	0.06	0.30	0.01	0.20	0.33	0.11
d_M, Delay for Movement [s/veh]	7.53	0.00	0.00	8.20	0.00	0.00	32.15	23.40	15.68	37.64	32.02	26.12
Movement LOS	A	A	A	A	A	A	D	C	C	E	D	D
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.20	0.20	0.20	1.63	1.63	1.63	4.28	4.28	4.28
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	5.00	5.00	5.00	40.76	40.76	40.76	106.95	106.95	106.95
d_A, Approach Delay [s/veh]	0.00			3.35			23.49			31.09		
Approach LOS	A			A			C			D		
d_I, Intersection Delay [s/veh]	10.85											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 104: Lois Lane (Future) / Colfax Lane

Control Type:	Two-way stop	Delay (sec / veh):	10.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.170

Intersection Setup

Name	Lois Lane (Future)		Colfax Ln		Colfax Ln	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration	T		↑		↑	
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Lois Lane (Future)		Colfax Ln		Colfax Ln	
Base Volume Input [veh/h]	0	0	0	30	40	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	123	45	19	0	13	69
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	123	45	19	30	53	69
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	13	5	8	15	19
Total Analysis Volume [veh/h]	137	50	21	33	59	77
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.05	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.69	9.97	7.51	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.85	0.85	0.04	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	21.21	21.21	0.89	0.89	0.00	0.00
d_A, Approach Delay [s/veh]	10.50		2.92		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	5.63					
Intersection LOS	B					