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TECHNICAL MEMORANDUM #4

Gilliam County Transportation System Plan Update

Future Conditions Analysis

Date: April 6, 2015 Project #: 17679
To: Michael Duncan, ODOT
Michelle Colby, Gilliam County

From: Casey Bergh, PE, Ashleigh Griffin, and Marc Butorac, PE
cc: Project Advisory Committee

This memorandum estimates year 2035 future transportation system conditions and identifies transportation system needs based on projected population and employment demographics of Gilliam County. Transportation needs were also identified for multi-modal elements of the transportation system.

DEVELOPMENT OF YEAR 2035 TRAFFIC FORECASTS

Population and Employment Projections

Existing and forecast year 2035 population estimates were developed and summarized in Technical Memorandum #3: Existing Conditions Inventory and Analysis. In summary, County population is forecast to grow, but employment declined in 2013. It will be important for the TSP to identify transportation improvements that can support economic development and help reverse the employment trends.

The Gilliam County 2010 population of 1,871 is forecast to grow by more than 25% to a future population of 2,378 in 2035. Thirty-four percent of the population is located in unincorporated areas of the County, 39 percent in the City of Condon, 26 percent in the City of Arlington, and one percent in the City of Lonerock.

Based on the State of Oregon Employment Department's Labor Trends summary report from November 2014, Gilliam County lost a total of 111 jobs in 2013, some of which can be attributed to the completion of wind farm construction projects. The only industry that experienced an increase in jobs in 2013 was the Natural Resources and Mining industry, which grew by nine jobs. Gilliam County is working to increase economic activity by developing new industrial parks. The growth in traffic volumes reflects this potential for economic growth and the need for transportation infrastructure to support industrial growth in the County.

Traffic Forecast Projections

Future (2035) traffic volumes were developed using Oregon Department of Transportation's (ODOT's) historical trends method, which relies on historic traffic volumes to develop an annual growth rate. ODOT maintains Future Volumes Tables that summarize current and future year traffic volumes for state roadways. Based on guidance from ODOT's Analysis Procedure Manual (APM), the projected average annual growth is 1.25 percent for all Gilliam County roadways (Reference 1). No historic volume data was available for County roadways. Therefore, the same growth rate was used on state and county roadways.

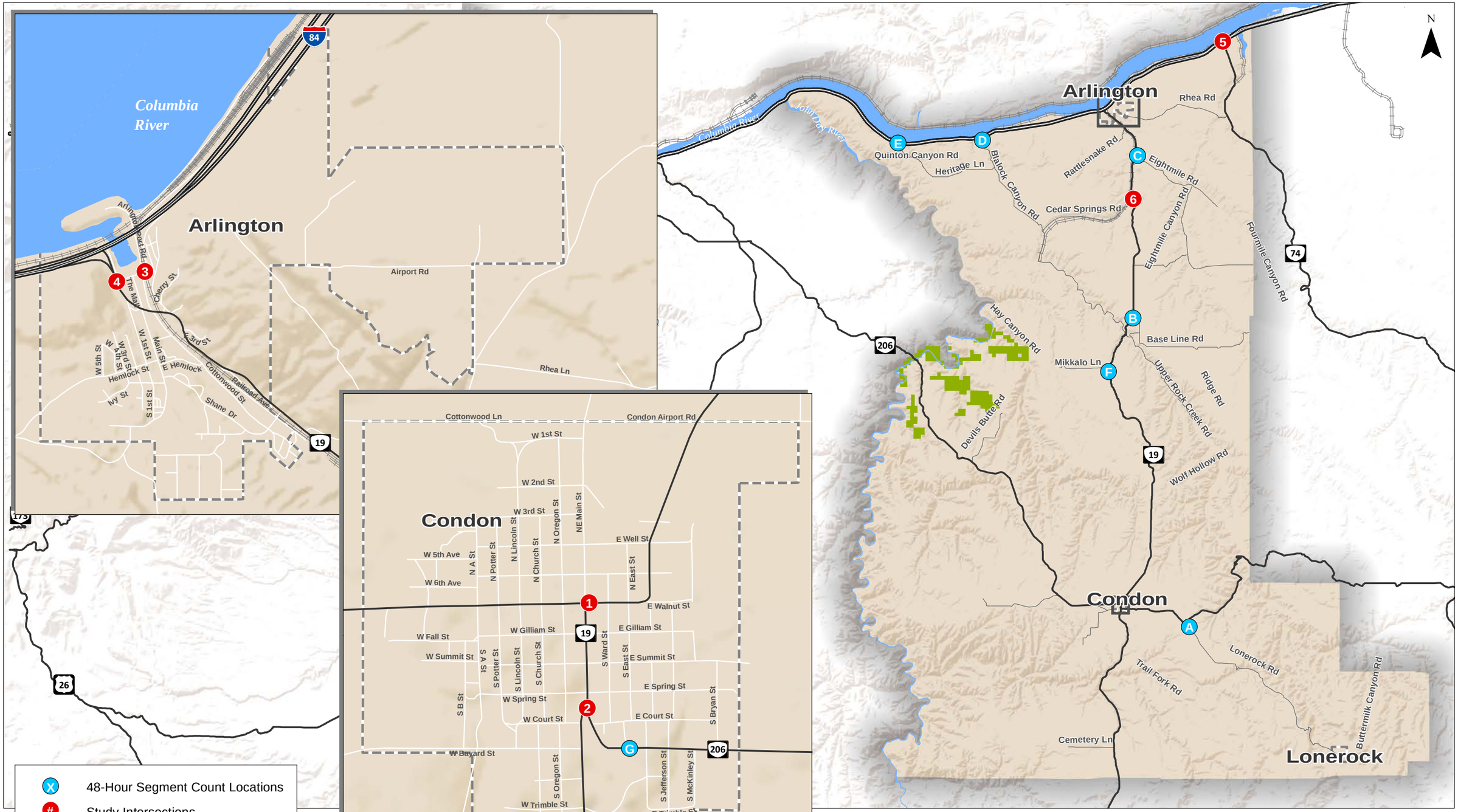
Appendix A provides the traffic volumes and projections for the locations that were used to develop the growth rate.

FUTURE TRAFFIC CONDITIONS AND NEEDS

The forecast 2035 traffic operations are summarized in the following sections. The technical analysis of the forecast 2035 transportation system is based on ADT for roadway segments and 30th highest hour traffic volume forecasts for intersections. Figure 4-1 shows the locations of the study intersections and study segments.

Year 2035 Forecast Traffic Volumes

The projected 1.25 percent annual growth rate was applied to existing 2014 volumes to estimate forecast year 2035 traffic volumes. Figure 4-2 shows the added traffic at the study intersections and segments.



Study Intersections and Segment Count Locations
Gilliam County, Oregon

Figure **4-1**

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, US Census

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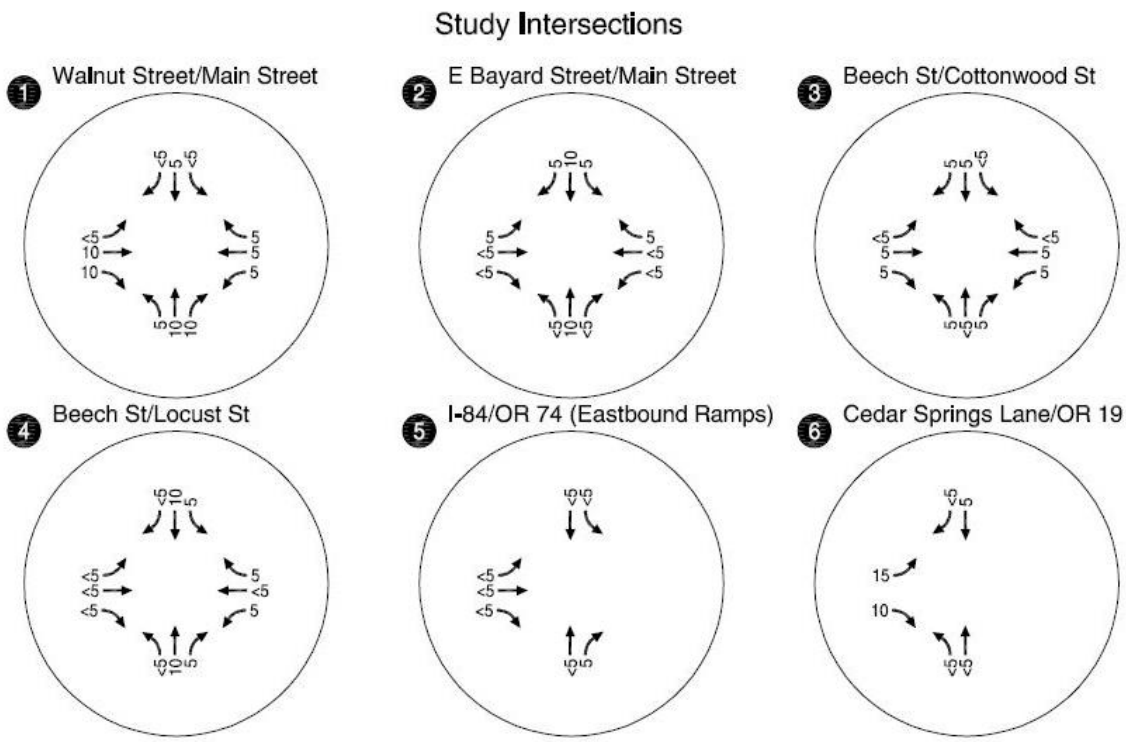


Figure 4-2. Forecasted 2014 – 2035 Study Intersection Volume Growth

Year 2035 Forecast Intersection Operations

Forecast 2035 transportation system capacity analysis was conducted based on forecast traffic volumes. The operational results indicate that no operational improvements are anticipated to meet State, County, or City operational standards for each respective facility in 2035.

The future conditions operational analysis was conducted based on the peak 15-minute period of traffic flow at each study intersection. Figure 4-3 illustrates the lane configurations and traffic control devices used in the future conditions analysis. No changes to the existing lane configurations and traffic control devices (as summarized in Technical Memorandum #3) were incorporated in this analysis because there are no planned improvements at the intersections.

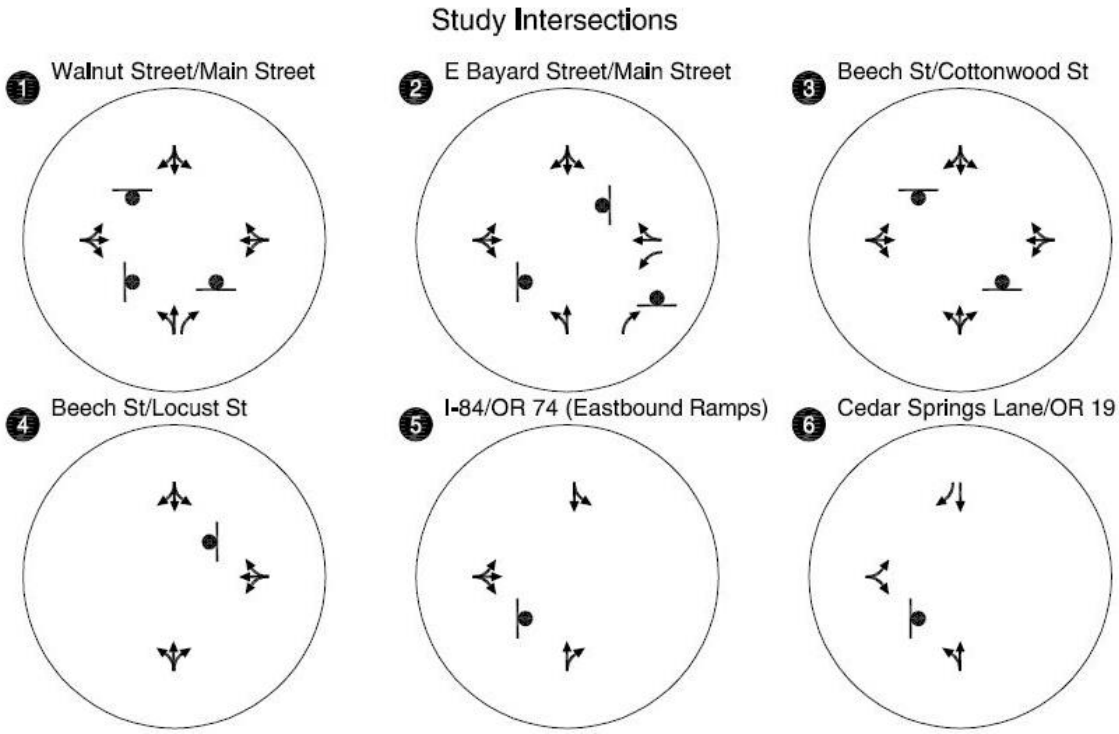


Figure 4-3. 2035 Study Intersection Lane Configurations

Figure 4-4 summarizes the 2035 30th highest hour traffic volumes and the resulting intersection operations. All study intersections are expected to operate with volume-to-capacity (v/c) ratio of less than 0.1 and level-of-service "B" or better. All intersections are expected to meet their performance standard in 2035. Performance standards for intersections were summarized in Technical Memorandum #3. *Appendix B includes the operational analysis worksheets for all study intersections*.

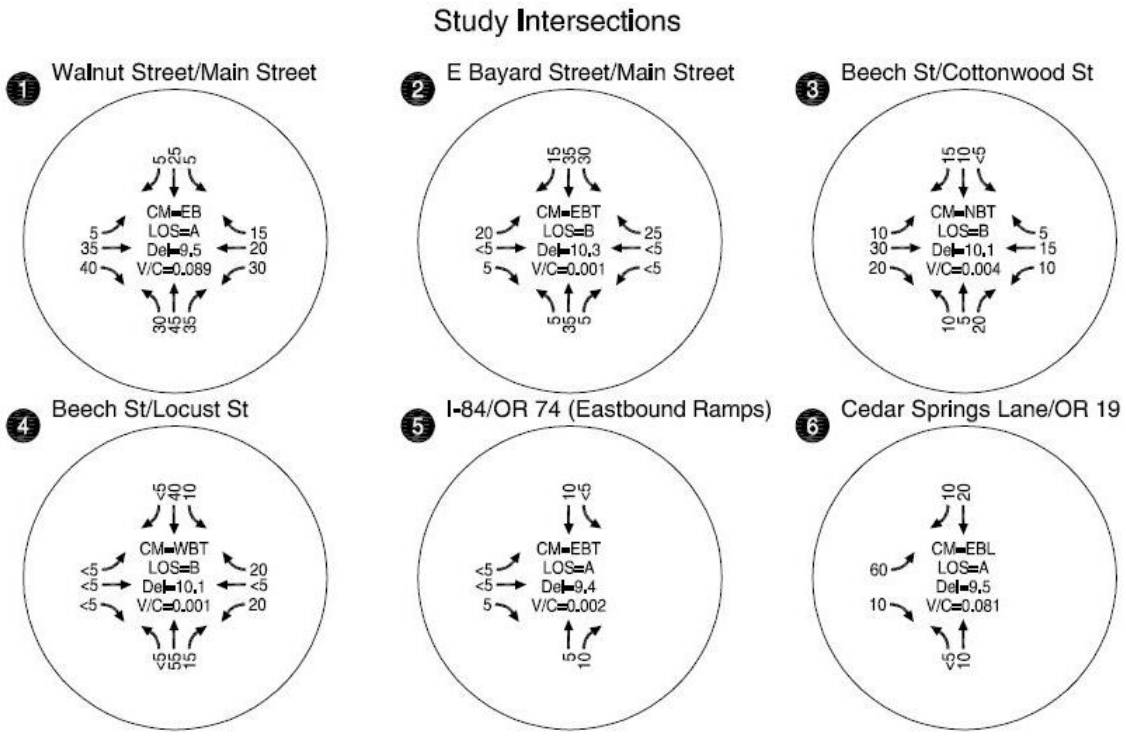


Figure 4-4. Forecasted 2035 Intersection Traffic Volumes and Operations

Year 2035 Forecast Roadway Segment Operations

Using the forecast volumes, the seven study roadway segments were analyzed to determine how they are expected to perform in 2035. Table 4-1 summarizes the forecasted 2035 traffic volumes and resulting operations. None of the roadway segments are expected to experience traffic growth that would result in over capacity conditions.

Table 4-1. 2035 Roadway Segment Operations

ID	Roadway	ADT* for 2035	Peak Hour Time Period	Seasonally-Adjusted Peak Hour Count	PHF^	Two-Way Demand Flow	Critical Flow Rate (pc/h)	Calculated V/C Ratio
A	Lonerock Road, south of OR 19	225	5:00 - 6:00 p.m.	25	0.85	31	3,200	0.01
B	Baseline Road, east of OR 19	312	9:30-10:30 am, 1:30-2:30 pm	34	0.90	40	3,200	0.01
C	Fourmile Road, SE of OR 19	249	1:45 - 2:45 pm	36	0.90	43	3,200	0.01
D	Blalock Canyon Road, south of I-84	184	5:15 - 6:15 pm	25	0.90	29	3,200	0.01
E	Quinton Canyon Road, south of I-84	87	8:45 - 9:45 am	13	0.85	17	3,200	0.01
F	Mikkalo Lane, west of OR 19	188	11:45 am - 12:45 pm	21	0.90	25	3,200	0.01
G	East Bayard Street, east of OR 19	748	10:45 - 11:45 am	71	0.95	80	3,200	0.03

*ADT = Average Daily Traffic volume

^PHF = Peak Hour Factor, a ratio of the total hourly traffic volumes to the peak 15-minute traffic flow

pc/h = passenger cars per hour

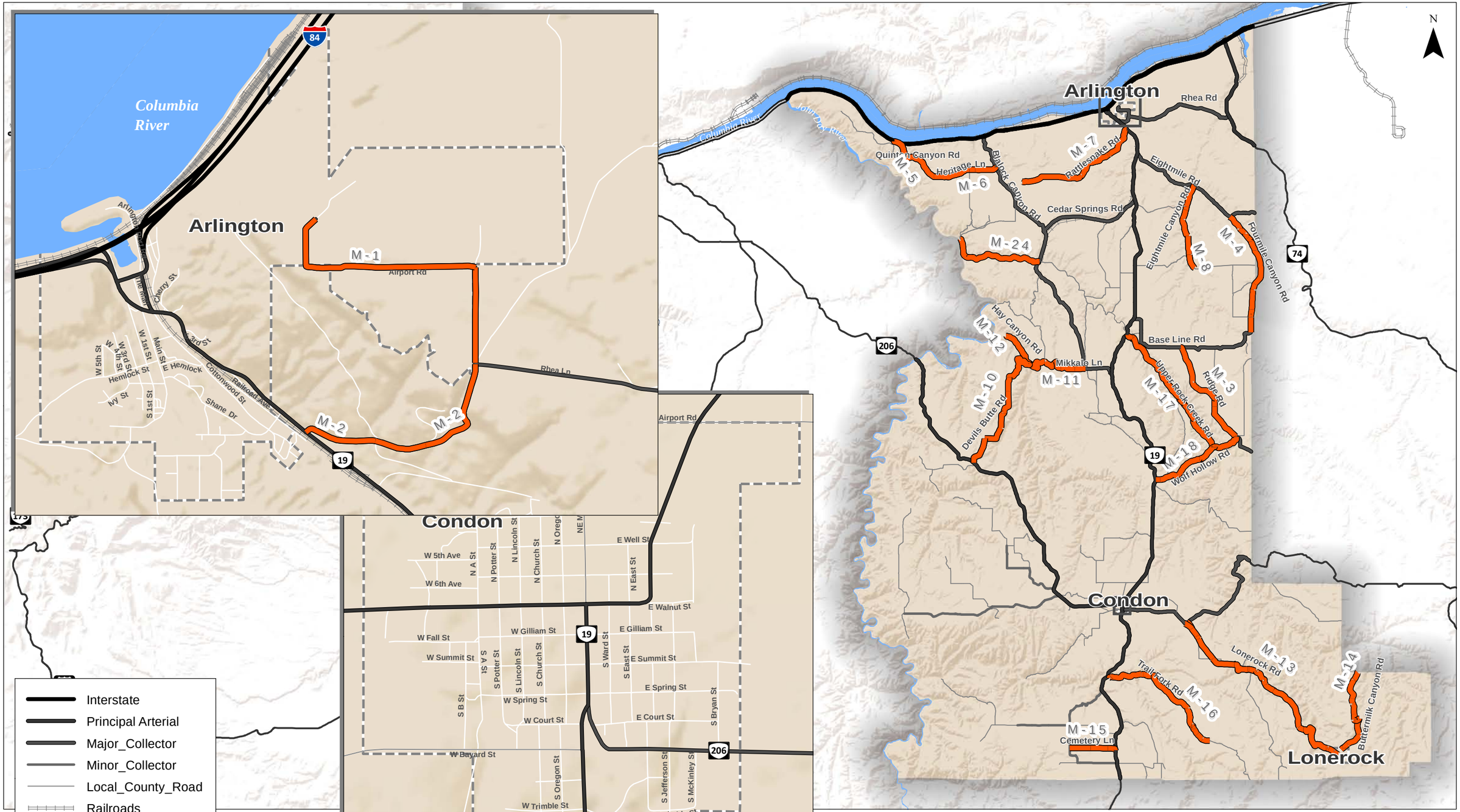
V/C = volume-to-capacity

Roadway Needs

Although the study roadways and intersections in Gilliam County are anticipated to operate acceptably, the County expects growth in industrial areas, in Arlington, in Condon, and in areas surrounding the Port of Arlington. To accommodate this new growth, these industrial areas need adequate connectivity to key highways. The lane width, curve radii, shoulder width, and shoulder type along these key industrial routes should be designed to accommodate freight traffic. Known connectivity needs as shown in Figure 4-5, include:

- Pave shoulders and strengthen roadbed on Airport Road (M-1 in the figure) in Arlington to accommodate larger trucks accessing Arlington Mesa Industrial Park;
- Improve Rhea Lane with shoulders to accommodate industrial truck traffic associated with Arlington Mesa Industrial Park (M-2);

- Reclassify Ridge Road (M-3) and Fourmile Road (M-4) to Major Collectors and upgrade roadway to match Major Collector design standards to accommodate agriculture truck traffic;
- Reclassify Quinton Canyon Road (M-5), Heritage Lane (M-6), Rattlesnake Road (M-7), Eightmile Canyon Road (M-8), and Cemetery Lane (M-15) from local streets to Minor Collectors and upgrade roadway to Minor Collector design standards to accommodate existing and forecast volume.
- Reclassify Lonerock Road (M-13) from a Minor Collector to a Major Collector to serve the traffic associated with the Lonerock community.
- Reclassify Upper Rock Creek Road (M-17) from a Major Collector to a Minor Collector due to the decrease in traffic using this road;
- Reclassify Devils Butte Road, Mikkalo Lane, and Hay Canyon Road (M-10, M-11, and M-12) to Minor Collectors and upgrade roadway to match Minor Collector design standards. These roads provide access to Cottonwood Canyon State Park;
- Improve Lower Road Creek Road (M-24) to serve the recreational traffic that uses this road to access the river;
- Reclassify Trail Fork Road (M-16), Buttermilk Canyon Road (M-14), and Wolf Hollow Road (M-18) from Minor or Major Collectors to Local Streets due to the change in land use activities the County has experienced and decrease in traffic using these roads.



Roadway Needs
Gilliam County, Oregon

Figure
4-5

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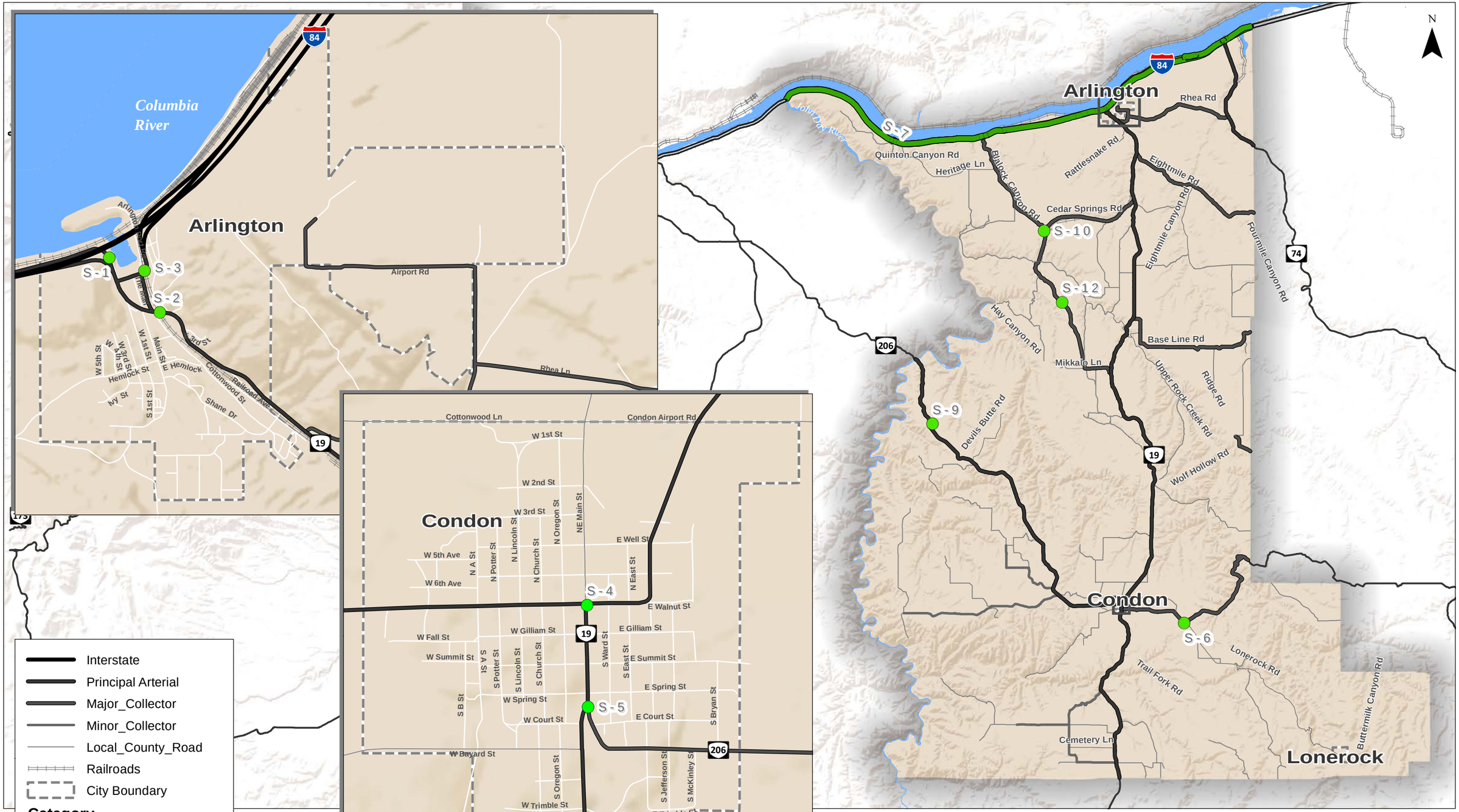
Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, US Census

Transportation Safety Needs

Although no locations with safety deficiencies were identified from the historical crash analysis documented in Technical Memorandum #3, there are several locations within the County where countermeasures could reduce crash potential. Additional analysis is needed to assess and identify countermeasures; input from the Project Advisory Committee identified the following needs, which are summarized in Figure 4-6:

- Weather-related Crashes:
  - A high percentage of crashes on I-84 were associated with adverse weather and roadway conditions (S-7 in the figure). Intelligent Transportation Systems (ITS) treatments will be considered as one potential countermeasure.
  - Observations from local residents indicate that snow drifts frequently occur on OR 206 near milepost 22 (S-9 in the figure). This location will be further reviewed to determine if treatments are available to minimize snow drifts and/or their impact to vehicles.
- Single-vehicle and speed-related crashes:
  - A high percentage of crashes in the County were single-vehicle run-off-road crashes and crashes associated with speed. Options for reducing these crash types using countermeasures such as rumble strips will be considered. Priority locations may include those identified in ODOT's Roadway Departure Plan and summarized in Technical Memorandum #3.
- Intersection Geometric/Traffic Control Deficiencies:
  - Safety concerns were identified at several intersections due to intersection design and traffic control (e.g., Walnut/Main Street (S-4); E Bayard Street/Main Street (S-5)) or sight distance (e.g., Lonerock Road at OR 206 (S-6); Cedar Springs Road/Blalock Canyon Road (S-10); and Barnett Road (S-12)). These intersections will be reviewed to determine if modifications in design may reduce safety risk.
- Directional Signage:
  - Drivers have been observed entering the I-84 ramps in the wrong direction in Arlington. Options to modify directional signage at the I-84 ramps in Arlington to reduce the number of wrong-way vehicles on ramps will be considered (S-1).
- Railroad Crossings:
  - There is concern about emergency vehicle access in Arlington during periods when trains block the railroad crossings and prevent vehicles from accessing the interstate (S-2 and S-3). This issue also occurs on Cedar Springs Lane at the railroad crossings. Strategies to allow emergency vehicle access during these times will be considered.



Safety Needs
Gilliam County, Oregon

Figure
4-6

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Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, US Census

Pedestrian Needs

Although the cities of Arlington and Condon have a limited network of connected sidewalks, both cities have gaps and deficiencies in their respective pedestrian systems. In Arlington, sidewalks exist around the commercial area formed by Beech Street, Cottonwood Street, and Locust Street. Sidewalks also connect this area to the school on Main Street. However, no sidewalks exist along Ivy Street, between W 3rd Street and Main Street. This route connects the Columbia Hills Manor Independent Living Center to the sidewalk along Main Street. Other priority gaps in the system include Cottonwood Street, Shane Drive, and W 1st Street, all of which lack sidewalks.

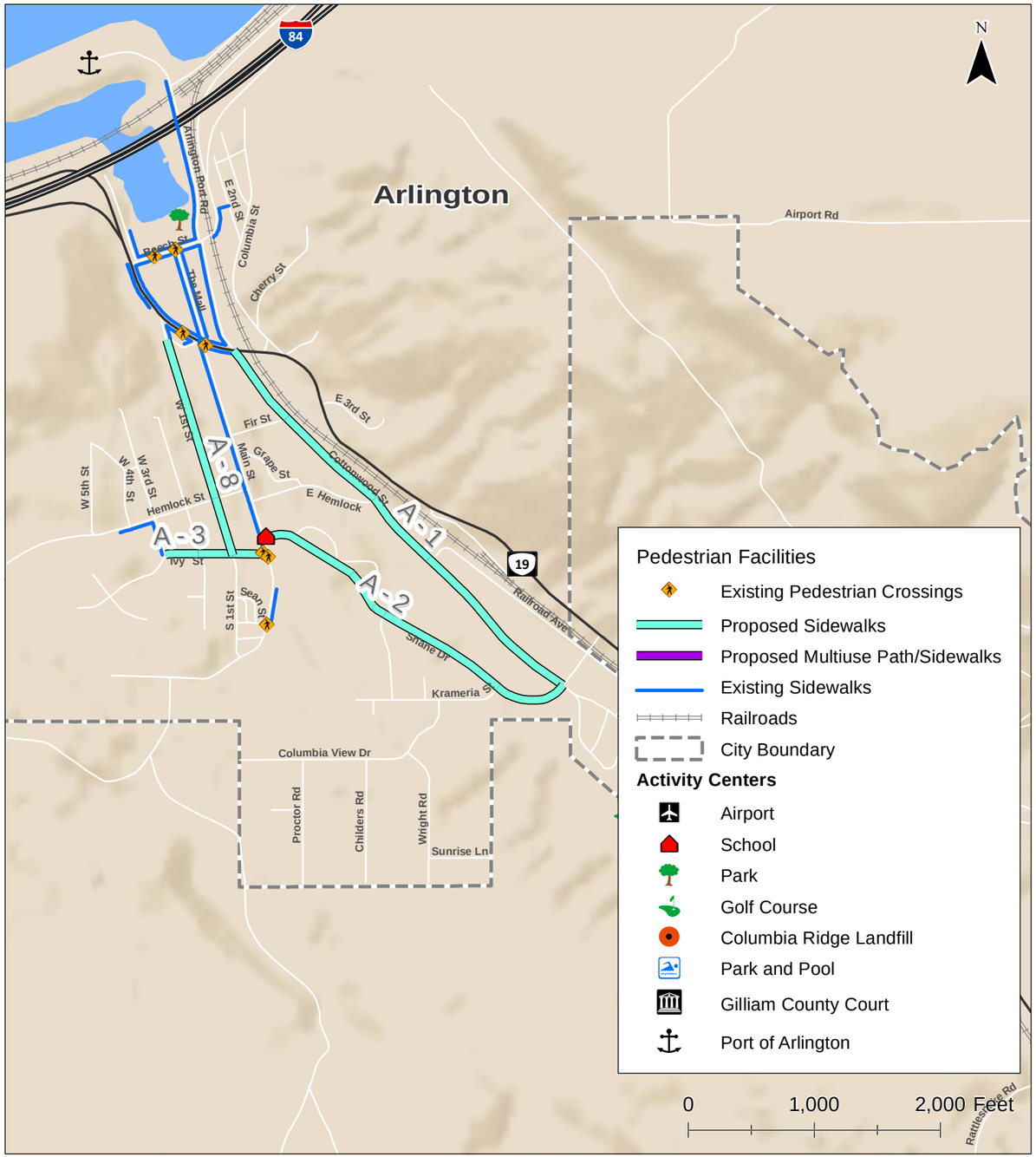
In Condon, sidewalks provide connections north and south along Main Street as well as to the two local schools. Residential areas in both cities are not connected to schools and commercial areas by continuous sidewalks. The sidewalks on the east side of Main Street between W 3rd Street and Walnut Street are in poor condition and need improvement. There are no sidewalk connections to the baseball fields on the corner of E Spring Street and Jefferson Street. Installing sidewalks on E Spring Street between S East Street and Jefferson Street would provide a connected pedestrian system to the baseball fields from the schools and Main Street. In addition, OR 19 lacks complete sidewalks between Main Street and the Fairgrounds driveway.

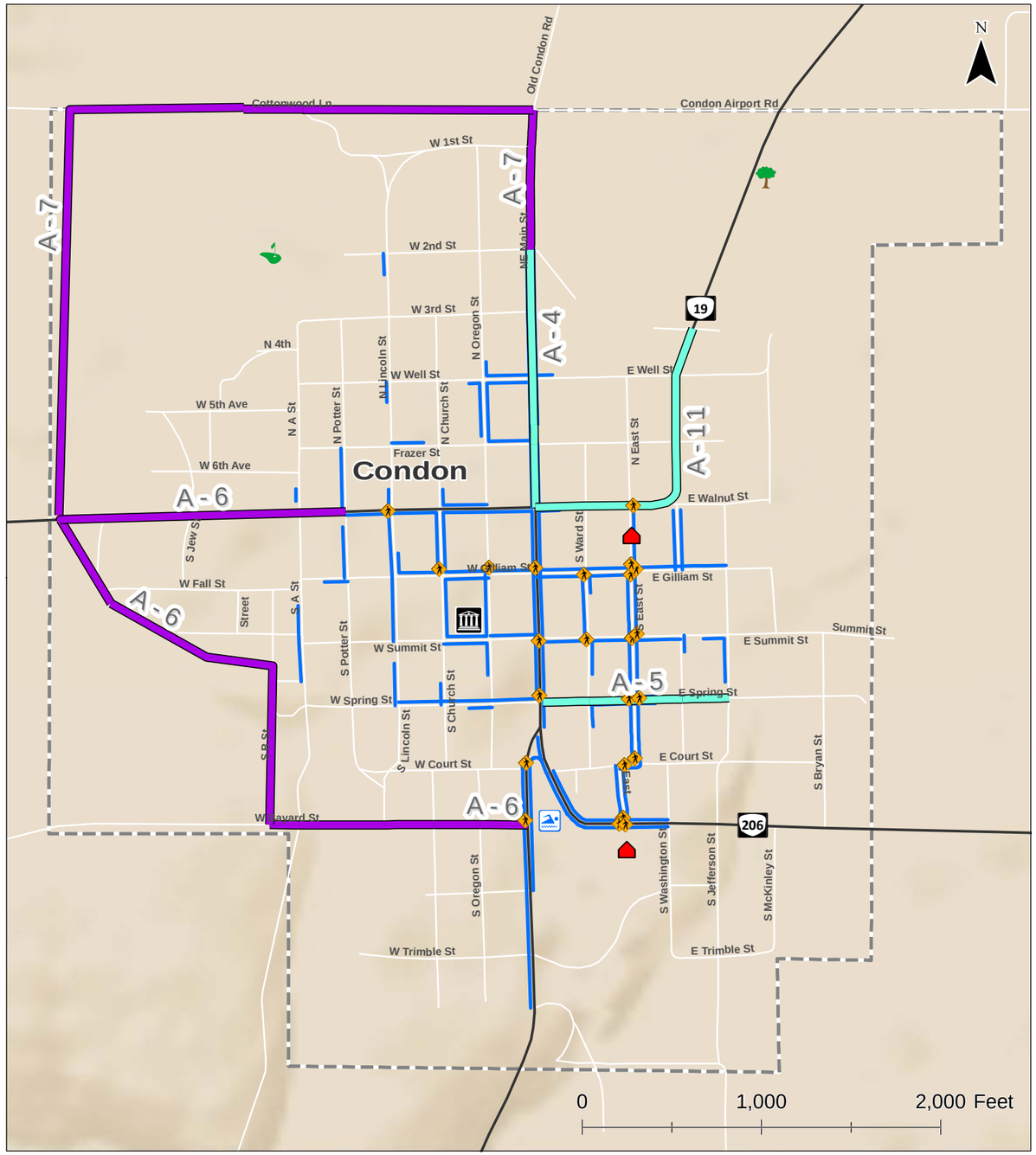
In Condon, residents have expressed a desire for more continuous sidewalk or paths for recreational purposes. Currently, residents use the school track to walk due to the limited sidewalks, but they would prefer a route around the City. One potential route (the inner loop) follows W Bayard Street west of downtown, turns north on Potter Street, and connects back to Main Street on OR 206. Another potential route (the outer loop) would follow W Bayard Street to the west of the City, connect north just outside of the City and along the edge of the golf course, and connect with Cottonwood Lane to the north to provide a longer loop.

Figure 4-7 illustrates the existing pedestrian system and identifies priority connections identified to increase accessibility to key attractions. These connections are also summarized in Table 4-2. Prioritizing these pedestrian routes will inform funding decisions.

Table 4-2. Priority Pedestrian Needs

#	Location	Start Point	End Point	City	Description of Need
A-1	Cottonwood Street Sidewalks	Shane Dr	OR 19	Arlington	Lacking connected sidewalks
A-2	Shane Drive Sidewalks	Main St	Cottonwood St	Arlington	Lacking connected sidewalks
A-3	Ivy Street Sidewalks	W 3rd St	Main St	Arlington	Lacking connected sidewalks; Connects to the Columbia Hills Manor Independent Living Center
A-4	Sidewalks on East Side of Main Street	W 3rd St	OR 206/Walnut St	Condon	Sidewalks in poor condition
A-5	Sidewalks on E Spring Street	Main St	S Jefferson St	Condon	No sidewalks connecting to baseball field.
A-6	Inner Pedestrian Recreational Route West of Condon	W Bayard St/Potter Street	OR 206	Condon	Need for recreational walking route. Residents currently use track.
A-7	Outer Pedestrian Recreational Route West of Condon	W Bayard St/East of Condon	Cottonwood St/Main St	Condon	Need for recreational walking route. Residents currently use track.
A-8	W 1st Street	Cedar Street	Ivy Street	Arlington	Lack of connected sidewalks.
A-11	OR 19	Main Street	Fairgrounds Road	Condon	Lack of connected sidewalks.





Pedestrian System Needs
Gilliam County, Oregon

Figure
4-7

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, US Census

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Bicycle Needs

There are no marked bicycle facilities in Gilliam County. Some of the state highways have shoulders that can accommodate bicyclists. On local/residential streets, bicyclists share the roadway with the slower vehicles. This practice is consistent with recommendations in the Oregon Bicycle and Pedestrian Design Guide, that urban and suburban roadways with posted speeds below approximately 20 miles per hour (mph) operate as shared facilities in which bicyclists share the road with vehicles. The Design Guide also recommends that urban and suburban roadways with average daily traffic volumes below approximately 1,500 vehicles per day have shared facilities rather than separated bicycle lanes regardless of the posted speed limit (Reference 2). County roads in Gilliam County currently carry less than 1,500 vehicles per day.

Several recreational routes attract bicyclists from around the state. Popular recreational routes include OR 19 south of Condon to Fossil, OR 206 west of Condon to Wasco, and OR 206 east of Condon to Heppner. Bicyclists are not frequently observed riding OR 19 between Condon and Arlington. The majority of these routes have minimal shoulders and rough pavement conditions. In addition, there are no commercial or public rest areas on these routes for bicyclists to stop and hydrate on the ride. As recreational riding increases, strategic locations for these rest areas will be useful.

Transit Needs

Gilliam County currently has a dial-a-ride system, operated by Gilliam County Special Transportation (GCST), as summarized in Technical Memorandum #3. The dial-a-ride system effectively serves as the County's transit system, and there is not expected to be enough growth to warrant a fixed route system within the TSP horizon. There are several needs including additional staff, vehicles, and funding to improve the dial-a-ride system in the future. These needs are further explained below:

- When drivers are unavailable, the GCST director is sometimes required to drive the vehicles. There are no part-time dispatch staff currently available to cover these occasions when the director, who also functions as the dispatcher, must leave. The County is interested in additional staff.
- The County has expressed interest in a carport at the Lonerock community center to protect the vehicle year-round and an expanded garage or similar facility in Condon to keep vehicles clean year-round.
- Most trips (90 percent) are for medical purposes. Shopping, social, or business trips are other common reasons for trips. There is often a need for volunteer caregivers to ride along with passengers to provide assistance to the passengers traveling to medical appointments. The nearest medical facilities are located in either The Dalles or Hermiston. Frequent trips are also made to Portland area hospitals.
- GCST is funded through grants, donations, and medical mileage reimbursement programs. GCST has expressed the need for more maintenance money to cover tires, snow tires, brake

repairs, etc. GCST also lacks funding for the defensive driving passenger assistance training, which is required for volunteer drivers. The Gilliam County Transportation Services Director is interested in becoming certified to provide this training to volunteers from Gilliam County and other nearby counties. Riders are not charged a fee for rides, but suggested donations are recommended and vary from $2 to $30 depending on the length of the trip, purpose of the trip, and type of vehicle used. Veterans often must travel longer distances for their services and are not asked to provide donations for their ride. The County lacks existing funding for drivers to take veterans to hospitals and wait until the following day to bring veterans back from procedures.

Downtown Parking Needs

Parking in the downtown areas of Condon and Arlington is primarily on-street parking. Arlington does have off-street parking lots adjacent to Earl Snell Memorial Park and behind the commercial areas across the street from the Park. Based on observations, parking demand does not generally exceed available capacity in Condon or Arlington during typical use. However, Arlington hosts several large events during the summer months. During these events, there is inadequate parking which leads to people parking illegally throughout the City. Requiring traffic control and parking management plans for special events may assist with these issues.

Freight Needs

Although I-84 is the only facility in the County that is designated as a state truck freight route, several County and State roads are heavily relied on for transporting agricultural or other industrial goods to I-84 and the Port of Arlington. Some of these routes are local roads that need upgrades to accommodate larger freight loads. The routes that carry freight traffic or are expected to carry freight traffic and may be considered for upgrade include:

- OR 19 between I-84 and Condon;
- Cedar Springs Road between OR 19 and the Columbia Ridge Landfill;
- Ridge Road between Baseline Road and Flett Road;
- Fourmile Canyon Road;
- Airport Road and Rhea Lane, connecting the Arlington Mesa Industrial Park to OR 19.

Aviation Needs

The two airports and port also serve an important role in freight transportation. The Arlington airport currently has an unpaved runway. As the surrounding industrial park grows, the runway will need to be paved. The Condon State Airport is expected to receive water service in the next few years. When this occurs, the airport may need improvements to serve additional air traffic and development.

Rail Needs

Rail service between the Columbia Ridge landfill and Arlington serves an important role for transporting waste and should be maintained. At Shutler Station, there is a need for rail crossovers for more efficient movement of railcars within the station.

Bridge Needs

The bridge conditions inventory, summarized in Technical Memorandum #3, identified one County bridge on Cayuse Canyon Road at Rock Creek (MP 4.0) that is closed due to structural reasons. This requires an 18-mile detour to get around the closure. Another County bridge, on Lonerock Road at Lonerock Creek, is posted with load restrictions.

In addition, the I-84 eastbound bridge over Willow Creek at MP 148.6 has a low sufficiency rating due to the width of the structure, which is narrower than current standards require.

TRANSPORTATION PLANNED FUNDING SOURCES

Historic Funding Sources

Capital projects as well as operations and maintenance of roadways within Gilliam County are funded through the Gilliam County Transportation Budget, which relies on a variety of sources as summarized in the ten year budget history, summarized in Technical Memorandum #3. The total Transportation revenue budget for fiscal year (FY) 2014 was approximately $1.5 million.

Technical Memorandum #3 also summarizes the 10-year history of transportation expenditures for the County. The majority of the funds were spent on maintenance and snow/ice removal historically, with the total transportation expenditures in FY 2014 at approximately $1.46 million. Therefore, Gilliam County will need to look for additional revenue sources and funding partners to complete future transportation improvements beyond the traditional maintenance projects.

The 2014 County Road Needs Study, prepared by the Association of Oregon Counties, evaluated the funding needed to manage county road system for the next five years (2014-2018). The Study found that Counties prioritize maintaining existing roads, aware that the roads would cost more to rebuild if they failed to maintain them. However, the study found that anticipated revenue will not provide enough funding for roadway maintenance, projecting a 63 percent gap in funding for pavement maintenance and a 24 percent gap in funding for maintenance, repairs, and operations, resulting in a total funding need of $505 million for maintenance activities alone. An additional funding need of over $450 million is necessary to complete capital construction projects (Reference 3).

Potential Funding Sources

The majority of the County's current funding revenue comes from property taxes and the state highway fund. Potential new funding sources that could help close the gap between transportation revenue and the cost to maintain and improve infrastructure are summarized in Table 4-3 below.

Table 4-3. Potential Funding Sources

Funding Source	Description	Benefits
User Fee	Fees tacked onto a monthly utility bill or tied to the annual registration of a vehicle to pay for improvements, expansion, and maintenance to the street system. This may be a more equitable assessment given the varying fuel efficiency of vehicles. Regardless of fuel efficiency, passenger vehicles do equal damage to the street system. The cost of implementing such a system could be prohibitive given the need to track the number of vehicle miles traveled in every vehicle. Additionally, a user fee specific to a single jurisdiction does not account for the street use from vehicles registered in other jurisdictions.	Primarily Street Improvements
Street Utility Fees/Road Maintenance Fee	The fee is based on the number of trips a particular land use generates and is usually collected through a regular utility bill. For the communities in Oregon that have adopted this approach, it provides a stable source of revenue to pay for street maintenance allowing for safe and efficient movement of people, goods, and services.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails
Local Fuel Tax	A local tax assessed on fuel purchased within the jurisdiction that has assessed the tax. Some would argue that this tax is unfair given the increased fuel efficiency of today's vehicles. On the other hand, the tax could potentially generate revenue while encouraging fuel efficiency and lessening impacts to the environment.	Primarily Street Improvements
Systems Development Charges (SDCs)	SDCs are fees assessed on development for their impacts on public infrastructure. Funds must be used for capacity enhancing improvements as defined in ORS 223.304.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails • Transit
Stormwater SDCs, Grants, and Loans	SDCs, Grants, and Loans obtained for the purposes of making improvements to stormwater management facilities. Some jurisdictions in Oregon have used these tools to finance the construction and maintenance of Green Streets. Stormwater SDCs also need to fund capacity enhancing improvements as defined in ORS 223.304.	Primarily Street Improvements

Funding Source	Description	Benefits
Local Sales Tax	A tax assessed on the purchase of goods and services within a specific location. A sales tax could be assessed only on auto-related goods and services to generate revenue for transportation-related improvements.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails • Transit
Optional Tax	A tax that is paid at the option of the taxpayer to fund improvements. Usually not a legislative requirement to pay the tax and paid at the time other taxes are collected, optional taxes are usually less controversial and easily collected since they require the taxpayer to decide whether or not to pay the additional tax.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails • Transit
Sponsorship	Financial backing of a public-interest program or project by a firm, as a means of enhancing its corporate image. This has been used by local transit providers to help offset the cost of providing transit services and maintaining transit related improvements.	Transit Facilities
Public/Private Partnerships	Public/private partnerships are agreements between public and private partners that can benefit from the same improvements. They have been used in several places around the country to provide public transportation amenities within the public right-of-way in exchange for operational revenue from the facilities. These partnerships could be used to provide services such as charging stations, public parking lots, or bicycle lockers.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails • Transit
Tax Increment Financing (TIF)	A tool cities use to create special districts (tax increment areas) and to make public improvements within those districts that will generate private-sector development. During a defined period, the tax base is frozen at the predevelopment level. Property taxes for that period can be waived or continue to be paid, but taxes derived from increases in assessed values (the tax increment) resulting from new development either go into a special fund created to retire bonds issued to originate the development or leverage future improvements. A number of small-to-medium sized communities in Oregon have implemented, or are considering implementing, urban renewal districts that will result in a TIF revenue stream.	System-wide transportation facilities including: • Streets • Sidewalks • Bike lanes • Trails • Transit

Table 4-3 is not an all-inclusive list of alternative funding sources. Each of these financing tools requires focused research to ensure that it is the right fit for the community, and can be closely match with achieving the objectives of the TSP update.

SUMMARY AND NEXT STEPS

The assessment of future land use and transportation system conditions identified the following:

- Annual growth rates were applied to existing 2014 volumes to estimate forecast 2035 traffic volumes. The annual growth rate of 1.25 percent was calculated using ODOT's historical volumes method.
- All study intersections were forecast to operate with v/c ratios of less than 0.1 and level-of-service "B" or better.
- The forecast v/c ratios on all two-lane state and county highways within Gilliam County are forecast to be less than 0.05.
- Several intersections or locations in the County were identified due to observed geometric and/or traffic control related safety concerns, including:
    - Main Street/Walnut Street in Condon;
    - Lonerock Road/OR 206;
    - E Bayard Street/Main Street in Condon;
    - Railroad Crossings in Arlington;
    - I-84 Ramps in Arlington.
- Several roadways carry higher traffic volumes and/or truck volumes than they have historically due to changes in land use around the County. These roadways should be reclassified and may need to be upgraded to meet County design standards. The roadways include:
    - Roadways connecting Gilliam County to Cottonwood Canyon State Park;
    - Ridge Road and Fourmile Canyon Road;
    - Airport Road in Arlington;
    - Quinton Canyon Road;
    - Heritage Lane;
    - Rattlesnake Road;
    - Fourmile Road;
    - Eightmile Canyon Road;
    - Cemetery Road;
    - Lonerock Road.
- There is not expected to be sufficient growth to warrant a fixed route transit system. However, some improvements in staffing, funding, and vehicles will improve the existing dial-a-ride transit system in the County.

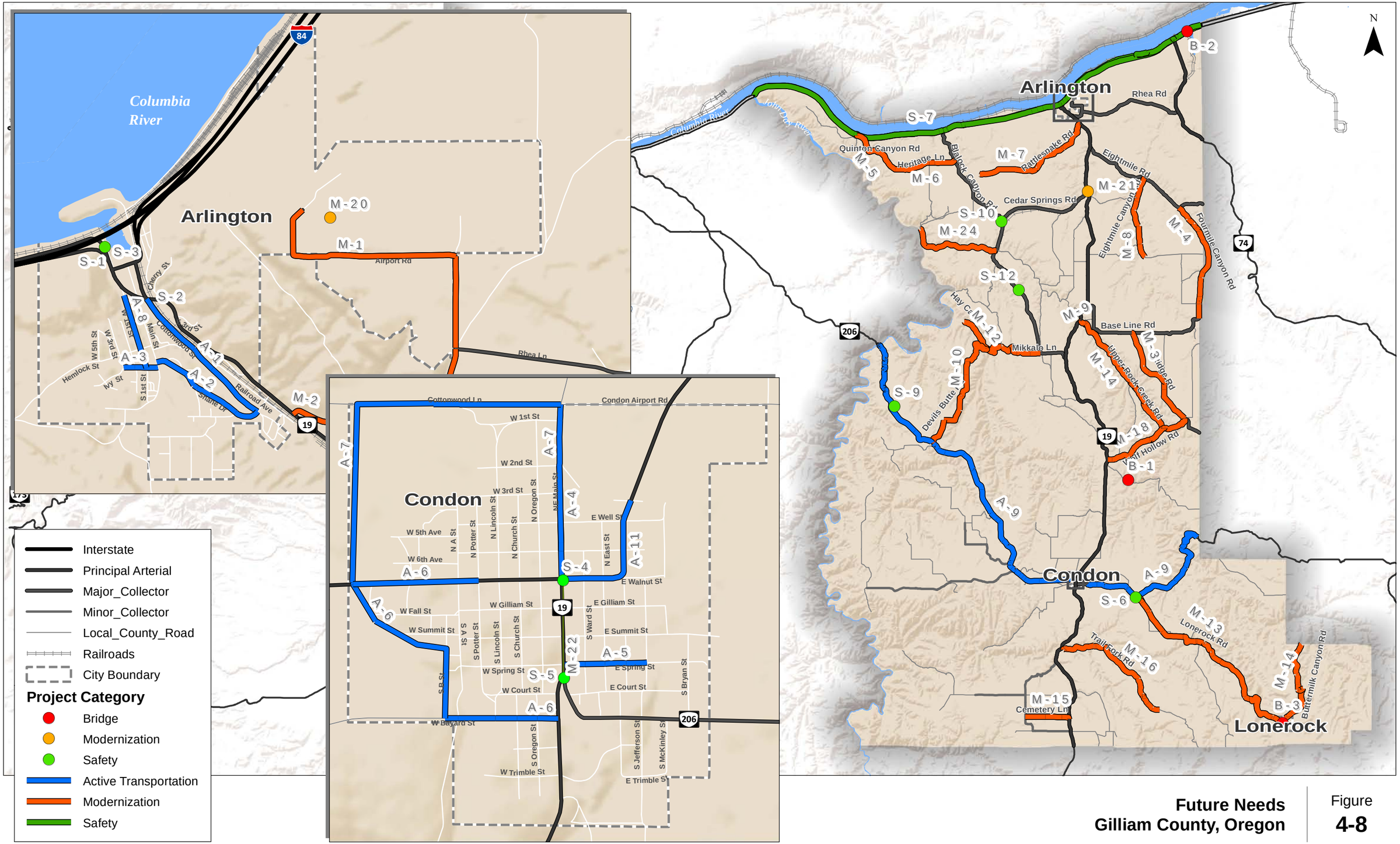
- Gilliam County will need to find additional funding sources to complete any projects beyond the traditional maintenance projects. Historically, the County has only funded general maintenance or safety projects as well as snow and ice removal.

Table 4-4 provides a description of each of the future needs identified in this memo, and Figure 4-8 illustrates the location of each of these needs throughout the County. These needs will be considered by the Project Management and Advisory Committees and will inform the development of Alternatives in Technical Memorandum #5.

Table 4-4. Summary of Future Needs

Number	Category	Location	Start Point	End Point	City	Description of Need
S-1	Safety	I-84 Ramps - Westbound On-Ramp	n/a	n/a	Arlington	Drivers are entering the WB on-ramps when they want to go EB
S-2	Safety	Railroad crossing of OR 19/Locust Street	n/a	n/a	Arlington	Emergency vehicle access concern when train on tracks
S-3	Safety	Railroad crossing of I-84 Ramps/Beech Street	n/a	n/a	Arlington	Emergency vehicle access concern when train on tracks
S-4	Safety	Main Street/Walnut Street	n/a	n/a	Condon	Safety concern due to sight distance and driver expectation
S-5	Safety	E Bayard Street/Main Street	n/a	n/a	Condon	Safety concern
S-6	Safety	Lonerock Road at OR 206	n/a	n/a	County	Restricted sight distance; intersection located on curve
S-7	Safety	I-84 throughout County	West CL	East CL	County	High percentage of weather related crashes.
S-8	Safety	Programmatic	n/a	n/a	County	High percentages of single-vehicle, run-off the road, and speed-related crashes.
S-9	Safety	OR 206, Near MP 22	n/a	n/a	County	Snow drifts frequently at this location
S-10	Safety	Cedar Springs Road/Blalock Canyon Road	n/a	n/a	County	Restricted sight distance due to hill.
S-11	Safety	Travel Speeds in Arlington	n/a	n/a	Arlington	Residents of Arlington feel travel speeds are high. There is also no posted speed limit sign for drivers who enter Arlington from the east off of I-84 along Beech Street.
S-12	Safety	Barnett Road Blind Corners	n/a	n/a	County	There is a blind corner on Barnett Road approximately half way between Mikkalo Lane and Lower Rock Creek Road.
S-13	Safety	Programmatic	n/a	n/a	County	Concern about crashes associated with aging drivers.
S-14	Safety	Programmatic	n/a	n/a	County	Lack of funding for driver education in schools.
B-1	Bridge	Cayuse Canyon Road Bridge	MP 4 / Rock Creek	n/a	County	Bridge sufficiency rating of 31.9; currently closed to all traffic
B-2	Bridge	I-84 EB Bridge	MP 148.6/Willow Creek	n/a	County	Bridge sufficiency rating of 33.3, due to outdated design
B-3	Bridge	Lonerock Road	Lonerock Creek	n/a	County	Bridge sufficiency rating of 57, currently posted for load
A-1	Active Transportation	Cottonwood Street Sidewalks	Shane Dr	OR 19	Arlington	Lacking connected sidewalks
A-2	Active Transportation	Shane Drive Sidewalks	Main St	Cottonwood St	Arlington	Lacking connected sidewalks
A-3	Active Transportation	Ivy Street Sidewalks	W 3rd St	Main St	Arlington	Lacking connected sidewalks; Connects to the Columbia Hills Manor Independent Living Center
A-4	Active Transportation	Sidewalks on East Side of Main Street	W 3rd St	OR 206/Walnut St	Condon	Sidewalks in poor condition
A-5	Active Transportation	Sidewalks on E Spring Street	Main St	S Jefferson St	Condon	No sidewalks connecting to baseball field.
A-6	Active Transportation	Inner Pedestrian Recreational Route West of Condon	W Bayard St/Potter Street	OR 206	Condon	Need for recreational walking route. Residents currently use track.
A-7	Active Transportation	Outer Pedestrian Recreational Route West of Condon	W Bayard St/East of Condon	Cottonwood St/Main St	Condon	Need for recreational walking route. Residents currently use track.
A-8	Active Transportation	W 1st Street	Cedar Street	Ivy Street	Arlington	Lack of connected sidewalks.
A-9	Active Transportation	OR 206	West County Limits (CL)	East CL	County	Popular cycing route with no rest area locations for cyclists
A-10	Active Transportation	Bicycle Parking	n/a	n/a	Cities	Lack of bicycle parking in downtown areas.
A-11	Active Transportation	OR 19 Sidewalks	Main Street	Fairgrounds Driveway	Condon	Lack of sidewalks.
M-1	Modernization	Airport Road	Rhea Road	End of Road	Arlington	Roadway serves truck traffic associated with Arlington Mesa Industrial Park. Roadway has little base rock and lacks shoulders.
M-2	Modernization	Rhea Lane	OR 19	Airport Road	Arlington	Roadway serves truck traffic associated with Arlington Mesa Industrial Park.
M-3	Modernization	Ridge Road	Baseline Rd/Ione Rd	Flett Rd	County	Roadway serves higher volume of agricultural truck traffic than intended based on classification.
M-4	Modernization	Fourmile Canyon Road	Fairview Ln	East CL	County	Roadway serves higher volume of agricultural truck traffic than intended based on classification. (Note: some of this section loops through Morrow County)
M-5	Modernization	Quinton Canyon Road/Heritage Lane	I-84	Heritage Lane	County	Roadway serves higher volume of truck traffic than intended based on classification.
M-6	Modernization	Heritage Lane	Quinton Canyon Road	Blalock Canyon Road	County	Roadway serves higher volume of truck traffic than intended based on classification.
M-7	Modernization	Rattlesnake Road	OR 19	End of Road (West)	County	Roadway serves higher volume of truck traffic than intended based on classification.
M-8	Modernization	Eightmile Canyon Road	Old Tree Ln	Fourmile Canyon Road	County	Roadway serves higher volume of agricultural truck traffic than intended based on classification.
M-9	Modernization	OR 19	Upper Rock Creek Rd	2-3 Miles South of Start	County	This is the only section of the roadway that cannot accommodate oversized freight in 1-lane.

Number	Category	Location	Start Point	End Point	City	Description of Need
M-10	Modernization	Devils Butte Rd	OR 206	Hay Canyon Road	County	Roadway was not intended to serve Cottonwood Canyon State Park traffic, but may in future.
M-11	Modernization	Mikkalo Ln	OR 19	Hay Canyon Road	County	Roadway was not intended to serve Cottonwood Canyon State Park traffic, but may in future.
M-12	Modernization	Hay Canyon Rd	Devils Butte Rd	John Day River	County	Roadway not intended to serve Cottonwood Canyon State Park traffic, but may in future.
M-13	Modernization	Lonerock Road	OR 206	City of Lonerock	County	Roadway serves high traffic volumes as it is the primary access to the Lonerock community; it should be upgraded in functional classification.
M-14	Modernization	Buttermilk Canyon Road	City of Lonerock	East County Limits	County	Road does not serve much traffic because it is only the back way into Lonerock from Morrow County; it should be downgraded in functional classification.
M-15	Modernization	Cemetery Lane	OR 19	Wherli Canyon Ln	County	Road serves agricultural traffic and should be upgraded in functional classification.
M-16	Modernization	Trail Fork Road	OR 19	End of Road	County	Road no longer serves agricultural lands and should be downgraded in functional classification.
M-17	Modernization	Upper Rock Creek Road	OR 19	Flett Road	County	This is an alternate route rather than a primary route and should be downgraded in functional classification.
M-18	Modernization	Wolf Hollow Road	OR 19	Ridge Road	County	This is an alternate route rather than a primary route and should be downgraded in functional classification.
M-19	Parking	Programmatic	n/a	n/a	Arlington	Parking overflow onto streets and downtown area during special summertime events
M-20	Modernization	Arlington Airport	n/a	n/a	Arlington	Currently has unpaved runway
M-21	Modernization	Shutler Station	n/a	n/a	County	Need for rail crossovers to make movements within the park easier.
M-22	Modernization	On-Street Parking on Spaces on Main Street	n/a	n/a	Condon	There are no on-street designated ADA spaces on Main Street.
M-23	Transit	Programmatic	n/a	n/a	County	Lack of funding for additional transit drivers, training, vehicle maintenance, and carports.
M-24	Modernization	Lower Rock Creek Road	End of road/John Day River	Barnett Road	County	Roadway is heavily traveled by rafters & river users but was not designed to carry river traffic.
M-25	Modernization	Condon State Airport	n/a	n/a	Condon	Airport needs upgrades once water service is provided.



Future Needs
Gilliam County, Oregon

Figure
4-8

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Oregon Department of Transportation, US Census

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REFERENCES

1. ODOT Analysis and Procedures Manual
2. Oregon Bicycle and Pedestrian Design Guide
3. 2014 County Road Needs Study

APPENDICES

Appendix A ODOT Future Volume Tables

Appendix B 2035 Future Conditions Operational Analysis Worksheets

Appendix A ODOT Future Volume Tables & Growth Rate Calculations

ODOT FUTURE VOLUME TABLES & GROWTH RATE CALCULATIONS

Future (2035) traffic volumes were developed using Oregon Department of Transportation's (ODOT's) historical trends method, which relies on traffic volumes from previous years to develop a growth pattern for use in projecting future volumes. ODOT maintains Future Volumes Tables that summarize current and future year traffic volumes for state roadways throughout the State. To calculate the growth rate for Gilliam County, all Gilliam County locations were selected from the Future Volumes Tables. Based on guidance from ODOT's Analysis Procedure Manual (APM), data with a RSQ value of less than 0.75 was not used. The growth rates of the remaining locations were averaged to develop the 1.25 percent annual growth rate, which was used to project future traffic volumes at all study intersections and segments.

ODOT Future Volume Table (Gilliam County Locations with RSQ > 0.75)

MP	Description of Location	Traffic Volumes			RSQ*	Highway Location	Calculated Growth Rate
		2011	2012	2033			
146.16	8.34 miles east of Arlington Interchange	10400		13500	0.8093	I-84	1.35%
147.78	Heppner Jct. Automatic Traffic Recorder, Sta. 11-009, 0.43 mile east of Heppner Highway No. 52 (OR74)	10800		11700	0.8805	I-84	0.38%
39.54	0.02 mile south of Shannon Road		590	730	0.8013	OR 19 - Rural	1.13%
43.81	0.20 mile south of Trail Fork Road		570	710	0.7724	OR 19 - Rural	1.17%
45.39	0.10 mile south of Wehrli Canyon Loop		510	630	0.7551	OR 19 - Rural	1.12%
50.41	0.60 mile north of Carter Hill Road		510	670	0.9400	OR 19 - Rural	1.49%
41.74	Condon Automatic Traffic Recorder, Sta. 11-004, 0.86 mile east of John Day Highway No. 5 (OR19)		190	200	0.8635	OR 206 - Condon	0.25%

*RSQ = R-squared value, which describes the fit of the data to a line.

Calculations: (1.35% + 1.13% + 1.17% + 1.12% + 1.49%)/5 = 1.25%

Appendix B 2035 Future Conditions Operational Analysis Worksheets

MOVEMENT SUMMARY

Site: Main St/E Walnut St

Gilliam County
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: S Main Street											
3	L2	30	4.0	0.086	1.2	LOS A	0.3	8.9	0.25	0.12	33.2
8	T1	46	2.0	0.086	1.2	LOS A	0.3	8.9	0.25	0.12	33.4
18	R2	35	6.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	34.7
Approach		111	3.8	0.086	0.8	LOS A	0.3	8.9	0.17	0.08	33.7
East: E Walnut Street											
1	L2	32	10.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.00	35.4
6	T1	18	1.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.00	37.2
16	R2	15	4.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.00	35.7
Approach		65	6.1	0.038	0.0	NA	0.0	0.0	0.00	0.00	36.0
North: N Main Street											
7	L2	5	3.0	0.044	0.8	LOS A	0.2	4.2	0.15	0.07	33.3
4	T1	27	4.0	0.044	0.8	LOS A	0.2	4.2	0.15	0.07	33.3
14	R2	6	19.0	0.044	0.8	LOS A	0.2	4.2	0.15	0.07	32.9
Approach		38	6.4	0.044	0.8	LOS A	0.2	4.2	0.15	0.07	33.3
West: W Walnut Street											
5	L2	6	26.0	0.089	9.5	LOS A	0.4	9.3	0.21	0.10	28.7
2	T1	35	8.0	0.089	9.5	LOS A	0.4	9.3	0.21	0.10	29.4
12	R2	37	2.0	0.089	9.5	LOS A	0.4	9.3	0.21	0.10	29.6
Approach		78	6.6	0.089	9.5	LOS A	0.4	9.3	0.21	0.10	29.4
All Vehicles		292	5.4	0.089	2.9	NA	0.4	9.3	0.14	0.07	32.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Gilliam County TSP

Vistro File: K:\...\Future no build.vistro Scenario: Base Scenario
Report File: K:\...\futurenobuild_report.pdf 1/8/2015

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Main Street/E Bayard Street	Two-way stop	HCM2010	EBT	0.001	10.3	B
3	Cottonwood Street / Beech Street	Two-way stop	HCM2010	NBT	0.004	10.1	B
4	I-84 Ramps / Beech Street	Two-way stop	HCM2010	WBT	0.001	10.1	B
5	OR 74 / I-84 Eastbound Ramps	Two-way stop	HCM2010	EBT	0.002	9.4	A
6	OR 19 / Cedar Springs Lane	Two-way stop	HCM2010	EBL	0.081	9.5	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value; for all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
#2: Main Street/E Bayard Street

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Main Street			Main Street			E Bayard Street			Access		
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Speed [mph]	25.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Main Street			Main Street			E Bayard Street			Access		
Base Volume Input [veh/h]	3	34	6	29	34	15	21	1	4	2	2	24
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles Percentage [%]	6.00	6.00	6.00	7.00	7.00	7.00	12.00	12.00	12.00	5.00	5.00	5.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	0	0	0	0	0	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]	3	34	6	29	34	15	21	1	4	2	2	24
Peak Hour Factor	0.950	0.950	0.950	0.950	0.950	0.950	0.850	0.850	0.850	0.850	0.850	0.850
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	1	9	2	8	9	4	6	0	1	1	1	7
Total Analysis Volume [veh/h]	3	36	6	31	36	16	25	1	5	2	2	28
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/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	0.01	0.00	0.00	0.03
d_M, Delay for Movement [s/veh]	7.36	0.00	0.00	7.39	0.00	0.00	10.06	10.31	8.80	9.70	10.19	8.64
Movement LOS	A	A	A	A	A	A	B	B	A	A	B	A
95th-Percentile Queue Length [veh]	0.09	0.09	0.09	0.17	0.17	0.17	0.13	0.13	0.13	0.10	0.10	0.10
95th-Percentile Queue Length [ft]	2.27	2.27	2.27	4.28	4.28	4.28	3.14	3.14	3.14	2.53	2.53	2.53
d_A, Approach Delay [s/veh]	0.49			2.76			9.86			8.80		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.39											
Intersection LOS	B											

Intersection Level Of Service Report
#3: Cottonwood Street / Beech Street

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Cottonwood Street			Arlington Port Road			Beech Street			I-84 Ramps		
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Speed [mph]	25.00			25.00			25.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Cottonwood Street			Arlington Port Road			Beech Street			I-84 Ramps		
Base Volume Input [veh/h]	12	3	19	2	12	14	9	30	21	12	14	4
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles Percentage [%]	22.00	22.00	22.00	18.00	18.00	18.00	11.00	11.00	11.00	16.00	16.00	16.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	0	0	0	0	0	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]	12	3	19	2	12	14	9	30	21	12	14	4
Peak Hour Factor	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	3	1	5	1	3	4	2	8	6	3	4	1
Total Analysis Volume [veh/h]	13	3	20	2	13	15	9	32	22	13	15	4
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
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	0.02	0.00	0.02	0.00	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.78	10.06	8.88	9.67	10.05	8.69	7.35	0.00	0.00	7.48	0.00	0.00
Movement LOS	A	B	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.13	0.13	0.13	0.11	0.11	0.11	0.13	0.13	0.13	0.07	0.07	0.07
95th-Percentile Queue Length [ft]	3.22	3.22	3.22	2.71	2.71	2.71	3.20	3.20	3.20	1.67	1.67	1.67
d_A, Approach Delay [s/veh]	9.30			9.34			1.05			3.04		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.84											
Intersection LOS	B											

Intersection Level Of Service Report
#4: I-84 Ramps / Beech Street

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Locust Street			I-84 Ramps			Access			Beech Street		
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Speed [mph]	25.00			45.00			20.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Locust Street			I-84 Ramps			Access			Beech Street		
Base Volume Input [veh/h]	2	53	14	12	39	2	2	1	2	18	1	18
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles Percentage [%]	27.00	27.00	27.00	26.00	26.00	26.00	6.00	6.00	6.00	13.00	13.00	13.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	0	0	0	0	0	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]	2	53	14	12	39	2	2	1	2	18	1	18
Peak Hour Factor	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	1	14	4	3	10	1	1	0	1	5	0	5
Total Analysis Volume [veh/h]	2	56	15	13	41	2	2	1	2	19	1	19
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/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	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
d_M, Delay for Movement [s/veh]	7.54	0.00	0.00	7.61	0.00	0.00	9.58	9.94	8.56	9.69	10.15	8.90
Movement LOS	A	A	A	A	A	A	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.16	0.16	0.16	0.13	0.13	0.13	0.02	0.02	0.02	0.14	0.14	0.14
95th-Percentile Queue Length [ft]	4.06	4.06	4.06	3.15	3.15	3.15	0.44	0.44	0.44	3.50	3.50	3.50
d_A, Approach Delay [s/veh]	0.21			1.77			9.24			9.32		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	3.03											
Intersection LOS	B											

Intersection Level Of Service Report
#5: OR 74 / I-84 Eastbound Ramps

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name	OR 74			OR 74			I-84 Exit Ramp			I-84 Entrance Ramp		
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Speed [mph]	55.00			55.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	OR 74			OR 74			I-84 Exit Ramp			I-84 Entrance Ramp		
Base Volume Input [veh/h]	0	6	12	2	8	0	2	2	5	0	0	0
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles Percentage [%]	6.00	6.00	6.00	2.00	2.00	2.00	22.00	22.00	22.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	0	0	0	0	0	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]	0	6	12	2	8	0	2	2	5	0	0	0
Peak Hour Factor	1.000	0.950	0.950	0.950	0.950	1.000	0.950	0.950	0.950	0.950	0.950	0.950
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	2	3	1	2	0	1	1	1	0	0	0
Total Analysis Volume [veh/h]	0	6	13	2	8	0	2	2	5	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	7.26	0.00	0.00	8.88	9.41	8.57	8.70	9.15	8.37
Movement LOS		A	A	A	A		A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.03	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.47	0.47	0.00	0.72	0.72	0.72	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00			1.45			8.83			8.74		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.47											
Intersection LOS	A											

Intersection Level Of Service Report
#6: OR 19 / Cedar Springs Lane

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.081

Intersection Setup

Name	OR 19		OR 19		Cedar Springs Lane	
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 Pocket	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	175.00	100.00	100.00
Speed [mph]	55.00		55.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		no	

Volumes

Name	OR 19		OR 19		Cedar Springs Lane	
Base Volume Input [veh/h]	2	11	20	11	61	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	10.00	10.00	17.00	17.00	40.00	40.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	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]	2	11	20	11	61	8
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	3	5	3	18	2
Total Analysis Volume [veh/h]	2	12	21	12	72	9
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/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	0.00	0.00	0.08	0.01
d_M, Delay for Movement [s/veh]	7.36	0.00	0.00	0.00	9.47	9.16
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.03	0.03	0.00	0.00	0.30	0.30
95th-Percentile Queue Length [ft]	0.69	0.69	0.00	0.00	7.46	7.46
d_A, Approach Delay [s/veh]	1.05		0.00		9.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.08					
Intersection LOS	A					