



## TECHNICAL MEMORANDUM #3

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Date: August 20, 2015 Project #: 18018.0

To: Mike Kuntz, Jackson County

CC: John McDonald, Oregon Department of Transportation, Region 3

From: Matthew Bell and Susan Wright, P.E. Kittelson & Associates, Inc.

Project: Jackson County Transportation System Plan (TSP) Update

Subject: Draft Technical Memorandum #3: Current Transportation System Operations

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This memorandum provides an overview of the current transportation system operations and deficiencies within Jackson County. This memorandum includes an analysis of existing traffic operations and safety at the study intersections and along several major roadways throughout Jackson County. The information included in this memorandum will be used to determine the existing transportation system needs for the Jackson County Transportation System Plan (TSP) update. The information was developed based the existing transportation system inventory presented in Tech Memo #2 as well as information and direction provided by Jackson County and the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU). *Additional information on the key assumptions and methodologies associated with this analysis is provided in Appendix "A".*

### CURRENT TRANSPORTATION SYSTEM OPERATIONS ANALYSIS

The current transportation system operations analysis identifies how the study area's transportation system operates today. This analysis includes an evaluation of traffic operations at the study intersections, including non-motorized (pedestrian and bicycle) operations. The results of this analysis will be used to identify existing transportation system needs at the study intersections for motorized and non-motorized travel modes. Figure 1 in the Map Atlas illustrates the study area for the Jackson County TSP update and the location of the study intersections.

Kittelison & Associates, Inc. (KAI) staff visited and inventoried the study area in March 2015. At that time, KAI collected information on existing transportation system conditions along County roadways and at the study intersections. Figure 2 in the Map Atlas illustrates the lane configurations and traffic control devices at the study intersections. *Additional information on the site visit is provided in Appendix "B".*

## Traffic Counts

Traffic counts were conducted at the study intersections in June and July 2014. All of the counts were conducted on a typical mid-week day over a 24-hour, 16-hour, or 3-hour time period. All of the counts include the total number of pedestrians, bicyclists, and motor vehicles that entered the study intersections in 15-minute intervals during the morning (6:00 to 9:00 a.m.) and/or evening (3:00 to 6:00 p.m.) peak time periods and on 60-minute intervals during all other times of the day. The traffic counts conducted during the morning and evening peak time periods were reviewed to determine individual intersection and system-wide peak hours for the operational analysis. The counts were also seasonally adjusted to reflect 30<sup>th</sup> highest hour traffic volumes and balanced consistent with the methodology provided in the ODOT Analysis Procedures Manual (APM). Figures 3 and 4 in the Map Atlas summarize the traffic counts at the study intersections during the weekday a.m. and weekday p.m. peak hours, respectively. *The traffic count worksheets are included in Appendix "C".*

## Analysis Methodology and Operational Standards

The intersection operations analysis was conducted using Synchro 8 software, which implements the methodologies outlined in the Highway Capacity Manual (HCM). Based on direction provided by TPAU, the HCM 2000 methodology was used to analyze traffic operations at the signalized intersections while the HCM 2010 methodology was used to analyze traffic operations at the unsignalized intersections.

The intersection operations analysis results were compared to operational standards and targets used by the County and ODOT to assess performance and potential areas for improvement. Both the County and ODOT use volume/capacity (v/c) ratios, which compare the volume of traffic entering an intersection to the theoretical capacity of the intersection to accommodate traffic. A v/c ratio of 1.0 indicates that an intersection is operating at capacity while a v/c ratio over 1.0 indicates that the intersection's capacity is exceeded. The County and ODOT v/c standards are summarized below.

- The County's current TSP sets a maximum v/c ratio of 0.85 for all signalized and unsignalized intersections located outside an MPO boundary and a v/c ratio of 0.95 for all signalized and unsignalized intersections located inside an MPO boundary.
- Table 6 of the *Oregon Highway Plan (OHP)* provides maximum v/c ratios for all signalized and unsignalized intersections located outside the Portland Metro area. The standards vary based on the classification of the roadway (Statewide Highway, Districts Highway, etc.), designation (Freight Route, Expressway, etc.), posted speed, and location (MPO, non-MPO, etc.). The ODOT controlled intersections within the study area are located along OR62, OR66, OR99, OR140, OR230, OR234, OR238, and at the I-5/Siskiyou Highway interchange.

## Intersection Operations

The traffic volumes shown in Figures 3 and 4 were used to analyze traffic operations at the study intersections. Figures 3 and 4 and Tables 1 and 2 summarize the results of the traffic operations analysis at the study intersections for the weekday a.m. and weekday p.m. peak hours, respectively.

Note: traffic operations were evaluated at 19 of the study intersections during the morning peak hour and 30 of the study intersections during the evening peak hour.

**Table 1: Existing Intersection Operations – Weekday AM Peak Hour**

Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Agency	Standard	Met?
1	Hamrick Road/E Pine Street-Biddle Road	A	9.8	0.64	County	0.95	Yes
2	Table Rock Road/Biddle Road	C	25.1	0.65	County	0.95	Yes
3	Table Rock Road/Vilas Road	C	24.3	0.66	County	0.95	Yes
4	Table Rock Road/Antelope Road	B	16.3	0.47	County	0.95	Yes
5	Table Rock Road/Wilson Road	B	11.8	0.15	County	0.95	Yes
6	Table Rock Road/Gregory Road	D	25.2	0.16	County	0.95	Yes
7	Kershaw Road/OR140	C	16.8	0.40	ODOT	0.85	Yes
8	OR62/OR140-Leigh Way	C	34.4	0.85	ODOT	0.85	Yes
9	OR62/OR234-Del Isle Way	C	16.6	0.01	ODOT	0.70	Yes
10	OR62/OR230	A	8.9	0.01	ODOT	0.70	Yes
11	OR62/Vilas Road	C	34.0	0.79	ODOT	0.85	Yes
12	I-5 SB Ramp /Siskiyou Highway	A	8.5	0.02	ODOT	0.75	Yes
13	I-5NB Ramp/Siskiyou Highway	A	8.9	0.00	ODOT	0.75	Yes
14	OR62/Tiller Trail Highway (OR 227)	A	9.5	0.06	ODOT	0.70	Yes
15	OR62/Mill Creek/1 <sup>st</sup> Street	A	9.7	0.02	ODOT	0.70	Yes
16	OR62/Butte Falls Highway	C	21.3	0.21	ODOT	0.70	Yes
17	OR66/Siskiyou Highway (OR273)	A	9.2	0.03	ODOT	0.75	Yes
18	Rogue River Highway/OR234	A	9.2	0.05	ODOT	0.75	Yes
19	OR238/Upper Applegate Road	A	9.1	0.13	ODOT	0.75	Yes

**Table 2: Existing Intersection Operations – Weekday PM Peak Hour**

Map ID	Intersection	Level of Service (LOS)	Delay (Sec)	Volume/ Capacity (V/C)	Agency	Standard	Met?
1	Hamrick Road/E Pine Street-Biddle Road	C	26.3	0.87	County	0.95	Yes
2	Table Rock Road/Biddle Road	C	28.9	0.67	County	0.95	Yes
3	Table Rock Road/Vilas Road	C	34.3	0.81	County	0.95	Yes
4	Table Rock Road/Antelope Road	C	28.5	0.75	County	0.95	Yes
5	Table Rock Road/Wilson Road	C	16.9	0.17	County	0.95	Yes
6	Table Rock Road/Gregory Road	F	>50	0.46	County	0.95	Yes
7	Kershaw Road/OR140	C	19.4	0.49	ODOT	0.85	Yes
8	OR62/OR140-Leigh Way	C	31.6	0.84	ODOT	0.85	Yes
9	OR62/OR234-Del Isle Way	D	31.4	0.53	ODOT	0.70	Yes
10	OR62/OR230	A	9.1	0.04	ODOT	0.70	Yes
11	OR62/Vilas Road	D	44.9	0.90	ODOT	0.85	No
12	I-5 SB Ramp /Siskiyou Highway	A	8.5	0.02	ODOT	0.75	Yes
13	I-5NB Ramp/Siskiyou Highway	A	9.0	0.03	ODOT	0.75	Yes
14	OR62/Tiller Trail Highway (OR 227)	B	11.5	0.11	ODOT	0.70	Yes
15	OR62/Mill Creek/1 <sup>st</sup> Street	A	9.7	0.03	ODOT	0.70	Yes
16	OR62/Butte Falls Highway	B	13.1	0.15	ODOT	0.70	Yes

17	OR66/Siskiyou Highway (OR273)	A	9.4	0.01	ODOT	0.75	Yes
18	Rogue River Highway/OR234	A	9.7	0.05	ODOT	0.75	Yes
19	OR238/Upper Applegate Road	A	9.2	0.16	ODOT	0.75	Yes
20	Foothill-Phoenix Road/Hillcrest Road	C	20.4	0.56	County	0.95	Yes
21	Foothill Road/McAndrew Road WB Ramp	E	38.9	0.32	County	0.95	Yes
22	Foothill Road/McAndrew Road EB Ramp	C	19.9	0.45	County	0.95	Yes
23	Foothill Road/Lone Pine Road	C	21.4	0.04	County	0.95	Yes
24	Foothill Road/Coker Butte Road	B	11.3	0.08	County	0.95	Yes
25	Hanley Road/Beall Lane	B	10.2	0.34	County	0.95	Yes
26	E Evans Creek Road at Minthorne Road	A	8.7	0.02	County	0.85	Yes
27	Columbus Road/South Stage Road	C	15.7	0.64	County	0.95	Yes
28	Atlantic Avenue/Antelope Road	B	11.0	0.02	County	0.95	Yes
29	OR66/Old Hyatt Prairie Road	-	0.0	0.00	ODOT	0.75	Yes
30	Antelope Road/Kirtland Road	B	13.1	0.16	County	0.95	Yes

As shown in Figure 3 and 4 and Tables 1 and 2, all of the study intersections currently operate acceptably according to their respective mobility standards with the exception of the OR62/Vilas Road intersection. The following summarizes the deficiencies at the study intersection under existing traffic conditions. *The worksheets used to evaluate existing traffic conditions at the study intersections are included in Appendix “D”.*

- #6 – Table Rock Road/Gregory Road – The Table Rock Road/Gregory Road intersection currently operates at a LOS “F”, but below capacity during the weekday p.m. peak hour. Although the intersection meets its respective mobility standard, LOS “F” represents a significant amount of delay (> 50 seconds) at an unsignalized intersection.
- #11 – OR62/Vilas Road – The OR62/Vilas Road intersection currently operates below capacity, but above its mobility target ( $v/c=0.85$ ) during the weekday p.m. peak hour. This is primarily due to the high volume of eastbound left and southbound through movements that occur at the intersection during the weekday p.m. peak hour.
  - There are separate left turn lanes at the northbound and southbound approaches with protected phasing.
  - There are separate left-turn lanes at the eastbound and westbound approaches with permitted phasing.
  - There are separate right turn lanes at each approach with overlap at the eastbound and westbound approaches.

### Intersection Queues

A queuing analysis was conducted at the seven signalized study intersections using Synchro 8 software. Table 3 summarizes the 95<sup>th</sup> percentile queues during the weekday a.m. and p.m. peak hours, which have been rounded to the nearest 25-foot (1 vehicle length). The storage lengths reflect the striped storage for each movement at the intersections.

**Table 3: Existing 95<sup>th</sup> Percentile Queues – Weekday AM and PM Peak Hours**

Map ID	Intersection	Movement	Weekday AM Queue (Feet)	Weekday PM Queue (feet)	Storage (feet)	Adequate?
1	Hamrick Road/E Pine Street-Biddle Road	EBL	150	375	380	Yes
		WBL	25	25	305	Yes
		NBR	0	0	150	Yes
2	Table Rock Road/Biddle Road	EBL	200	125	450	Yes
		EBR	50	50	225	Yes
		WBL	25	75	75	Yes
		WBR	50	75	200	Yes
		NBL	50	100	100	Yes
		SBL	150	150	100	No
3	Table Rock Road/Vilas Road	EBL	100	100	85	No
		WBL	125	200	115	No
		NBL	50	75	90	Yes
		NBR	75	75	215	Yes
		SBL	100	125	90	No
4	Table Rock Road/Antelope Road	EBR	0	25	150	Yes
		WBL	100	225	275	Yes
		NBL	25	25	100	Yes
		SBL	50	50	270	Yes
8	OR62/OR140-Leigh Way	NBL	75	150	130	No
		NBR	50	175	60	No
		SBL	75	125	200	Yes
11	OR62/Vilas Road	EBL	250	#375	150	No
		EBR	50	75	200	Yes
		WBL	75	100	50	No
		NBL	175	#375	250	No
		NBR	25	50	90	Yes
		SBL	100	150	200	Yes
		SBR	275	250	90	No
20	Foothill-Phoenix Road/Hillcrest Road	175	NA	125	175	Yes
		100	NA	50	100	Yes
		15	NA	100	175	Yes
		150	NA	50	150	Yes

# 95<sup>th</sup> percentile queues exceed the available capacity; queues may be longer

As shown in Table 3, five of the seven signalized study intersections currently have one or more movements where the 95<sup>th</sup> percentile queues exceed the available striped storage for that movement. In most cases the queues can be accommodated within a center two-way left-turn lane that extends beyond the striped storage, with the exception of the northbound right-turn at the #8 - OR62/OR140-Leigh Way intersection and the southbound right-turn at the #11 - OR62/Vilas Road intersection. These queues have the potential to extend into the adjacent through lane and block traffic. *The worksheets used to evaluate existing queuing at the signalized study intersections are included in Appendix "E".*

## Non-Motorized Operations

As indicated previously, the traffic counts include the total number of pedestrians and bicyclists that entered the study intersections in 15-minute intervals during the morning (6:00 to 9:00 a.m.) and/or evening (3:00 to 6:00 p.m.) peak time periods and on 60-minute intervals during all other times of the day. Tables 4 and 5 summarize the peak hour pedestrian and bicycle volumes by crossing location and direction of travel. The intersections shown in grey are located along urban facilities.

**Table 4: Existing Peak Hour Pedestrian Volumes by Crossing Location**

Map ID	Intersection	North Leg (am/pm)	East Leg (am/pm)	South Leg (am/pm)	West Leg (am/pm)	Total (am/pm)
1	Hamrick Road/E Pine Street-Biddle Road	1/2		1/1		2/3
2	Table Rock Road/Biddle Road		1/1			1/1
3	Table Rock Road/Vilas Road				0/1	0/1
4	Table Rock Road/Antelope Road	1/0				1/0
5	Table Rock Road/Wilson Road					0/0
6	Table Rock Road/Gregory Road		1/0	1/0		2/0
7	Kershaw Road/OR140	1/0				1/0
8	OR62/OR140-Leigh Way	1/2	1/0		0/2	2/4
9	OR62/OR234-Del Isle Way					0/0
10	OR62/OR230					0/0
11	OR62/Vilas Road		1/0			1/0
12	I-5 SB Ramp /Siskiyou Highway					N/A
13	I-5NB Ramp/Siskiyou Highway					0/0
14	OR62/Tiller Trail Highway (OR 227)	0/1				0/1
15	OR62/Mill Creek/1 <sup>st</sup> Street		0/1		0/1	0/2
16	OR62/Butte Falls Highway					0/0
17	OR66/Siskiyou Highway (OR273)					0/0
18	Rogue River Highway/OR234				1/0	1/0
19	OR238/Upper Applegate Road					0/0
20	Foothill-Phoenix Road/Hillcrest Road					NA/0
21	Foothill Road/McAndrew Road WB Ramp					NA/0
22	Foothill Road/McAndrew Road EB Ramp					NA/0
23	Foothill Road/Lone Pine Road					NA/0
24	Foothill Road/Coker Butte Road					NA/0
25	Hanley Road/Beall Lane	NA/5				NA/5
26	E Evans Creek Road at Minthorne Road					NA/0
27	Columbus Road/South Stage Road					NA/0
28	Atlantic Avenue/Antelope Road	NA/1				NA/1
29	OR66/Old Hyatt Prairie Road	NA/6	NA/2			NA/8
30	Antelope Road/Kirtland Road					NA/0

The peak hour pedestrian volumes shown in Table 4 indicate that there is a low level of pedestrian activity at a majority of the study intersections. The intersections with the highest level of pedestrian activity are located along urban facilities and within predominantly urban areas as summarized below.

- #1 – Hamrick Road/E Pine Street-Biddle Road – a total of two pedestrians were observed at the intersection during the morning and three pedestrians were observed during the evening peak hours. The intersection is located along an urban minor collector (E Pine Street-Biddle Road) and therefore, should provide sidewalks at the eastbound and westbound approaches at a minimum.
  - The intersection is currently signalized with pedestrian pushbuttons, countdown signal heads, and marked crosswalks at each leg.
  - There are sidewalks in all four corners of the intersection and along the south side of Biddle Road and the east side of Hamrick Road south of the intersection.
- #8 – OR62/OR140-Leigh Way – a total of two pedestrians were observed at the intersection during the morning and four pedestrians were observed during the evening peak hours. The intersection is located at the intersection of two ODOT facilities in a predominantly urban environment.
  - The intersection is currently signalized with pedestrian pushbuttons, countdown signal heads, and marked crosswalks at the north, east, and west legs.
  - There are sidewalks in the northeast, northwest, and southwest corners of the intersection and along both sides of OR62 north of the intersection and both sides of Leigh Way west of the intersection.
- #25 - Hanley Road/Beall Lane – a total of five pedestrians were observed at the intersection during the evening peak hour. The intersection is located at the intersection of an urban minor arterial (Hanley Road north of the intersection), and urban major collector (Beall Lane east of the intersection), a rural minor arterial, and an rural major collector and therefore, should provide sidewalks on the north and east legs at a minimum; however, the intersection is also located in a predominantly residential area adjacent to a neighborhood retail store.
  - The intersection is currently all-way stop-controlled (AWSC) with overhead beacons to alert motorists of the intersection.
  - There are no signed or striped crosswalks at the intersection and no sidewalks along Hanley Road and Beall Road north and east of the intersection.
  - There are 4 to 6-foot shoulders along both sides of Hanley Road and Beall Road south and west of the intersection.
- #29 - OR66/Old Hyatt Prairie Road – a total of eight pedestrians were observed at the intersection during the evening peak hour. The intersection is located at the intersection of an ODOT facility (OR66) with a Bureau of Land Management (BLM) facility (Old Hyatt Prairie Road) in a predominantly rural area adjacent to the Pacific Crest trail system.
  - The intersection is currently two-way stop-controlled (TWSC).
  - There are no signed or striped crosswalks at the intersection and no sidewalks.

*Opportunities to improve the pedestrian environment at these intersections, such as wider shoulders in the rural areas, sidewalks in the urban areas, and appropriate crossing treatments, will be evaluated as part of the alternatives analysis and considered as part of the TSP update.*

**Table 5: Existing Peak Hour Bicycle Volumes by Movement**

Map ID	Intersection	Northbound	Eastbound	Southbound	Westbound	Total
1	Hamrick Road/E Pine Street-Biddle Road	0/1	1/1	2/2	2/0	5/4
2	Table Rock Road/Biddle Road	0/2		0/2		0/4
3	Table Rock Road/Vilas Road	0/1		0/1	0/2	0/4
4	Table Rock Road/Antelope Road	1/0		0/1	2/4	3/5
5	Table Rock Road/Wilson Road	0/1	0/2	0/2		0/5
6	Table Rock Road/Gregory Road	0/1		0/1		0/2
7	Kershaw Road/OR140				1/0	1/0
8	OR62/OR140-Leigh Way	1/3	0/1	5/2	1/0	7/6
9	OR62/OR234-Del Isle Way	0/0				0/0
10	OR62/OR230					0/0
11	OR62/Vilas Road	4/1		2/5		6/6
12	I-5 SB Ramp /Siskiyou Highway					N/A
13	I-5NB Ramp/Siskiyou Highway				1/0	1/0
14	OR62/Tiller Trail Highway (OR 227)		0/1			0/1
15	OR62/Mill Creek/1 <sup>st</sup> Street					0/0
16	OR62/Butte Falls Highway					0/0
17	OR66/Siskiyou Highway (OR273)					0/0
18	Rogue River Highway/OR234				0/1	0/1
19	OR238/Upper Applegate Road					0/0
20	Foothill-Phoenix Road/Hillcrest Road	2	4			6
21	Foothill Road/McAndrew Road WB Ramp					0
22	Foothill Road/McAndrew Road EB Ramp					0
23	Foothill Road/Lone Pine Road					0
24	Foothill Road/Coker Butte Road					0
25	Hanley Road/Beall Lane		1		1	2
26	E Evans Creek Road at Minthorne Road					0
27	Columbus Road/South Stage Road			2	5	7
28	Atlantic Avenue/Antelope Road					0
29	OR66/Old Hyatt Prairie Road					0
30	Antelope Road/Kirtland Road		1			1

The peak hour bicycle volumes shown in Table 5 indicate that there is a moderate level of bicycle activity at several of the study intersections. The locations with the highest level of bicycle activity are summarized below.

- #1 - Hamrick Road/E Pine Road-Biddle Street – a total of five bicyclists were observed at the intersection during the morning peak hour and four bicyclists were observed during the



evening peak hour. The intersection is located along an urban minor collector (E Pine Street-Biddle Road) and therefore, should provide east-west on-street bike lanes at a minimum.

- There are striped bicycle lanes along both sides of E Pine Street west of the intersection and both sides of Biddle Road east of to the intersection – the bicycle lanes along Biddle Road terminate east of Table Rock Road.
  - There are striped bicycle lanes on both sides of Hamrick Road north of the intersections and a wide shoulder (>6-feet) along the west side of Hamrick Road south of the intersection.
  - The bicycle lane at the southbound approach is located between the through and the separate right-turn lane.
- #4 – Table Rock Road/Antelope Road – a total of three bicyclists were observed at the intersection during the morning peak hour and five bicyclists were observed during the evening peak hour. The intersection is located along an urban major arterial (Table Rock Road and Antelope Road east of the intersection) and an urban industrial collector (Antelope Road west of the intersection) and therefore, should provide north-south and east-west bike lanes at a minimum.
- There are striped bicycle lanes along both sides of Antelope Road east of the intersection.
  - The bicycle lane at the westbound approach is located between the through and the separate right-turn lane.
  - There are wide shoulders (4 to 6-feet) along both sides of Table Rock Road north and south of the intersection and Antelope Road west of the intersection.
  - If on-street bicycle lanes are installed along Table Rock Road and Antelope Road, the bicycle lanes at the northbound and eastbound approaches should be between the through and separate right turn lanes.
- #8 - OR62/OR140-Leigh Way – a total of seven bicyclists were observed at the intersection during the morning peak hour and six bicyclists were observed during the evening peak hour. The intersection is located at the intersection of two ODOT facilities in a predominantly retail/commercial area.
- There are striped bicycle lanes along both sides of OR 62 north and south of the intersection.
  - The bicycle lane at the northbound approach is located between the through and the separate right-turn lane.
  - There are striped bicycle lanes on both sides of Leigh Way west of the intersection and a wide shoulder (4 to 6-feet) on the south side of OR140 east of the intersection.

- #11 - OR62/Vilas Road - a total of six bicyclists were observed at the intersection during the morning peak hour and six bicyclists were observed during the evening peak hour. The intersection is located at the intersection of an ODOT facility with an urban minor arterial (Vilas Road west of the intersection) and a rural major collector (Vilas Road east of the intersection), and therefore should provide bike lanes west of the intersection and shoulders east of the intersection at a minimum.
  - There are striped bicycle lanes along OR62 north and south of the intersection.
  - The bike lanes at the northbound and southbound approaches are located between the through and the separate right-turn lanes.
  - There are striped bicycle lanes along both sides of Vilas Road west of the intersection. There is also a striped bicycle lane on the north side of Vilas Road east of the intersection; however, the south side has no bicycle lane and no shoulder.

*Opportunities to improve the bicycle environment at these intersections, such as wider shoulders in the rural areas, striped bike lanes in the urban areas, and appropriate crossing treatments, will be evaluated as part of the alternatives analysis and considered as part of the TSP update.*

## BICYCLE LEVEL OF TRAFFIC STRESS

The bicycle facilities located along select County roadways were evaluated under existing traffic conditions in an effort to identify any potential issues that could be addressed as part of the TSP update. The APM provides a methodology for evaluating bicycle facilities within urban and rural environments that is known as Bicycle Level of Traffic Stress (LTS). As applied by ODOT, this methodology classifies four levels of traffic stress that a cyclist can experience on the roadway, ranging from LTS 1 (little traffic stress) to LTS 4 (high traffic stress). A road segment with a LTS 1 generally has low traffic speeds and low volumes and is suitable for all cyclists, including children. A road segment with a LTS 4 generally has high speeds, high volumes and is perceived as unsafe by most adults. LTS 2 is considered appealing to a majority of the bike-riding population and therefore, is the desired target on most roadways. Figure 5 in the Map Atlas illustrates the results of the LTS analysis for Jackson County.

There results of the analysis indicate that there are three segments with LTS 2, 11 segments with LTS 3, and 21 segments with LTS 4. It is important to note that while some segments with LTS 3 or 4 have shorter segments with lower LTS scores, the LTS of the whole segment is based on the worst LTS.

The following summarizes the segments with LTS 3:

- W Pine Street from Highway 99 to Hanley Road
- W Main Street from Renault Avenue to Hanley Road
- Antelope Road from Kirtland Road to Bigham-Brown Road
- Payne Road from Fern Valley Road to Suncrest Road
- Suncrest Road from Payne Road to West Valley View Road

- West Valley View Road from Suncrest Road to S Valley View Road
- East Valley View Road from South Valley View Road to Butler Creek Road
- Butler Creek Road from E Valley View Road to Eagle Mill Road
- Dark Hollow Road from Pioneer Road (north) to Pioneer Road (south)
- Griffin Creek Road from South Stage Road to Pioneer Road
- Meadows Road from East Evans Creek Road to OR234

A majority of the segments rated LTS 3 have shoulders or striped bike lanes; however, they are too narrow for roadway conditions. In order for these segments to be rated LTS 2, the shoulders would need to be widened to a minimum of 6 feet and the striped bike lanes would need to be widened to 7 feet and/or the posted speed limits would need to be reduced to as low as 30 miles per hour (mph). Enhanced facilities, such as separated multi-use paths, may also be needed in some areas where traffic volumes and/or travel speeds are high.

The following summarizes the segments with LTS 4:

- Hanley Road from W Pine Street to Rossanley Drive
- Old Stage Road from Jacksonville city limits to I-5 Exit 40
- S Stage Road from Highway 99 to Jacksonville
- N Phoenix Road from Phoenix city limits to Barnett Road
- Foothill Road from Hillcrest Road to Corey Road
- Bigham-Brown Road from Antelope Road to Alta Vista Road
- E Pine Street from I-5 northbound ramps to 500' east of Table Rock Road
- Table Rock Road from south touchdown of I-5 overcrossing to OR234
- East Vilas Road from OR62 to Foothill Road
- Fern Valley Road from N. Phoenix to Payne
- Eagle Mill Road from S Valley View Road to Oak Street
- Pioneer Road from Colver Road to Griffin Creek Road
- Houston Road from Colver Road to Coleman Creek Road
- Coleman Creek Road from Pioneer Road to Carpenter Hill Road
- Carpenter Hill Road from Coleman Creek Road to Voorhies Road
- Voorhies Road from Carpenter Hill Road to S Stage Road
- Stewart Avenue from Oak Grove Road to Hull Road
- Hull Road from Stewart Avenue to S Stage Road

- Bellinger Lane from Hull Road to S Stage Road
- E Main Street (Ashland) from Walker Road to OR66
- E Evans Creek Road from Rogue River city limit to Meadows Road

A majority of the segments with LTS 4 have shoulder or striped bike lanes; however, they are too narrow for roadway conditions. In order for these segments to be rated LTS 2, the shoulders would need to be widened to a minimum of 6 feet and the striped bike lanes would need to be widened to 7 feet and/or the posted speed limits would need to be reduced to as low as 30 miles per hour (mph). Enhanced facilities, such as separated multi-use paths, may also be needed in some areas where traffic volumes and/or travel speeds are high. *Additional information on the Bicycle LTS analysis results is included in Appendix "F".*

*Opportunities to improve the bicycle environment along the segments with an LTS 3 or higher, such as wider shoulders in the rural areas and striped bike lanes in the urban areas, will be evaluated as part of the alternatives analysis and considered as part of the TSP update.*

## CRASH ANALYSIS

A crash analysis was conducted at the study intersections and along select County facilities in an effort to identify any potential safety issues that could be addressed as part of the TSP update. The crash analysis includes a review and summary of data obtained from ODOT for the five-year period from January 1, 2009 through December 31, 2013. The data includes the location, type, and severity of all crashes that occurred along County and ODOT facilities within Jackson County, as well as detailed information on the crashes (year, month, day, time, weather, number, age, and gender of drivers/passengers, direction, actions, errors, causes, etc.).

A majority of roadways within Jackson County are narrow, two-lane roads, with relatively low traffic volumes and high travel speeds. A majority of roadways also have limited sight distance due to substandard horizontal and vertical curvature as well as vegetation and other physical and geographical features along the sides of the roadways. The result is a high number of high-speed crashes where motorists lose control of their vehicles, drive off-the side of the road, and collide with various fixed-objects (trees, rocks, embankments, etc.), and/or other vehicles on the roadway. The intersection and segment crash data summarized below identifies many of these types of crashes and more; however, a more system-wide review of historical crash data is required to better understand the challenges along rural County roadways.

### Intersection Crash Analysis

Figure 6 in the Map Atlas illustrates the location and severity of crashes along all County and ODOT facilities. The crash data at the study intersections was compiled and analyzed for crash patterns, potential causes, and potential countermeasures. Table 6 summarizes the location, type, severity, and number of crashes that occurred at the study intersections over the 5-year period.

**Table 6: Intersection Crash Summary (January 1, 2009 – December 31, 2013)**

Map ID	Intersection	Collision Type								Severity			Total	Crash Rate per MEV	Exceed 90 <sup>th</sup> Percentile Rate?
		Angle	Turning	Side-swipe	Rear End	Head On	Fixed Object	Ped/Bike	Other	PDO	Injury	Fatal			
1	Hamrick Road/E Pine Street-Biddle Road	3	18		4					14	11	0	25	0.60	No
2	Table Rock Road/Biddle Road		3		7					5	5	0	10	0.23	No
3	Table Rock Road/Vilas Road	5	12		11				3	14	17	0	31	0.68	No
4	Table Rock Road/Antelope Road		3				1			1	3	0	4	0.17	No
5	Table Rock Road/Wilson Road		5		1					4	2	0	6	0.23	No
6	Table Rock Road/Gregory Road		3		6		2	1		4	7	1	12	0.55	No
7	Kershaw Road/OR140	12	1							2	11	0	13	0.92	No
8	OR62/OR140				4				1	3	2	0	5	0.09	No
9	OR62/OR234-Del Isle Way		6				1			2	5	0	7	0.42	No
10	OR62/OR230								1	1	0	0	1	0.42	No
11	OR62/Vilas Road	3	15	1	13			1	2	16	19	0	35	0.52	No
12	I-5 SB Ramp /Siskiyou Highway								1	1	0	0	1	1.00	Yes
13	I-5NB Ramp/Siskiyou Highway									0	0	0	0	0.00	No
14	OR62/Tiller Trail Highway (OR 227)				1					0	1	0	1	0.12	No
15	OR62/Mill Creek/1 <sup>st</sup> Street									0	0	0	0	0.00	No
16	OR62/Butte Falls Highway		2				1			3	0	0	3	0.28	No
17	Siskiyou Highway/OR66								1	1	0	0	1	0.34	No
18	Rogue River Highway/OR234									0	0	0	0	0.00	No
19	OR238/Upper Applegate Road								1	1	0	0	1	0.22	No
20	Foothill-Phoenix Road/Hillcrest Road									0	0	0	0	0.00	No
21	Foothill Road/McAndrew Road WB Ramp		2		1					2	1	0	3	0.14	No
22	Foothill Road/McAndrew Road EB Ramp		2							2	0	0	2	0.09	No
23	Foothill Road/Lone Pine Road		1				1			2	0	0	2	0.10	No
24	Foothill Road/Cocker Butte Road				6		1			3	4	0	7	0.59	Yes
25	Hanley Road/Beall Lane									0	0	0	0	0.00	No
26	E Evans Creek Road at Minthorne Road		2							1	1	0	2	0.50	Yes
27	Columbus Road/Stage Road	1	1		1					3	0	0	3	0.25	No
28	Atlantic Avenue/Antelope Road						1			1	0	0	1	0.19	No

29	OR66/Old Hyatt Prairie Road									0	0	0	0	0.00	No
30	Antelope Road/Kirtland Road									0	0	0	0	0.00	No

PDO = Property Damage Only  
MEV = Million Entering Vehicles

Table 6 also includes a calculated crash rate for each study intersection per million entering vehicles (MEV). This rate was compared to the 90<sup>th</sup> percentile rates for similar facilities included in Table 4-1 of the APM to identify intersections for further review. As shown in Table 6, a total of three study intersections currently exceed the 90<sup>th</sup> percentile crash rates for similar intersections. Of the three intersections, one experienced more than two crashes over the five year period, and therefore was identified for further evaluation.

- #24 - Foothill Road/Coker Butte Road – Seven crashes were reported at the intersection over the five year period of which four resulted in an injury and three resulted in property damage only. Six of the crashes were reported as rear end crashes and one as a fixed object crash, which is typical of two-way stop controlled intersections. . All of the rear-end crashes involved a northbound motorist that failed to avoid another slowed or stopped northbound motorist waiting to make a left-turn onto Coker Butter Road. The fixed object crash involved an eastbound motorist that failed to maintain the travel lane and hit the ditch/embankment.
  - There is currently no separate left or right turn lanes at the northbound and southbound approaches to separate slowed or stopped vehicles from high-speed through vehicles.
  - The eastbound approach has a flared right-turn lane.
  - The eastbound and westbound approaches are stop controlled.

As shown in Table 6, several additional intersections experienced a relatively high number of crashes over the five year period. The following provides a summary of the trends and patterns these additional study intersections.

- #1 - Hamrick Road/E Pine Street-Biddle Road – A total of 25 crashes were reported at the intersection over the five year period of which 11 resulted in an injury and 14 resulted in property damage only. A majority of the crashes were reported as turning movement crashes, which is typical of signalized intersections with permitted and protected-permitted phasing. Of the turning movement crashes, a majority involved an eastbound left-turning motorist that failed to yield the right-of-way and collided with a westbound through motorist
  - The intersection currently has separate left turn lanes at the eastbound and westbound approaches with protected-permitted phasing (the signal at the westbound approach is a dog-house).
  - The northbound and southbound approaches have shared through-left turn lanes with permitted phasing and a negative off-set.
- #3 - Table Rock Road/Vilas Road - A total of 31 crashes were reported at the intersection over the five year period of which 17 resulted in an injury and 14 resulted in property damage only. A majority of the crashes were reported as turning movement crashes, which

is typical of signalized intersections with protected-permitted phasing. Of the turning movement crashes, a majority involved a southbound left-turning motorist that failed to yield the right-of-way and collided with a northbound through motorist.

- The intersection currently has separate left turn lanes at the north, south, east, and westbound approaches with protected-permitted phasing.
  - The northbound approach has a separate channelized right-turn lane with yield control.
- #7 - Kershaw Road/OR140 - A total of 13 crashes were reported at the intersection over the five year period of which 11 resulted in an injury and two resulted in property damage only. A majority of the crashes were reported as angle crashes, which is typical of a two-way stop controlled intersection. Of the angle crashes, a majority involved northbound and southbound through motorists failing to yield the right-of-way and colliding with eastbound and westbound through motorists.
    - The northbound and southbound approaches are stop controlled.
    - Beacons are provided overhead to alert motorist of the intersection.
    - There appears to be sufficient sight-distance at each approach.
  - #11 - OR 62/Vilas Road – A total of 35 crashes were reported at the intersection over the five year period of which 19 resulted in an injury and 16 resulted in property damage only. A majority of the crashes were reported as turning movement and rear-end crashes, which is typical of a signalized intersection with permitted phasing. Of the turning movement crashes, a majority involved an eastbound left-turning motorist that failed to yield the right-of-way and collided with a westbound through motorist. Of the reach-end crashes a majority involved a northbound or southbound motorist that failed to avoid a slowed or stopped motorist not waiting to make a left.
    - The intersection currently has separate left-turn lanes at the northbound and southbound approaches with protected phasing.
    - The eastbound and westbound approaches have separated left-turn lanes with permitted phasing.
    - The northbound, southbound, and eastbound approaches have separated right-turn lanes.
    - The Crater Lake Avenue/Vilas Road intersection is located approximately 140-feet east of the OR 62/Vilas Road intersection. Based on anecdotal information provided by the County, the proximity of the two intersections creates safety issues at both intersections that should be addressed.

No trends or patterns were identified at the remaining study intersections that require further evaluation as part of the TSP update. *Appendix "G" contains the crash data provided by ODOT.*



Opportunities to improve traffic operations and safety at these intersections, such as signing and striping, separate left- and right-turn lanes, signal timing and phasing, will be evaluated as part of the alternatives analysis and considered as part of the TSP update.

### Segment Crash Analysis

Segment crash rates were calculated and compared with official published crash rates from ODOT *Crash Tables – Table II*, which provides 90<sup>th</sup> percentile crash rates by functional classification. Ten segments were analyzed for crash rates. Table 7 reports the crash rate analysis findings. Cells that are highlighted represent crash rates that are higher than the 90<sup>th</sup> percentile crash rate for that type of facility.

**Table 7: Segment Crash Summary (2009-2013)**

Roadway	Segment	Number of Crashes	Segment Length	ADT	Crash Rate	90 <sup>th</sup> Percentile Crash Rate
Foothill Rd	Hillcrest to Lone Pine	21	0.26	4,879	<b>9.01</b>	1.36
	Lone Pine Road to Coker Butte	41	2.06	6,228	<b>1.75</b>	1.36
	Coker Butte to Corey	46	2.88	6,228	<b>1.41</b>	1.36
Old Stage Rd	Jacksonville City Limits to Tami Lane	2	1.08	2,269	0.45	1.36
	Tami Lane to Ross Lane	4	0.90	2,283	1.06	1.36
	Ross Lane to Beall Lane	6	1.27	1,503	<b>1.72</b>	1.36
	Beall Lane to Taylor Road	10	0.85	2,110	<b>3.06</b>	1.36
	Taylor Road to Scenic Ave	2	1.38	2,227	0.36	1.36
	Scenic Ave to I-5 exit	27	4.77	2,562	1.21	1.36
Table Rock Road	Morningside to Biddle Road	51	1.28	17,283	<b>1.26</b>	1.15
	Biddle Road to E Villas Road	74	0.76	17,283	<b>3.10</b>	1.15
	E Villas Road to Wilson	17	0.50	18,266	1.02	1.15
	Wilson to West Gregory	36	0.99	16,933	<b>1.18</b>	1.15
	West Gregory to Antelope Road	33	1.14	14,545	1.09	1.15
	Antelope Road to Kirtland Rd	8	0.54	8,434	0.95	1.15
	Kirtland Road to Modoc/Bybee Ferry Road	9	1.24	7,291	0.54	1.15
	Modoc/Bybee Ferry Road to Highway 234	31	4.55	2,703	<b>1.38</b>	1.36
Antelope	Kirtland to Table Rock Road	9	1.20	3,040	135	1.36
	Kirtland to Agate Road	21	1.52	13,550	0.56	0.76
	Agate Road to Hwy 62	28	0.33	8,703	<b>5.41</b>	1.15
	Hwy 62 to Division Road	13	0.15	10,799	4.27	1.15
	Division Road to Hale Way	7	0.46	7,452	1.12	1.15
	Hale Way to Atlantic Ave	9	0.97	4,999	1.01	1.15
	Atlantic Ave to Bighma-Brown	2	0.83	2,367	0.56	1.36
Meadows Rd	E Evans Creek to Beagle Road	9	5.23	549	<b>1.72</b>	1.36
	Beagle Road to Highway 234	4	2.75	723	1.10	1.36

E Evans Creek Rd	Rogue River city limit to Forest Hills Road	30	3.56	4,715	0.98	1.36
	Forest Hills Road to Minthorne Road	7	1.61	2,968	0.80	1.36
	Minthorne Road to Pleasant Creek Road	8	1.40	2,503	1.26	1.36
	Pleasant Creek to Covered Bridge Road	0	0.56	1,284	0.00	1.36
	Covered Bridge Road to East of Sykes Road	1	1.58	1,040	0.33	1.36
	East of Sykes Road to Meadows Road	9	12.51	570	0.69	1.36
Pioneer Rd	Colver Road to Coleman Creek Road	5	1.24	1,630	1.36	1.96
	Coleman Creek Road to Dark Hollow Road	2	0.66	1,237	1.34	1.96
	Dark Hollow Road to Carpenter Hill Road	6	2.21	747	<b>1.99</b>	1.96
	Carpenter Hill Road to Dark Hollow Road	8	0.47	1,106	<b>8.47</b>	1.96
	Dark Hollow Road to Griffin Creek Road	3	0.79	1,367	1.52	1.96
S Stage Rd	Highway 99 to Voorhies Road	5	0.25	6,561	1.70	1.15
	Voorhies Road to Kings Highway	15	1.68	5,723	0.86	1.15
	Kings Highway to Columbus Avenue	6	0.57	5,537	1.05	1.15
	Columbus Avenue to Orchard Home	6	0.43	4,438	1.72	1.15
	Orchard Home to Hull Road	9	1.04	3,868	<b>1.23</b>	1.15
	Hull Road to Arnold Lane	11	1.09	4,091	<b>1.35</b>	1.15
	Arnold Lane to Bellinger Lane	2	0.97	3,236	0.35	1.15
	Bellinger Lane to Jacksonville	2	0.56	5,151	0.38	1.15
Hanley Road	W Pine to Ross Lane	7	1.58	4,848	0.50	1.15
	Ross Lane to Rossanley	4	0.32	5,997	1.15	1.36
	Rossanley to Jacksonville City Limits	59	2.15	5,920	<b>2.54</b>	1.36
N Phoenix Rd	Phoenix city limits to Barnett	23	2.30	7,610	0.72	1.15
Upper Applegate Rd	OR 238 to Little Applegate Road	10	2.80	2,685	0.73	1.36
	Little Applegate Road to Carberry Creek Road	28	16.0	1,441	0.67	1.36

As shown in Table 7, a total of 19 segments currently exceed the 90<sup>th</sup> percentile crash rates for the similar facilities. Of the 19 segments, 16 were identified for further evaluation – based on the APM, segments that are less than a mile long tend to show an over-estimated segment crash rate and are impacted more significantly by intersection crashes than longer segments. Six of the segments shorter than a mile that were found to exceed the 90<sup>th</sup> percentile crash rates were analyzed based on engineering judgement. The following segments were analyzed.

- Foothill Road – Hillcrest to Lone Pine – Of the 21 crashes along the segment, 7 were reported as fixed object, which was the most common type of crash on the segment. The majority, 15 crashes, were property damage only crashes and 6 crashes resulted in injury. No fatalities were reported.
- Foothill Road – Lone Pine Road to Coker Butte – Rear-end crashes were the most common type of crash on this segment with 18 of the 41 crashes. Fixed object crashes were the second most common type of crash with 14 crashes. Injuries were reported in 25 of the crashes recorded.
- Foothill Road – Coker Butte to Corey Road – Fixed object and rear-end crashes account for 32 of the 46 reported crashes on the segment, with 20 and 12 crashes, respectively. Almost half, 20 crashes, reported excessive speeds as a factor in the crashes. This segment experienced one fatal crash. The fatality was the result of a head-on collision. Alcohol was not involved but the road surface had precipitation and speed too fast for conditions was the attributing cause from the report.
- Old Stage Road – Ross Lane to Beall Lane – This study section reported six crashes. Fixed object and turning movement were the two crash types reported on the segment with 2 and 4 crashes, respectively. No crash patterns were observed.
- Old Stage Road – Beall Lane to Taylor Road – A total of 10 crashes were reported on the segment. Fixed object crashes accounted for the majority of the crashes on the corridor with six reported. Of the 10 crashes, 8 resulted in an injury, while the other 2 were property damage only.
- Table Rock Road – Morningside to Biddle Road – A total of 51 crashes were reported on the segment. Rear-end account for over half (31) of the crashes recorded on the segment. Turning movement crashes were the second highest with nine crashes. Of the 51 crashes, 31 resulted in an injury and the remaining 20 were property damage only.
- Table Rock Road – Biddle Road to E Villas Road – Of the 74 crashes reported on the segment, the two most common types were turning movement and rear-end with 31 and 26 crashes, respectively. Forty-three crashes resulted in an injury and 31 crashes were reported as property damage only.
- Table Rock Road – Wilson to West Gregory Road – Rear-end crashes account for 19 of the 36 crashes reported on the segment. Of the 36 crashes, 22 resulted in an injury while the other 14 were property damage only. One of the reported crashes involved a pedestrian and resulted in an injury. The crash report cited the cause of the collision to be from the pedestrian being illegally in the roadway.
- Table Rock Road – Modoc/Bybee Ferry Road to OR234 – Of the 31 crashes along the segment, 11 were reported as fixed object, the most common type. Turning movement crashes followed with 8 crashes. Two-thirds of the crashes reported injuries and just under

half of the crashes occurred under lighting other than day light. No street lights are present on this section of roadway which may be a contributing factor.

- Antelope Road – Agate Road to OR62 – A total of 28 crashes were recorded on the segment, 15 of which were rear-end crashes. Fifteen of the crashes resulted in injuries while the other 13 were property damage only.
- Meadows Road – E Evans Creek to Beagle Road – Fixed object crashes were the most common on this segment of Meadows Road with five of the nine recorded crashes. There were no fatalities but seven crashes reported injuries.
- Pioneer Road – Dark Hollow Road (south) to Carpenter Hill Road – A total of six crashes were recorded on this segment, of which four were fixed object collisions. The severity of the six crashes was evenly split between injury and property damage only. Two crashes occurred when there was ice on the roadway surface; both of these crashes were fixed object and speed too fast for conditions was cited as the cause.
- Pioneer Road – Carpenter Hill Road to Dark Hollow Road – A total of eight crashes were reported on the segment. Turning movement crashes accounted for half (4) of the crashes recorded and fixed object crashes accounted for 3 crashes. Of the crashes reported, three resulted in an injury and the other five were property damage only.
- S Stage Road – Orchard Home Road to Hull Road – Of the nine crashes recorded on the segment, five were turning movement crashes. Four of the crashes resulted in injuries while the other five were property damage only. No fatality crashes were reported.
- S Stage Road – Hull Road to Arnold Lane – Fixed object and turning movement crashes each accounted for the four of the 11 crashes on the segment. Six of the crashes resulted in injuries while the other five were property damage only. No fatality crashes were reported.
- Hanley Road – Rossanley to Jacksonville City Limits – A total of 59 crashes were recorded during the five year period. Of the 59 crashes, the two most common types were turning movement and fixed object with 29 and 19 crashes, respectively. An injury resulted in 36 crashes, 22 crashes were property damage only, and one crash resulted in a fatality. The fatal crash was a fixed object crash. Alcohol was not reported as a factor; driving in excess of posted speed was cited as a cause.

For all segments with crash rates higher than the 90<sup>th</sup> percentile crash rate, the three most common collision types are fixed object, rear-end, and turning movement. A majority of the rear-end and turning movement crashes occur at intersections along the segments, while the fixed object crashes occur between the intersections.

*Opportunities to improve traffic operations and safety along these roadway segments, such as signing and striping, separate left- and right-turn lanes will be evaluated as part of the alternatives analysis and considered as part of the TSP update.*

## Statewide Safety Priority Index System

The ODOT Statewide Priority Index System (SPIS) identifies sites along state highways where safety issues warrant further investigation. The SPIS is a method developed by ODOT for identifying hazardous locations on state highways through consideration of crash frequency, crash rate, and crash severity. Sites identified within the top 5 percent are investigated by ODOT staff and reported to the Federal Highway Administration (FHWA). Table 8 summarizes the segments identified by ODOT as within the top five percent over the last five-year period.

**Table 8: ODOT Top 5% SPIS Sites Investigation Report**

Route	Road Name	BMP	EMP	Problem Description	Potential Remedies
OR-62	Crater Lake	0.05	0.14	Rear end crashes due to following too closely	Over capacity intersection and continue to monitor
OR-62	Crater Lake	0.45	0.63	STIP Project (key #13994)	
OR-62	Crater Lake	0.78	0.99	STIP Project (key #13994)	
OR-62	Crater Lake	1.31	1.47	STIP Project (key #13994)	
OR-62	Crater Lake	1.51	1.69	STIP Project (key #13994)	
OR-62	Crater Lake	3.56	3.74	High volumes, multiple conflict points. High speed signalized intersection rear end crashes	Move Crater Avenue away from OR-62
OR-62	Crater Lake	5.95	6.12	High volumes, multiple conflict points. High speed signalized intersection rear end crashes	Safety project on OR-62 from MP 6 to 11. installed signal coordination, continue to monitor
OR-99	Rogue Valley	5.25	5.42	Part of Big X area, congestion and multiple conflict points	Convert Elm Street to right in right out on both sides of highway, install median barrier, no work at Table Rock at this time. Part of (STIP # 14433 & 14434) Work with City of Medford on signal timing
OR-99	Rogue Valley	8.49	8.66	Proximity of train tracks and width of crossing contribute to angle crashes	Extend RED clearance
OR-140	Lake Of The Woods	2.20	2.38	Angle crashes, Failure to Yield ROW, Disregard of TCD, All Daylight	Continue to monitor
OR-238	Jacksonville	0.04	0.21	Non-standard intersection with need for access management related to Union and Harbeck	Coordinate with city for possible future project to address accesses
OR-238	Jacksonville	28.40	28.59	Run off road, high speeds, rural highway	Consider rumble strip installation
OR-238	Jacksonville	34.78	34.96	Drivers making poor decisions pulling out in front of vehicles moving through intersection, both left and right turns to and from highway, high speeds create serious injury crashes	Project completed 2013, Continue to monitor
OR-238	Jacksonville	37.99	38.17	Fatal - Stolen Motorcycle, Speed, Disregard Traffic Device, Disregard Police Officer, Wet conditions, Others - Following too Closely, Rear End, Angle, Turning, Speed	Check signal timing, Continue to monitor

BMP=Beginning Mile Point  
EMP=End Mile Point

*The potential remedies identified by ODOT will be evaluated as part of the alternatives analysis and considered as part of the TSP update.*

## FREIGHT ANALYSIS

The Motor Carrier Transportation Division (MCTD) routes within Jackson County were reviewed along with the following intersections to identify any potential issues with freight truck movements. These routes and intersections experience the highest percentage of heavy vehicle traffic within the County, and therefore should accommodate efficient freight truck movements.

- #10 - OR62/OR230 – There are currently separate right turn lanes at the northbound and westbound approaches to the intersection that appear to be capable of accommodating freight truck movements.
- #8 - OR62/OR140-LeighWay – There are currently separate right-turn lanes at the eastbound and westbound approaches to the intersection that appear to be capable of accommodating freight truck movements.
  - This intersection is identified above as exceeding the 90<sup>th</sup> percentile crash rate for similar facilities.
- #11 - OR 62/Vilas Road – There are currently separate right-turn lanes at the northbound, southbound, and eastbound approaches to the intersection that appear to be capable of accommodating freight truck movements.
  - This intersection is identified above as operating below capacity, but above its mobility target ( $v/c=0.85$ ) during the weekday p.m. peak hour. This intersection is also identified as exceeding the 90<sup>th</sup> percentile crash rate for similar facilities.
- OR62/OR99/OR238 – There are currently separate right-turn lanes at the northbound, southbound, and westbound approaches to the intersection that appear to be capable of accommodating freight truck movements.
- #17 - OR66/Siskiyou Highway (OR273) – There are currently no separate right-turn lanes at the intersection; however, the intersection appears to be capable of accommodating freight truck movements.
- OR99/OR234 – There are currently no separate right-turn lanes at the intersection and while the intersection appears to be capable of accommodating freight truck movements, the narrow travel lanes may make turning movements a challenging for some drivers.
- OR62/OR234 – There is a separate right-turn lane at the southbound approach and a flared right-turn lane at the eastbound approach that appear to be capable of accommodating freight truck movements.

In 2012, The Rogue Valley Metropolitan Planning Organization (RVMPO) released the *Freight Study Report*. The report provides a comprehensive review of existing freight conditions within the RVMPO service area of Jackson County. Based on the report, the primary deficiencies of the Jackson Country roadway network include a lack of viable alternative routes when regular routes are blocked during construction, daily out-of-direction travel to avoid bottlenecks and congestion, and restrictions that prevent the movement of oversized freight at certain times.

- Alternative Routes – Due to congestion, many carriers use alternate routes to avoid the North Medford Interchange and OR62. Heading to I-5 from White City and/or OR62, they use Vilas Road and Table Rock Road. Those heading north often connect with I-5 at the Seven Oaks Interchange via Kirtland Road.
- Out-of-direction travel – Manufacturers are taking circuitous routes to reach their warehouses. Shippers are using alternative routes to OR99, OR62, and particularly the northbound OR62/I-5 interchange. This is placing significant burdens on the Central Point Interchange, Hamrick Road, Table Rock Road, Vilas Road, and Kirtland Road. These routes are de facto freight routes in the area.
  - Table Rock Road which travels north-south through Medford connects to OR234. The road is heavily used by trucks. Expanding the road into a four-lane highway with turning lanes would improve freight movement along this roadway.
  - Many freight truck drivers currently use the Central Point interchange to avoid the North Medford Interchange and OR62 during heavy congestion. A common occurrence is when drivers exit I-5 at the Central Point interchange, head east on Pine Street and then north on Hamrick Road. Further evaluation of potential restrictions of Hamrick Road is provided below.
- Regulatory Issues - Truckers are most disturbed about the state and federal regulations that restrict freight movements on certain roadways and during certain times of the day.
  - Oversize freight loads face several key limitations. For example, a curfew exists on oversize loads from 7:00 to 9:00 a.m., 11:00 a.m. to 1:00 p.m., and 4:00 to 6:00 p.m. on the viaduct and within city limits. There is also a statewide regulation that prevents oversized loads from using state highways on weekends from Memorial Day through Labor Day. These restrictions severely limit the operational capacity of freight movement.

If freight truck movements were restricted on Hamrick Road, drivers would likely continue to use the Central Point interchange to avoid the North Medford Interchange and OR62 during heavy congestion. However, rather than using Hamrick Road drivers would continue east to Table Rock Road where heavy vehicle volumes would increase by approximately 200 percent. Based on the current transportation system operations analysis described above, the Table Rock Road/Biddle Road intersection can accommodate the increase in heavy vehicle volumes. In addition, the intersection currently has separate right-turn lanes at the eastbound, westbound, and southbound approaches that appear to be capable of accommodating freight truck movements.

## EXISTING DEFICIENCIES

The following provides a summary of existing deficiencies in the County related to freight movement, pedestrian and bicycle facilities within the urban areas, and pavement conditions.

## Intersection Deficiencies

Table 9 summarizes the intersection deficiencies identified under existing traffic conditions.

**Table 9: Intersection Deficiencies**

Map ID	Intersection	Deficiency
6	Table Rock Road/Greggory Road	Currently operates below its mobility target (v/c = 0.95), but at LOS F
8	OR62/OR140-Leigh Way	Northbound right-turn queue currently exceeds storage
11	OR62/Vilas Road	Currently operates above mobility target (v/c=0.85)
11	OR62/Vilas Road	Southbound right-turn queue currently exceeds storage

## Bicycle Deficiencies

Table 10 summarizes the bicycle LTS deficiencies identified under existing traffic conditions.

**Table 10: Bicycle LTS Deficiencies**

Road	From/To	Deficiency
W Pine Street	Highway 99 to Hanley Road	Currently rated LTS 3
W Main Street	Renault Avenue to Hanley Road	Currently rated LTS 3
Antelope Road	Kirtland Road to Bigham-Brown Road	Currently rated LTS 3
Payne Road	Fern Valley Road to Suncrest Road	Currently rated LTS 3
Suncrest Road	Payne Road to West Valley View Road	Currently rated LTS 3
West Valley View Road	Suncrest Road to S Valley View Road	Currently rated LTS 3
East Valley View Road	South Valley View Road to Butler Creek Road	Currently rated LTS 3
Butler Creek Road	E Valley View Road to Eagle Mill Road	Currently rated LTS 3
Dark Hollow Road	Pioneer Road (north) to Pioneer Road (south)	Currently rated LTS 3
Griffin Creek Road	South Stage Road to Pioneer Road	Currently rated LTS 3
Meadows Road	East Evans Creek Road to OR234	Currently rated LTS 3
Hanley Road	W Pine Street to Rossanley Drive	Currently rated LTS 4
Old Stage Road	Jacksonville city limits to I-5 Exit 40	Currently rated LTS 4
S Stage Road	Highway 99 to Jacksonville	Currently rated LTS 4
N Phoenix Road	Phoenix city limits to Barnett Road	Currently rated LTS 4
Foothill Road	Hillcrest Road to Corey Road	Currently rated LTS 4
Bigham-Brown Road	Antelope Road to Alta Vista Road	Currently rated LTS 4
E Pine Street	I-5 northbound ramps to 500' east of Table Rock Road	Currently rated LTS 4
Table Rock Road	south touchdown of I-5 overcrossing to OR234	Currently rated LTS 4
East Vilas Road	OR62 to Foothill Road	Currently rated LTS 4
Fern Valley Road	N. Phoenix to Payne Road	Currently rated LTS 4
Eagle Mill Road	S Valley View Road to Oak Street	Currently rated LTS 4
Pioneer Road	Colver Road to Griffin Creek Road	Currently rated LTS 4
Houston Road	Colver Road to Griffin Creek Road	Currently rated LTS 4
Coleman Creek Road	Pioneer Road to Carpenter Hill Road	Currently rated LTS 4
Carpenter Hill Road	Coleman Creek Road to Voorhies Road	Currently rated LTS 4
Voorhies Road	Carpenter Hill Road to S Stage Road	Currently rated LTS 4
Stewart Avenue	Oak Grove Road to Hull Road	Currently rated LTS 4



Hull Road	Stewart Avenue to S Stage Road	Currently rated LTS 4
Bellinger Lane	Hull Road to S Stage Road	Currently rated LTS 4
E Main Street	Walker Road to OR66	Currently rated LTS 4
E Evans Creek Road	Rogue River city limit to Meadows Road	Currently rated LTS 4

In addition to the above LTS deficiencies identified in Table 10, a majority of the County’s rural roadways currently lack standard width shoulders to accommodate cyclists outside of the vehicle travel lane. Appendix “H” contains a comprehensive list of County facilities and a summary of the pedestrian and bicycle system needs within the rural areas.

### Safety Deficiencies

Tables 11 and 12 summarize the safety deficiencies identified at the study intersections and roadway segments under existing traffic conditions.

**Table 11: Safety Deficiencies - Intersections**

Map ID	Intersection	Deficiency
1	Hamrick Road/E Pine Street-Biddle Road	Currently experiences a high volumes of crashes
3	Table Rock Road/Vilas Road	Currently experiences a high volumes of crashes
7	Kershaw Road/OR140	Currently experiences a high volumes of crashes
11	OR 62/Vilas Road	Currently experiences a high volumes of crashes
24	Foothill Road/Coker Butte Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities

**Table 12: Safety Deficiencies - Segments**

Road	From/To	Deficiency
Foothill Road	Hillcrest to Lone Pine Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Foothill Road	Lone Pine Road to Coker Butte	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Foothill Road	Coker Butte to Corey Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Old Stage Road	Ross Lane to Beall Lane	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Old Stage Road	Beall Lane to Taylor Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Table Rock Road	Biddle Road to E Villas Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Table Rock Road	Wilson to West Gregory Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Table Rock Road	Modoc/Bybee Ferry Road to OR234	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Antelope Road	Kirtland Road to Table Rock Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Antelope Road	Agate Road to OR62	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Meadows Road	E Evans Creek to Beagle Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
E Evans Creek Road	Minthorne Road to Pleasant Creek Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Pioneer Road	Dark Hollow Road to Carpenter Hill Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Pioneer Road	Carpenter Hill Road to Dark Hollow Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
S Stage Road	Orchard Home Road to Hull Road	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
S Stage Road	Hull Road to Arnold Lane	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities
Hanley Road	Rossanley to Jacksonville City Limits	Currently exceeds 90 <sup>th</sup> percentile crash rate for similar facilities

## Freight Deficiencies

Table 13 summarizes the intersection deficiencies identified under existing traffic conditions.

**Table 13: Freight Deficiencies**

Deficiency
Alternative Routes
Out-of-Direction Travel
Regulatory Restrictions

## Pedestrian and Bicycle Deficiencies within UGBs

Jackson County currently has jurisdiction over approximately 30 miles of roads located with the boundaries of incorporated cities and approximately 40 miles of roads within the Urban Growth Boundaries (UGB). Appendix "I" contains a comprehensive list of County facilities and a summary of the pedestrian and bicycle system needs within the UGBs of the incorporated Cities.

## Pavement Deficiencies

The following summarizes pavement condition deficiencies for County and State facilities.

### **County Roads**

Jackson County collects an extensive amount of pavement condition data and compiles a pavement condition index (PCI). The County classifies each roadway link as follows:

- 70-100 PCI: Very Good
- 50-70 PCI: Good
- 25-50 PCI: Poor
- 0-25 PCI: Very Poor

The Oregon Department of Transportation goal is to have 78 percent of all their highway road mileage in fair (equivalent to the County's Good) or better (equivalent to the County's Very Good) condition. The pavement management system data shows that of the 767 miles of County roadways, approximately 74% are in "Very Good" condition, 20% are in "Good" condition, 5% miles are in "Poor" condition and 0.1% are in "Very Poor" condition. For the remaining 0.9% of roads under County jurisdiction, the data were missing or incomplete. Hence, the County maintains 94 percent of its roadways in fair or better condition.

### **State Roads**

The Oregon Department of Transportation conducts pavement condition surveys biennially. It employs two separate and distinct pavement rating procedures. The National Highway System (NHS), consisting

of the most important highways, is surveyed using the Objective Rating Method, which provides detailed data on pavement surface distress types, severity, and quantities. The methodology is time- and labor-intensive. NHS highways in Jackson County are I-5, Highway 140, and Highway 62 between I-5 and Highway 140. For non-NHS highways, the subjective Good-Fair-Poor (GFP) Rating Method is used, which relies on visual inspection of pavement surface and is rated from 1.0 to 5.0 based on the ride quality and surface distresses. The indexes resulting from both methodologies are then categorized into five conditions: "Very Good", "Good", "Fair", "Poor" and "Very Poor." Based on the most recent survey data, most of the pavement on the State Highways is in fair, good, or very good condition. Poor pavement condition is reported at the following locations in Jackson County:

- Highway 99 between Central Point and Medford;
- Highway 62 through Shady Cove and east of the junction with Highway 230; and
- Sections of Highway 66 east of I-5.

A section of Highway 99 just above the Oregon-California border is reported as having very poor pavement condition and is the only reported location with very poor conditions in the county.

## Title VI Deficiencies

The following populations and geographic areas have been identified within Jackson County for conducting outreach and data analysis. Special consideration should be taken for public outreach and County transportation facility analysis near areas known to have protected populations to minimize adverse impacts and maximize positive impacts. Areas and populations identified through American Community Survey is not exhaustive of protected populations within Jackson County. It's possible additional areas of protected populations may be identified.

In general, areas in and around White City and portions of the I-5 corridor between the cities of Talent and Ashland contain protected populations that should be considered. Other notable areas are generally distributed in or near cities within the county. More information can be found below.

### ***Non-white Population***

Overall, Jackson County's non-white population is below state averages for comparable years, except for populations identifying as two or more races. The largest minority population identifies as Hispanic or Latino (11.1%), followed by two or more races (3.2%). Two census block groups whose non-white population is higher than state averages are located within White City and in SW Medford.

### ***Population Over 65***

Jackson County's population over the age of 65 is higher than the state average, 18.3% compared to 14.5%. Census block groups within the County where the population exceeds state averages are generally distributed around the county. Census block groups that have the highest percentages, over 41%, are concentrated along the I-5 corridor between the cities of Medford, Phoenix, and Talent.

## ***Households in Poverty***

Approximately 16% of households within Jackson County are below poverty level. Compared to the state average, Jackson County has a slightly higher rate of poverty. Areas with the highest rates of poverty are generally located along the I-5 corridor near or within the city limits of Rogue River, Medford, Talent. Other areas with high rates of poverty outside of the I-5 corridor can be found near White City, Jacksonville, and Shady Cove. The census block group outside of White City to the west has the highest concentration of households in poverty within the county, ranging between 34-46%.

## **FINDINGS AND NEXT STEPS**

The information provided in this memorandum indicates that, there are a number of issues that could be addressed as part of the TSP update. The following provides a summary of issues for further consideration:

- All study intersections currently meet their respective mobility standards with the exception of OR 62/Vilas Road. There are several movements at the signalized intersections that currently exceed the striped storage for the movement.
- There are several gaps in the shoulder facilities along rural county roadways that impact pedestrian and bicycle connectivity.
- There are several gaps in the pedestrian and bicycle facilities (sidewalks and bike lanes) along urban county roadways that impact pedestrian and bicycle connectivity.
- The gaps in shoulders and bicycle facilities limit the potential to attract new riders or encourage existing rider to commute or complete other trips by bike.
- The Foothill Road/Coker Butte Road intersection currently exceeds the 90<sup>th</sup> percentile crash rates for similar facilities – several other intersections experienced a high volumes of crashes over the five-year study period.
- There are several roadway segments that currently exceed the 90<sup>th</sup> percentile crash rates.
- While all of the major intersections located along the MVTD designated freight routes appear to be capable of accommodating freight truck turning movements, many of the routes themselves lack shoulders in the rural areas and sidewalks and bike lanes in the urban areas.
- Based on the RVMPO freight study, there is also a lack of alternative routes, out-of-direction travel, and regulatory restrictions that impact freight movement in the county.
- There are areas in the County with above average concentrations of non-white population, people over 65, and households in poverty where special consideration should be taken for public outreach and to minimize adverse impacts and maximize positive impacts.

The information provided in this memorandum will be used to determine existing transportation system needs for the Jackson County TSP update. The information will be reviewed by the Project Management Team (PMT), Technical Advisory Committee (TAC), Citizens Advisory Committee (CAC), and general public for confirmation of the needs prior to the development of the alternatives analysis and TSP update.

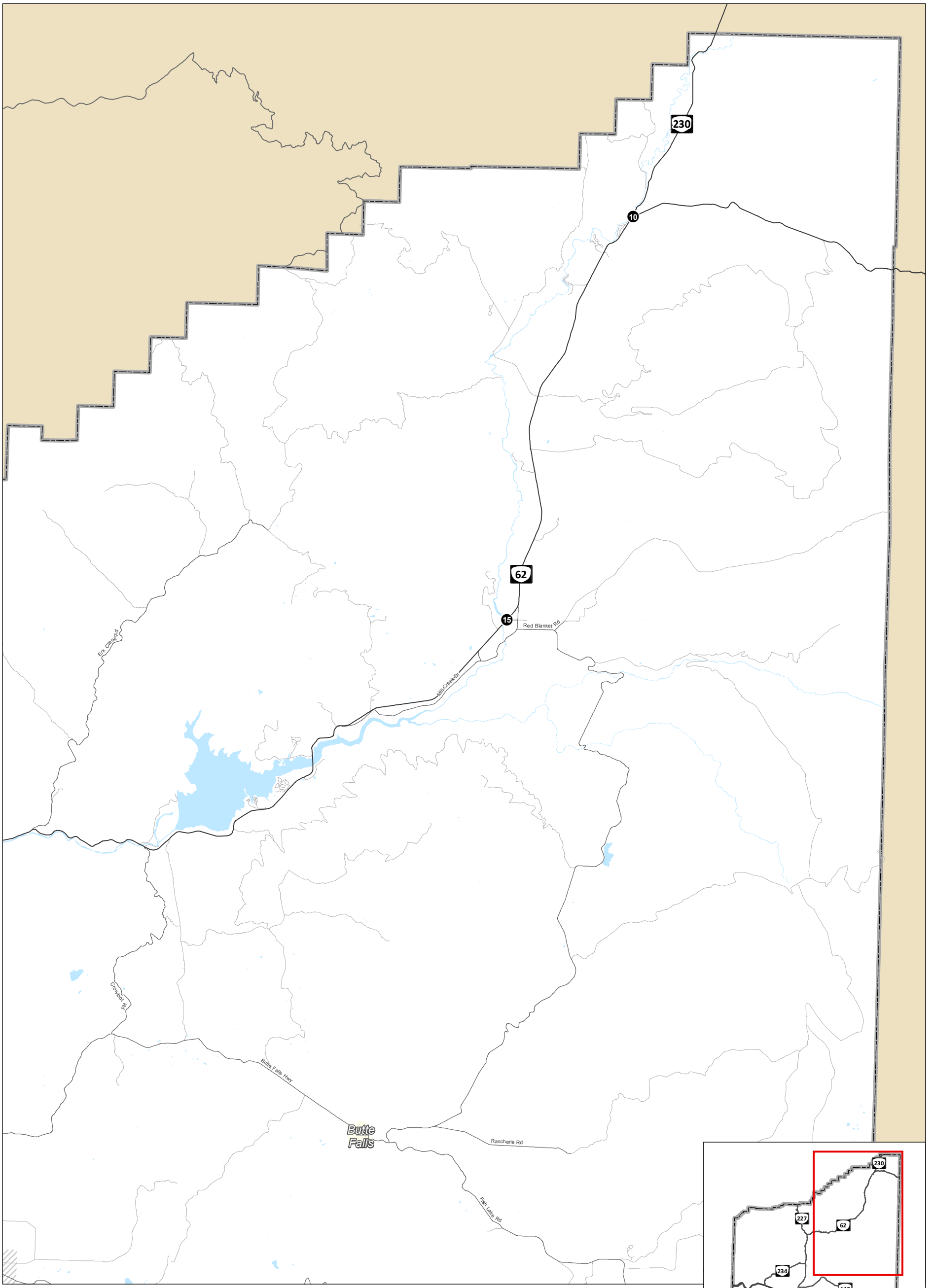
## MAP ATLAS

1. Study Area
2. Lane Configurations and Traffic Control Devices
3. Existing Traffic Conditions, Weekday AM Peak Hour
4. Existing Traffic Conditions, Weekday PM Peak Hour
5. Bicycle Level of Traffic Stress (LTS)
6. Crash Sites (2009-2013)

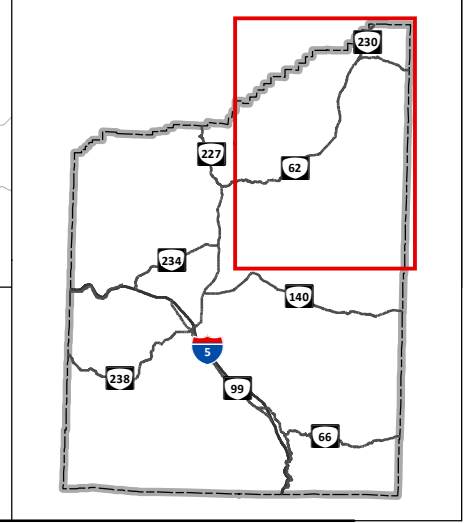
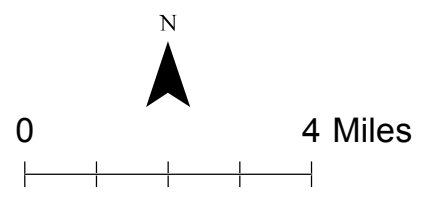
## APPENDIX

- A. Methodology Memo
- B. Site Visit Memo
- C. Traffic Counts
- D. Existing Traffic Conditions Worksheets
- E. Queuing Worksheets
- F. Bicycle Level of Traffic Stress Summary
- G. Crash Data
- H. Pedestrian and Bicycle Needs Summary – Rural Areas
- I. Pedestrian and Bicycle Needs Summary - UGBs

Map Atlas



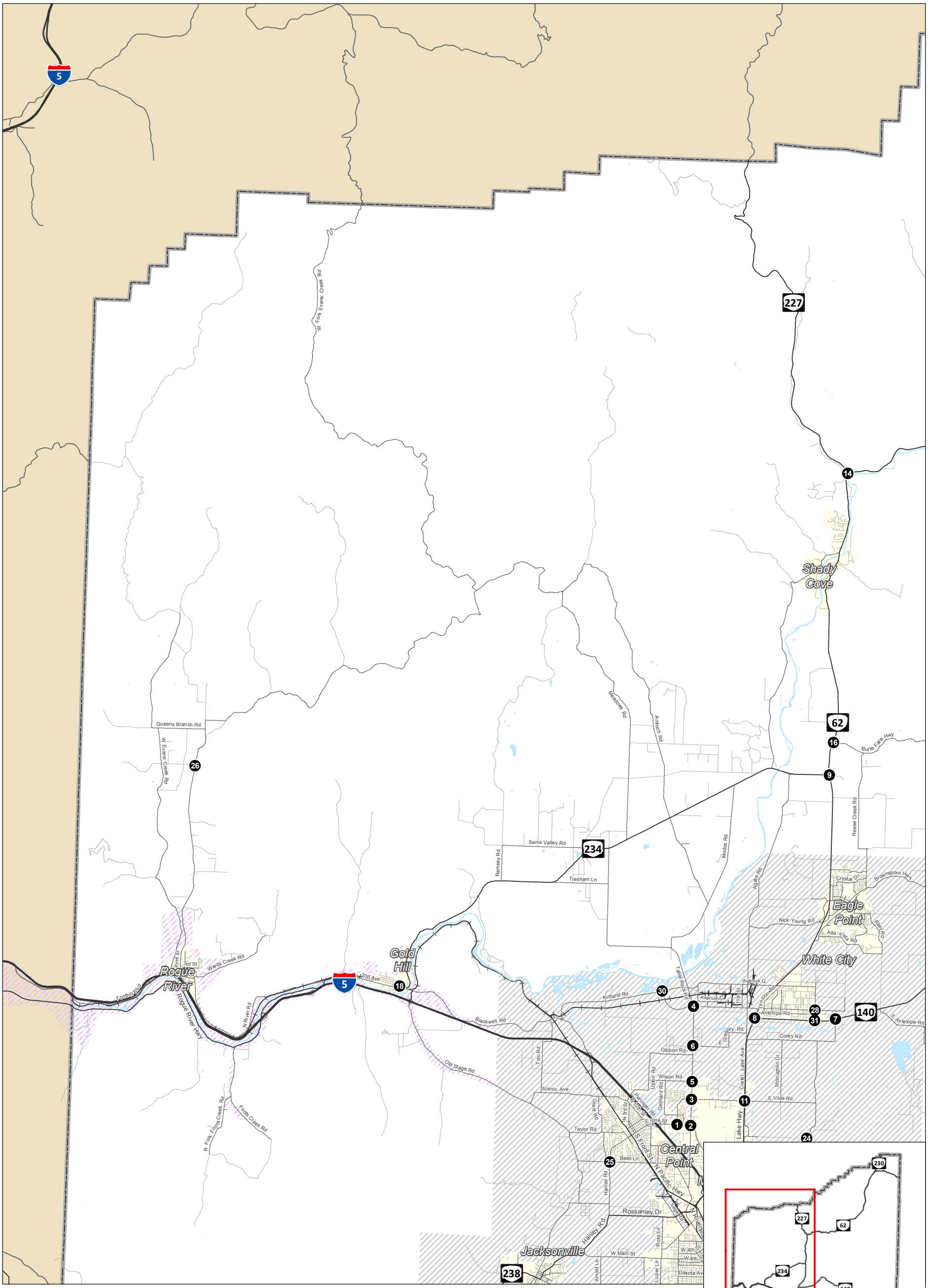
- Study Intersections
- Middle Rogue MPO
- Rogue Valley MPO
- County Boundary



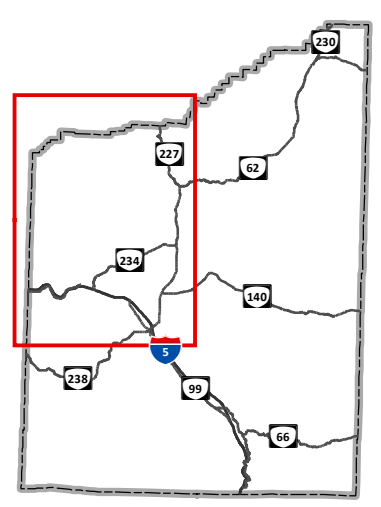
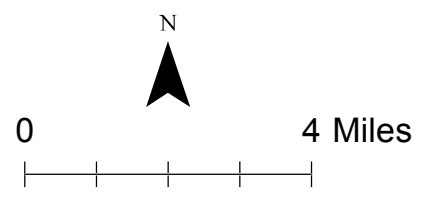
**Study Intersections  
Jackson County, OR**

**Figure  
1A**

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- Study Intersections
- ▨ Middle Rogue MPO
- ▨ Rogue Valley MPO
- ⊕ County Boundary

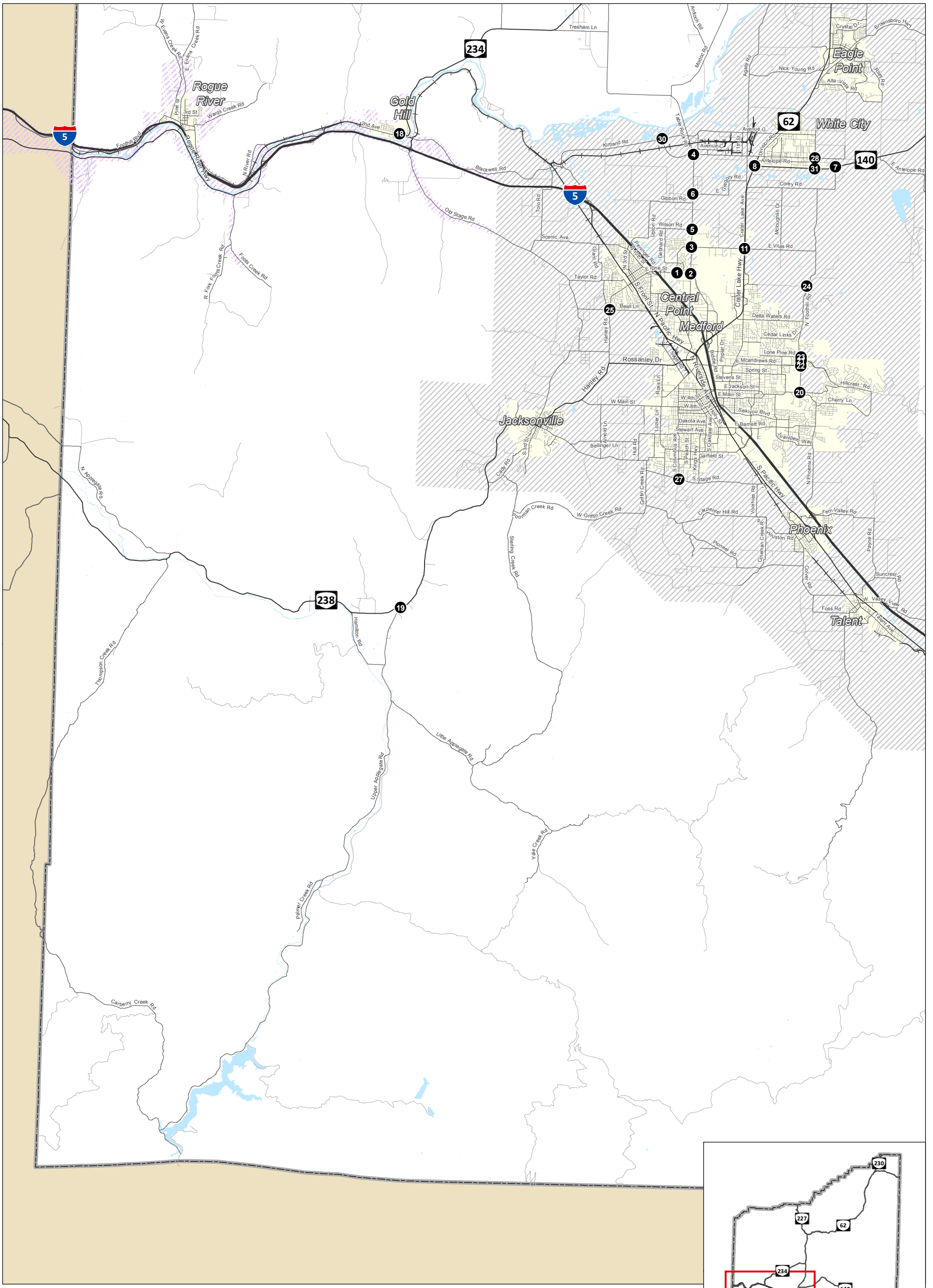


Study Intersections  
Jackson County, OR

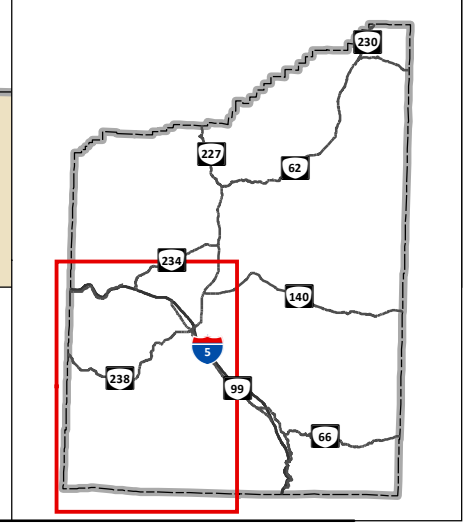
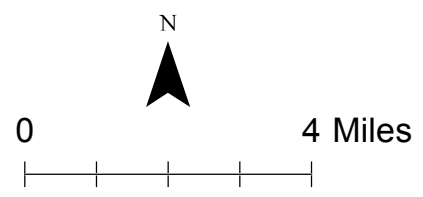
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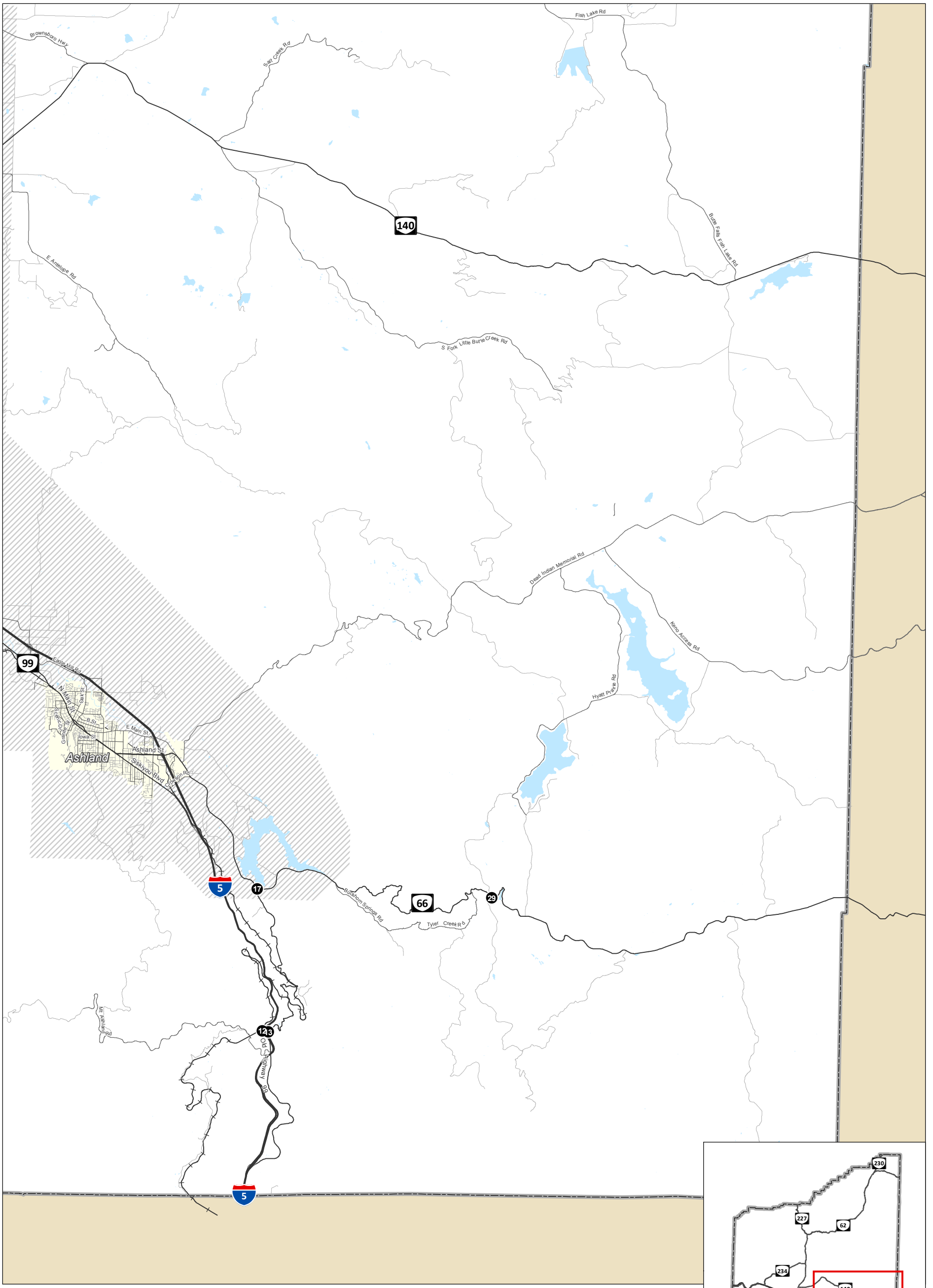
- Study Intersections
- ▨ Middle Rogue MPO
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- ⊕ County Boundary



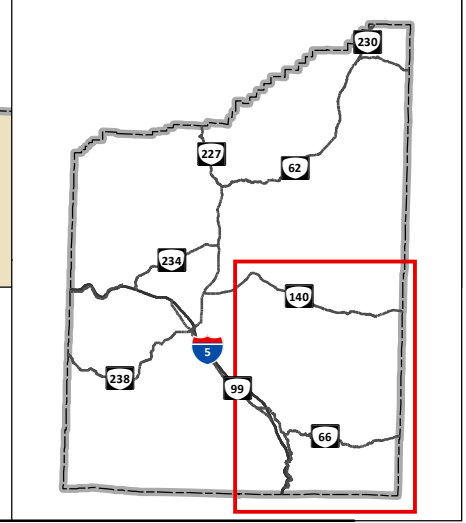
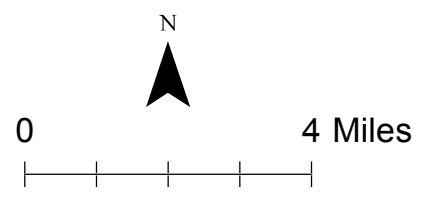
Study Intersections  
Jackson County, OR

Figure  
1C

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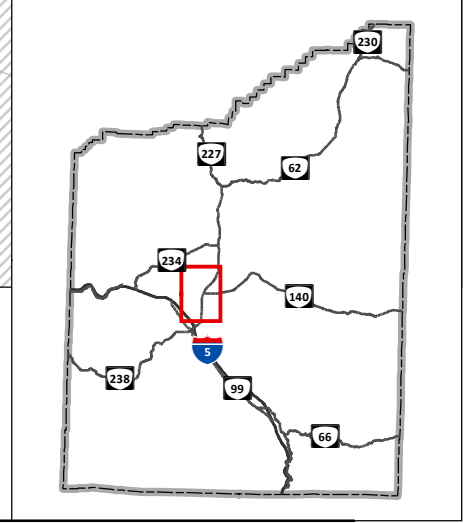
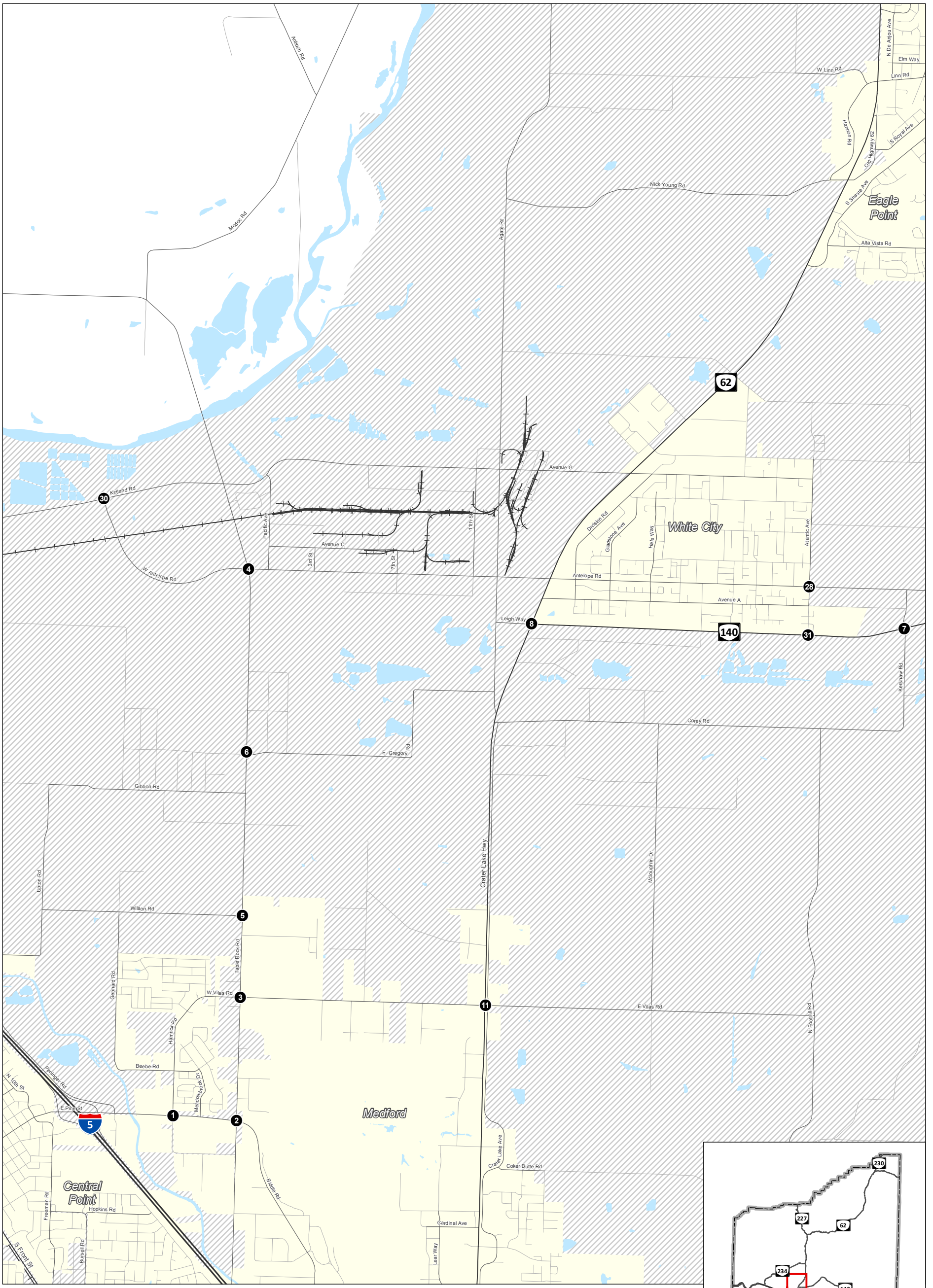
- Study Intersections
- ▨ Middle Rogue MPO
- ▩ Rogue Valley MPO
- ⊕ County Boundary



**Study Intersections  
Jackson County, OR**

**Figure  
1D**

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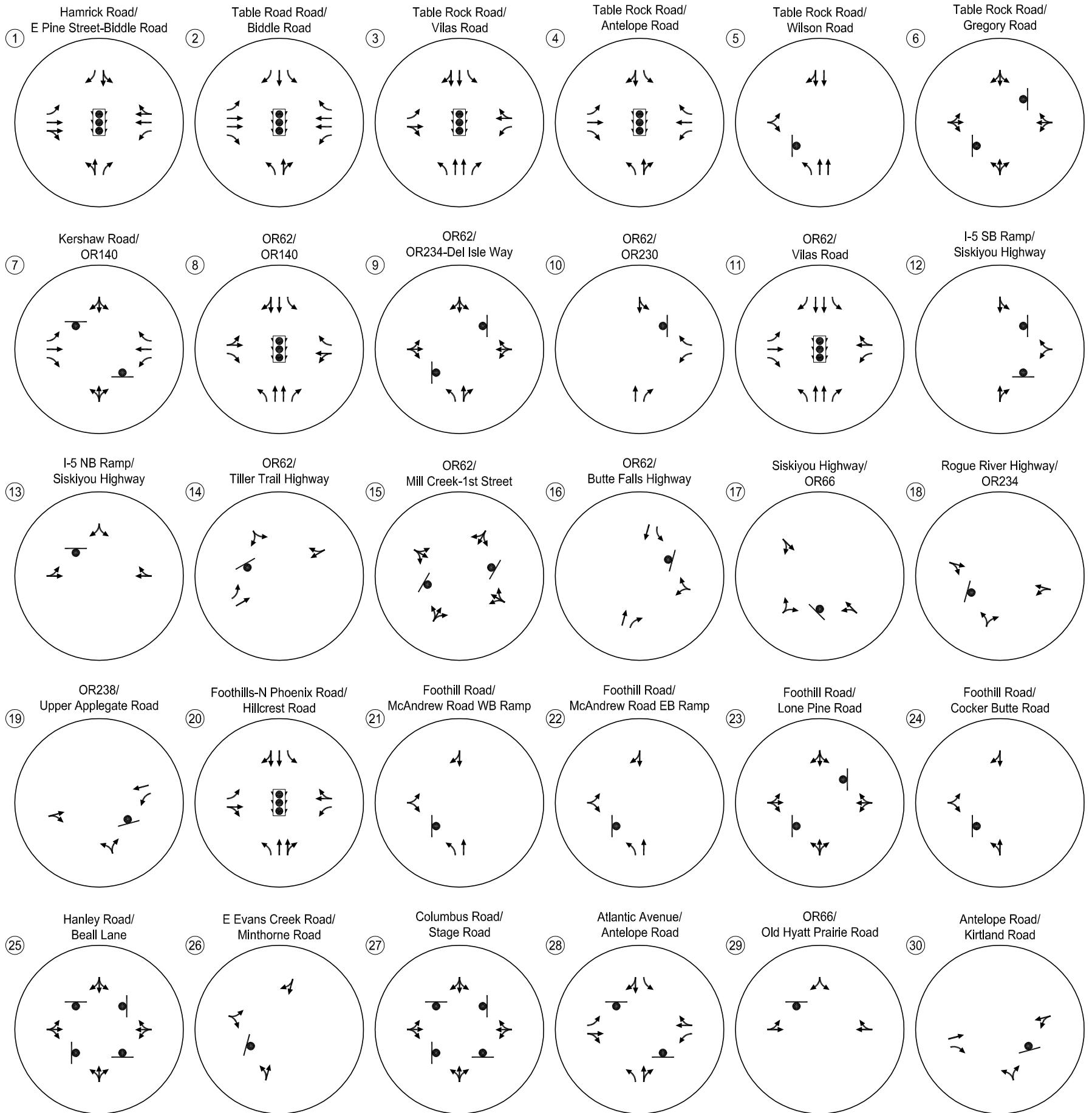


- Study Intersections
- ▨ Middle Rogue MPO
- ▨ Rogue Valley MPO
- ▬ County Boundary

**Study Intersections  
Jackson County, OR**

**Figure  
1E**

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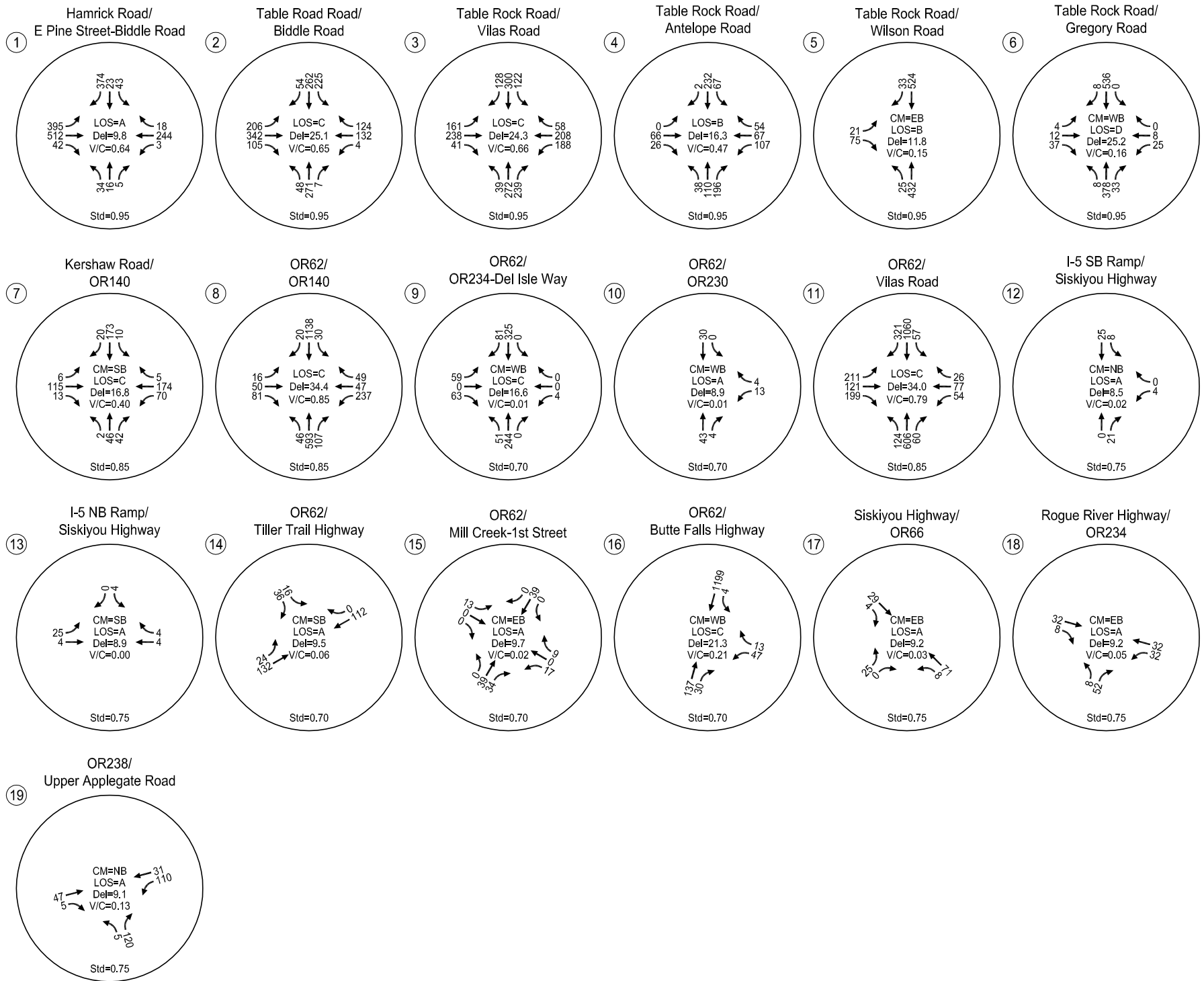


 - STOP SIGN  
 - TRAFFIC SIGNAL

Existing Land Configurations & Traffic Control Devices  
Jackson County, OR

Figure 2

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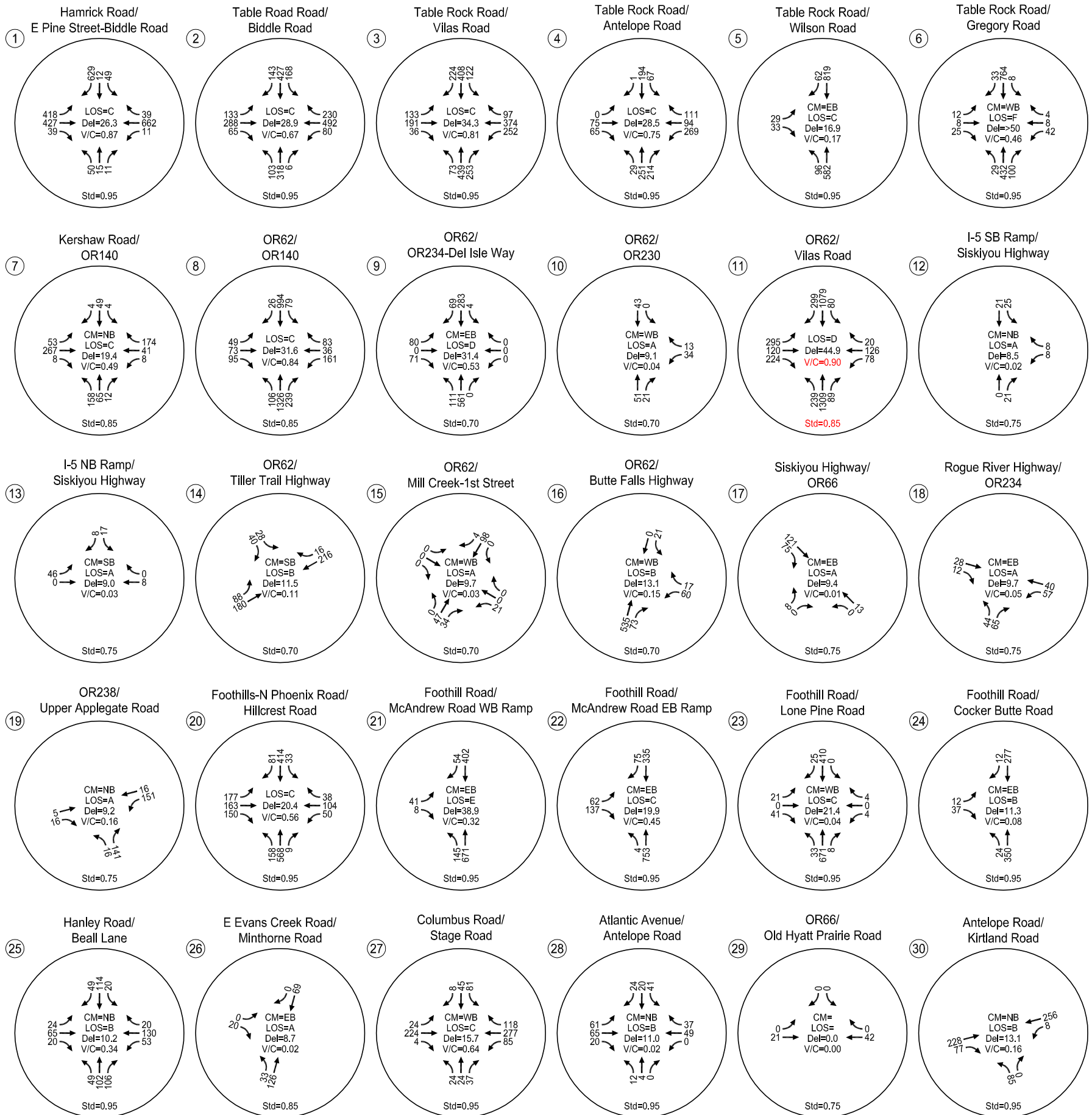


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 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)  
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)  
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 TWC = TWO-WAY STOP CONTROL  
 AWSC = ALL-WAY STOP CONTROL

Existing Traffic Conditions  
 Weekday AM Peak Hour  
 Jackson County, OR

Figure  
 3

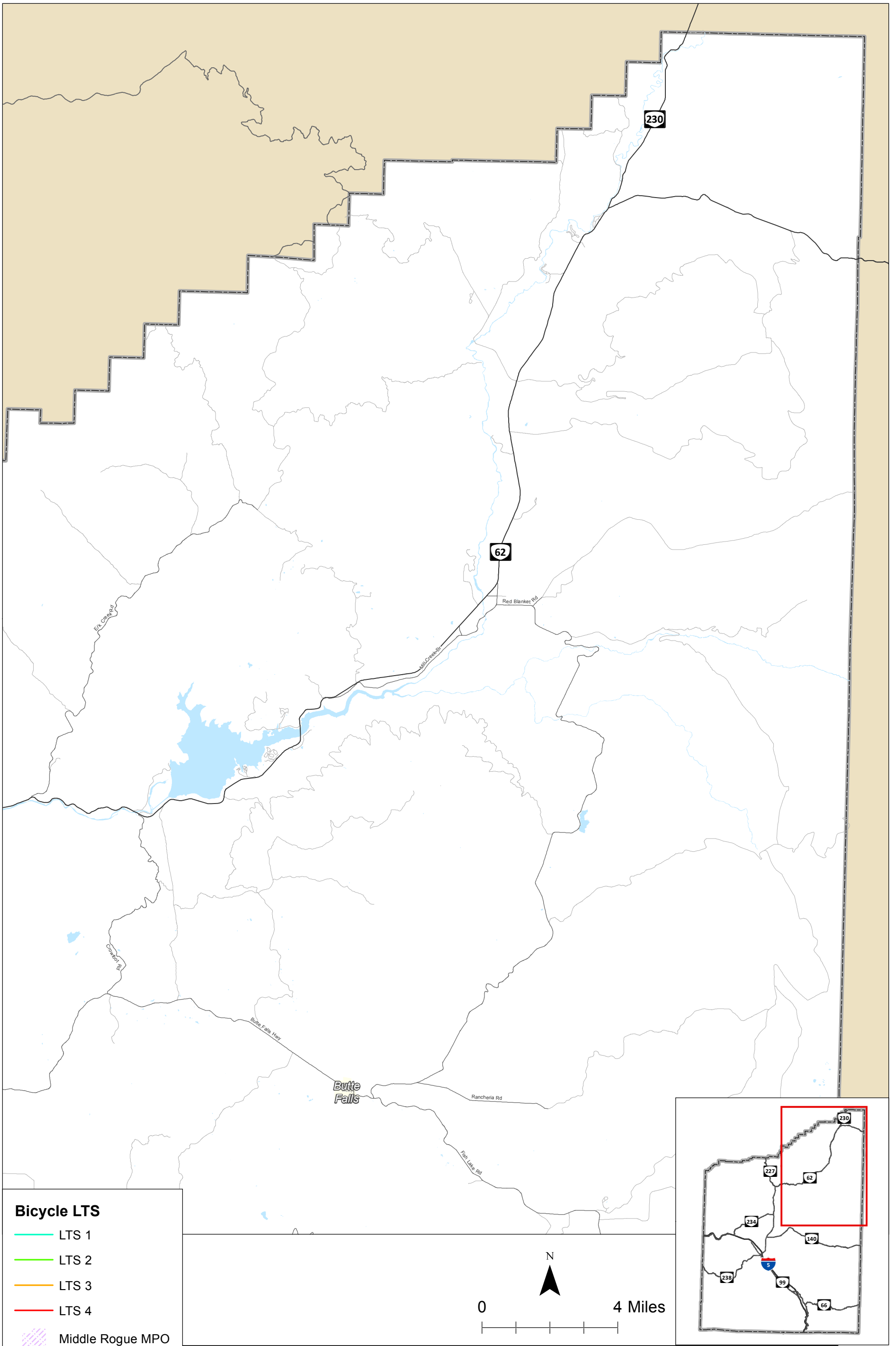
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 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)  
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 AWSC = ALL-WAY STOP CONTROL

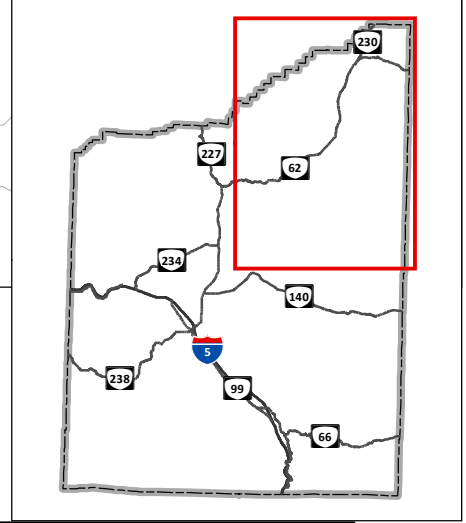
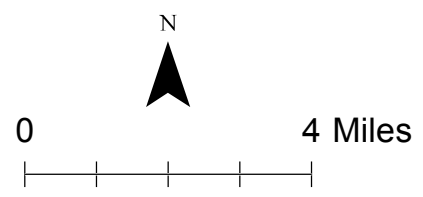
Existing Traffic Conditions  
 Weekday PM Peak Hour  
 Jackson County, OR

Figure  
 4



**Bicycle LTS**

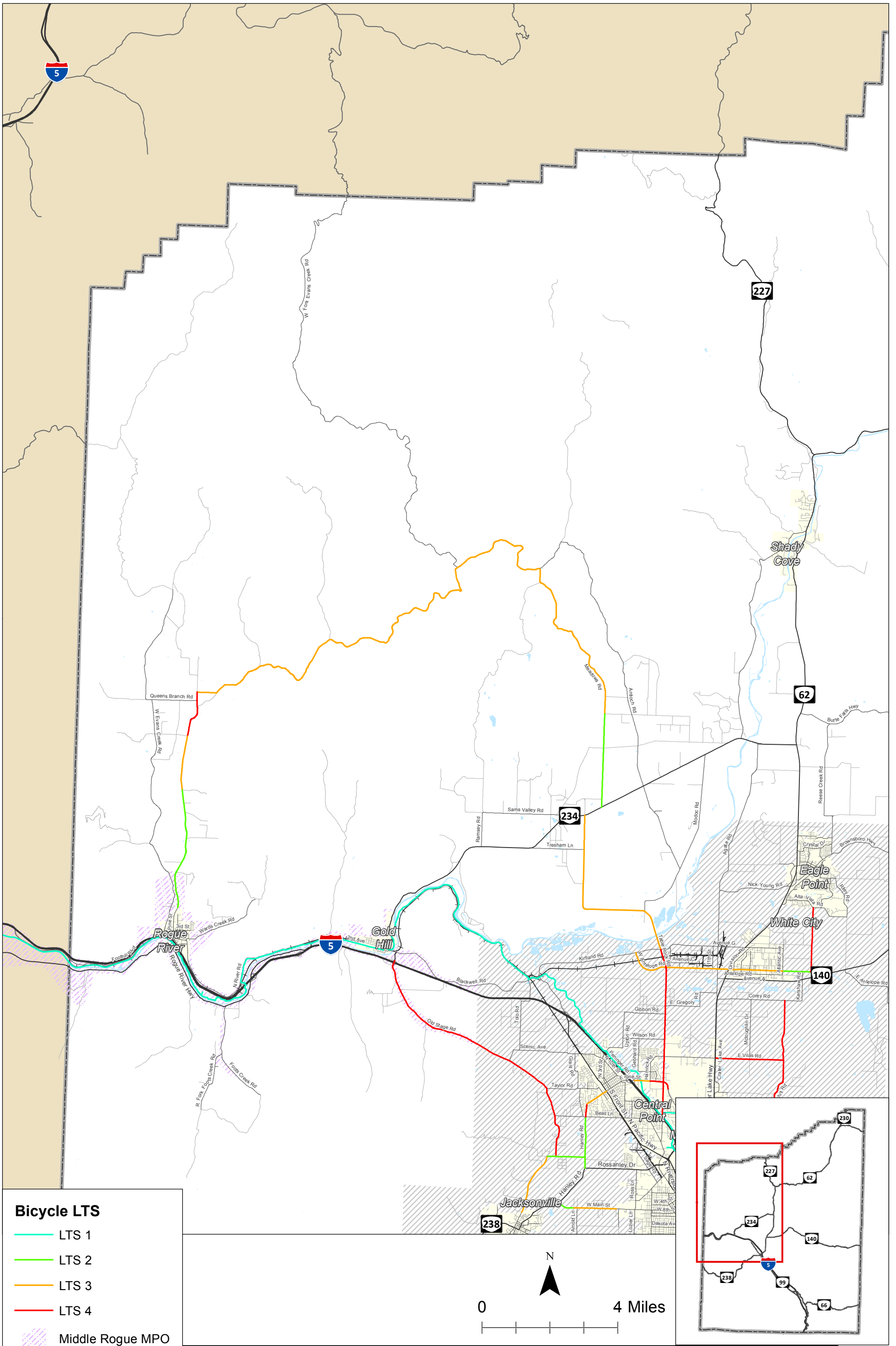
- LTS 1
- LTS 2
- LTS 3
- LTS 4
- Middle Rogue MPO
- Rogue Valley MPO
- County Boundary



**Bicycle Level of Traffic Stress (LTS)  
Jackson County, OR**

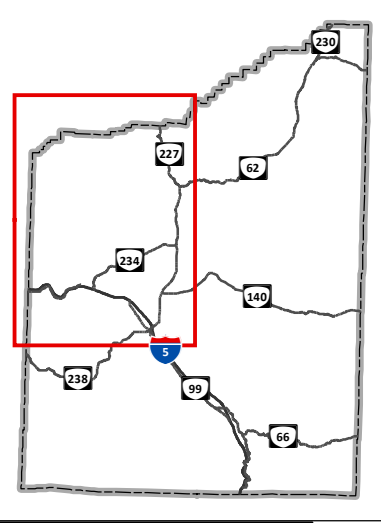
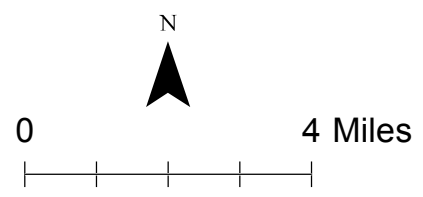
**Figure  
5A**

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**Bicycle LTS**

- LTS 1
- LTS 2
- LTS 3
- LTS 4
- Middle Rogue MPO
- Rogue Valley MPO
- County Boundary

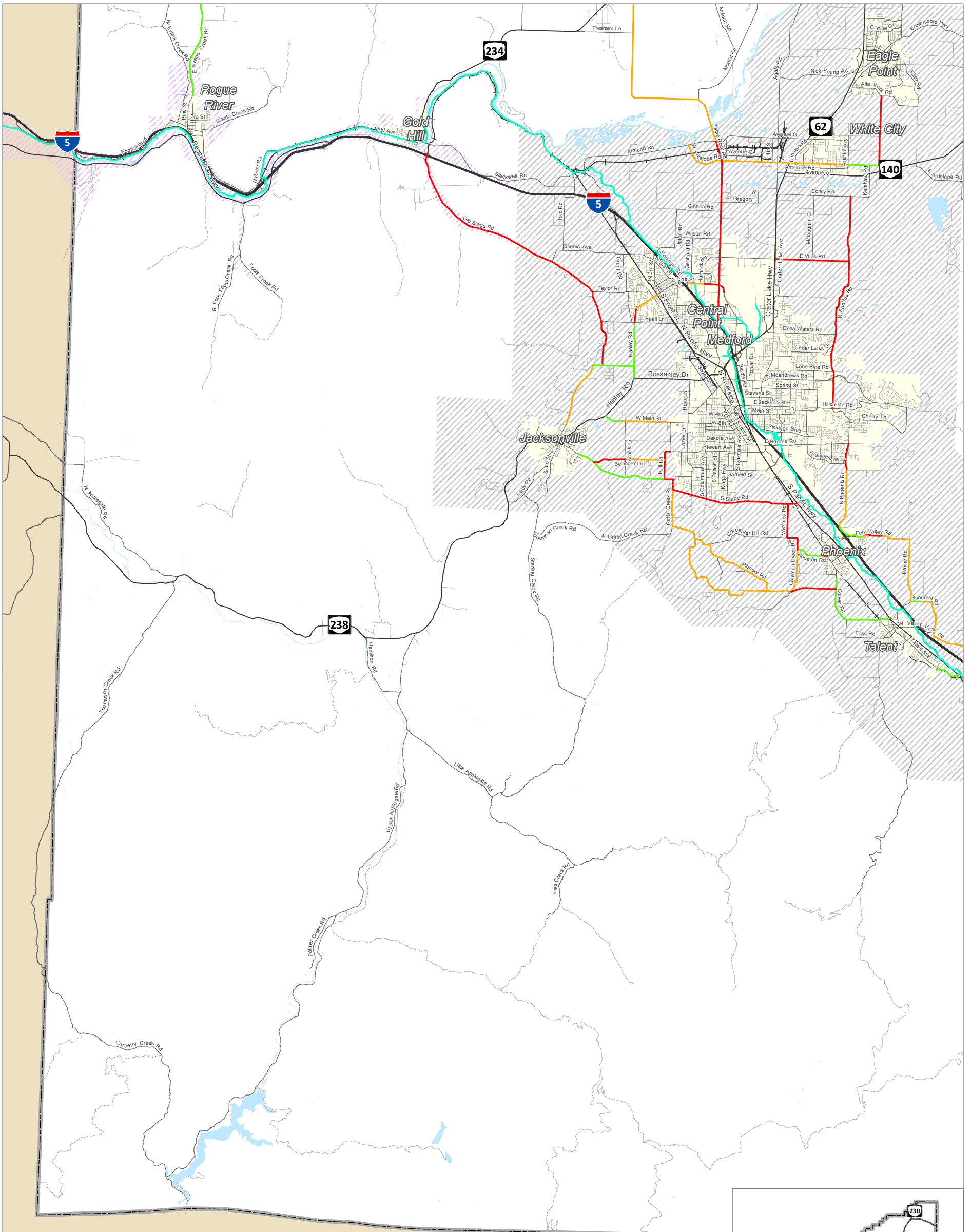


**Bicycle Level of Traffic Stress (LTS)  
Jackson County, OR**

**Figure  
5B**

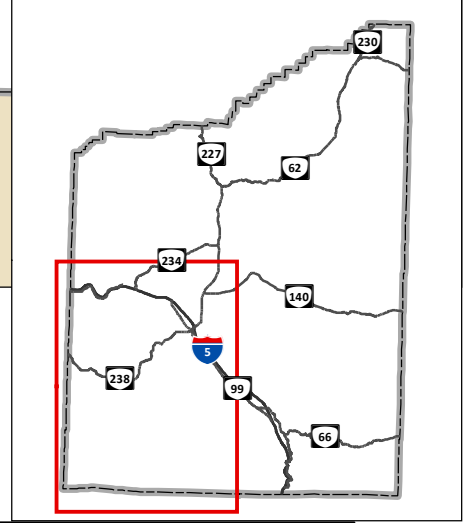
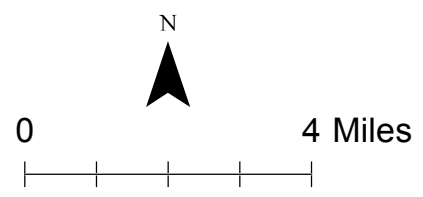
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**Bicycle LTS**

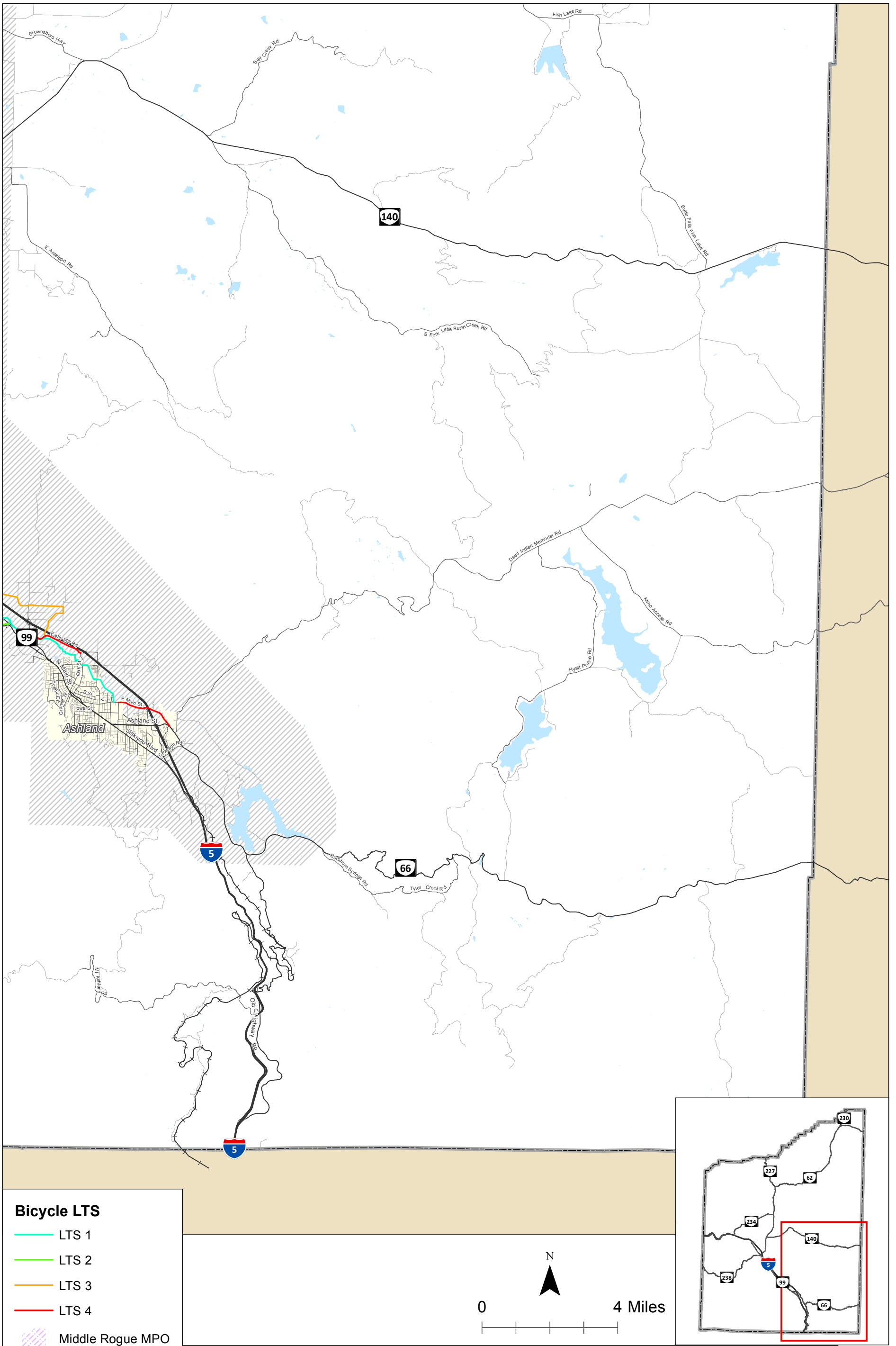
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- Rogue Valley MPO
- County Boundary



**Bicycle Level of Traffic Stress (LTS)  
Jackson County, OR**

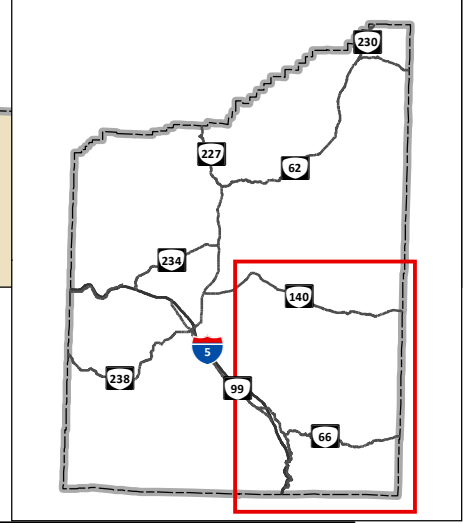
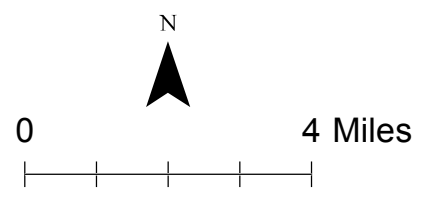
**Figure  
5C**

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**Bicycle LTS**

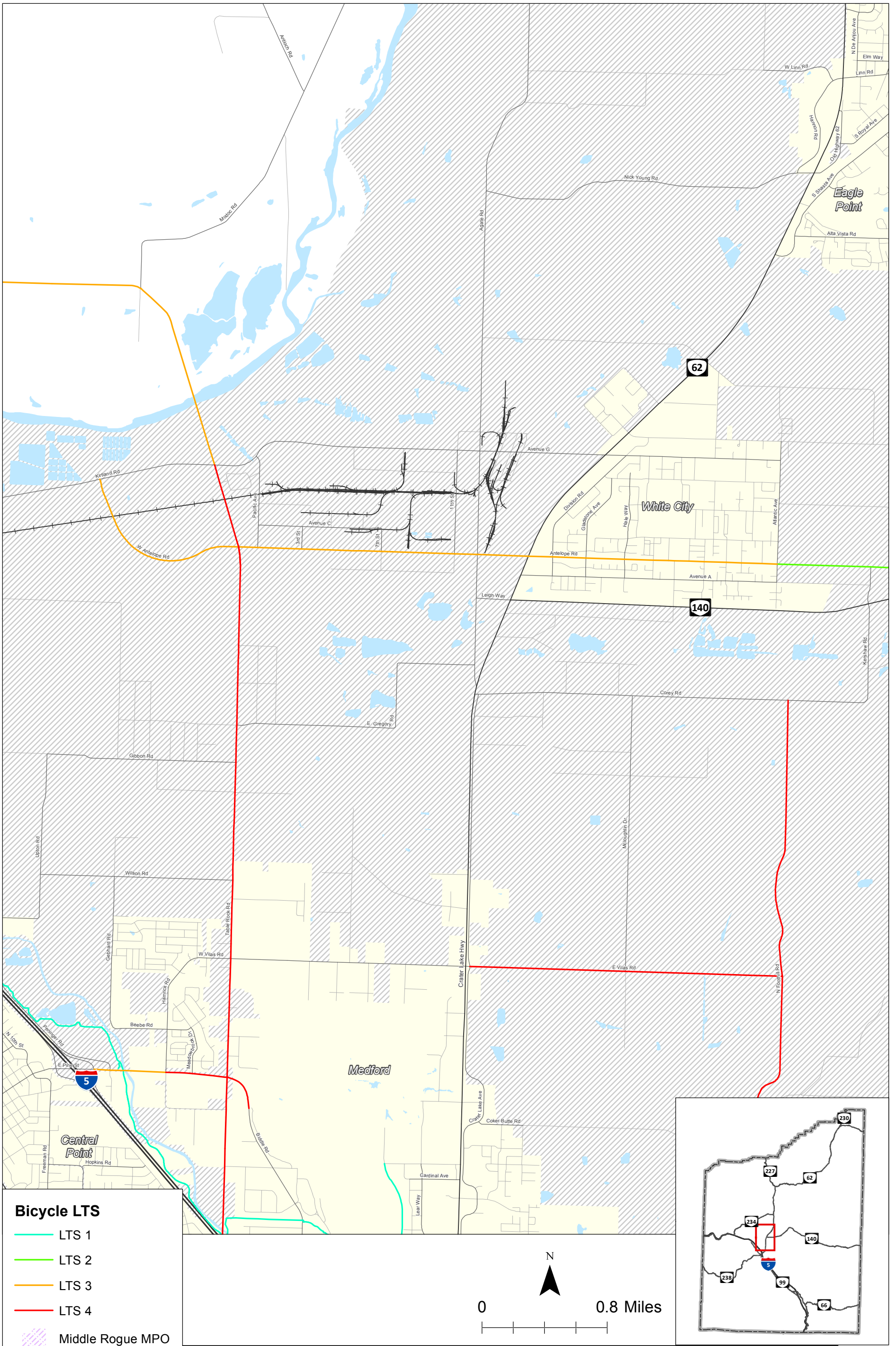
- LTS 1
- LTS 2
- LTS 3
- LTS 4
- Middle Rogue MPO
- Rogue Valley MPO
- County Boundary



**Bicycle Level of Traffic Stress (LTS)  
Jackson County, OR**

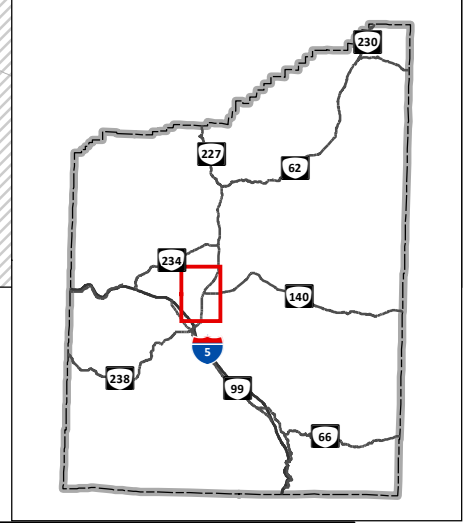
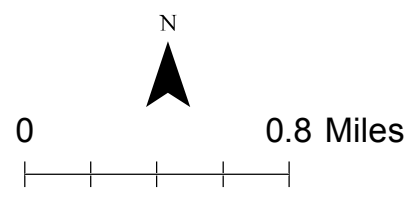
**Figure  
5D**

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**Bicycle LTS**

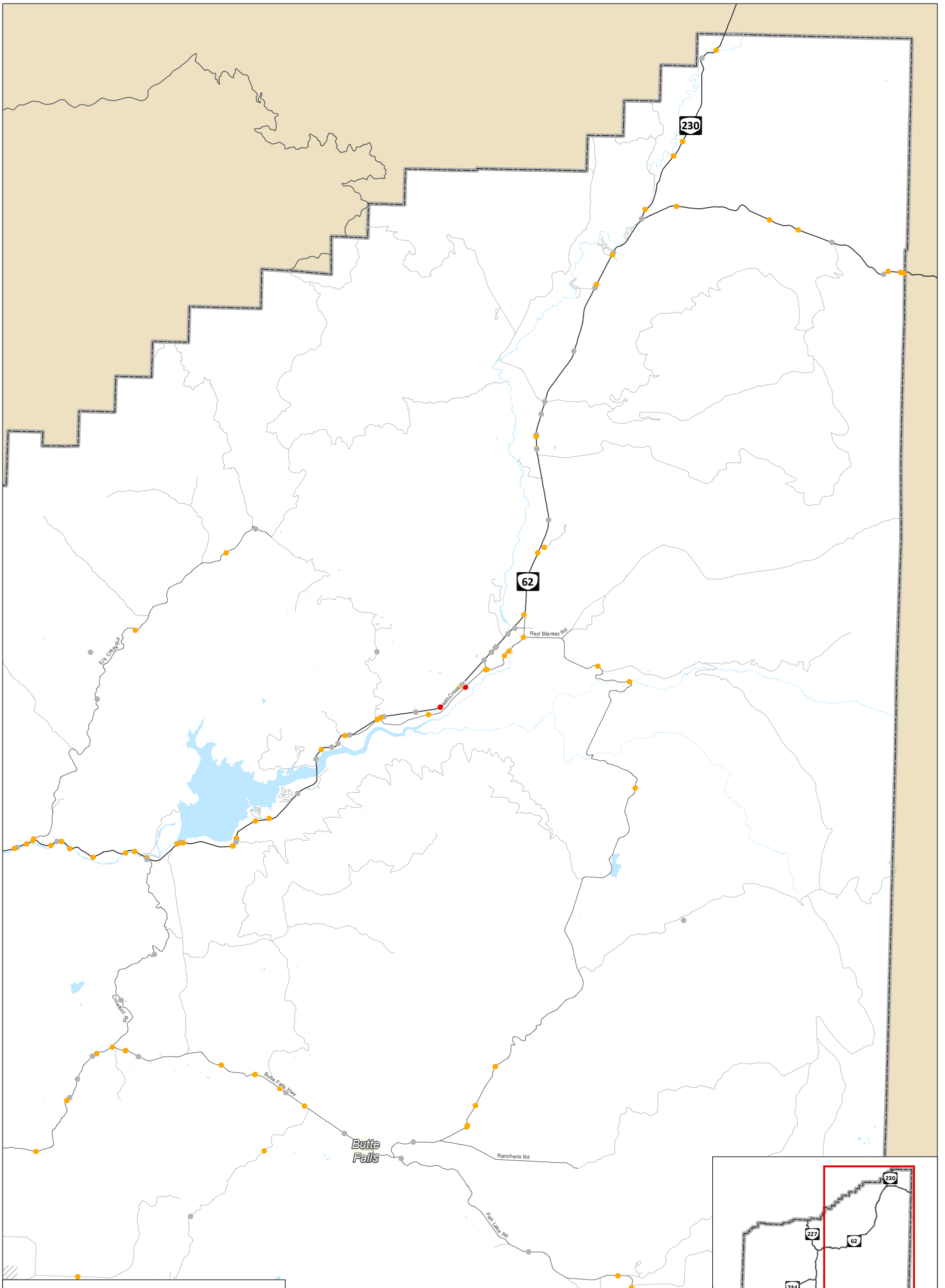
- LTS 1
- LTS 2
- LTS 3
- LTS 4
- Middle Rogue MPO
- Rogue Valley MPO
- County Boundary



**Bicycle Level of Traffic Stress (LTS)  
Jackson County, OR**




**Figure  
5E**

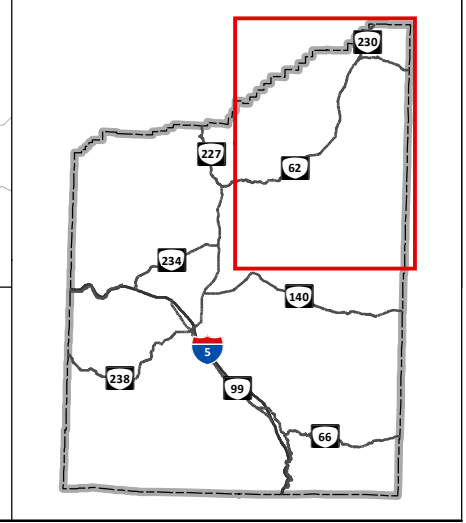
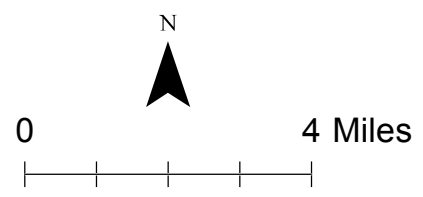
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**Crash Severity**

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)

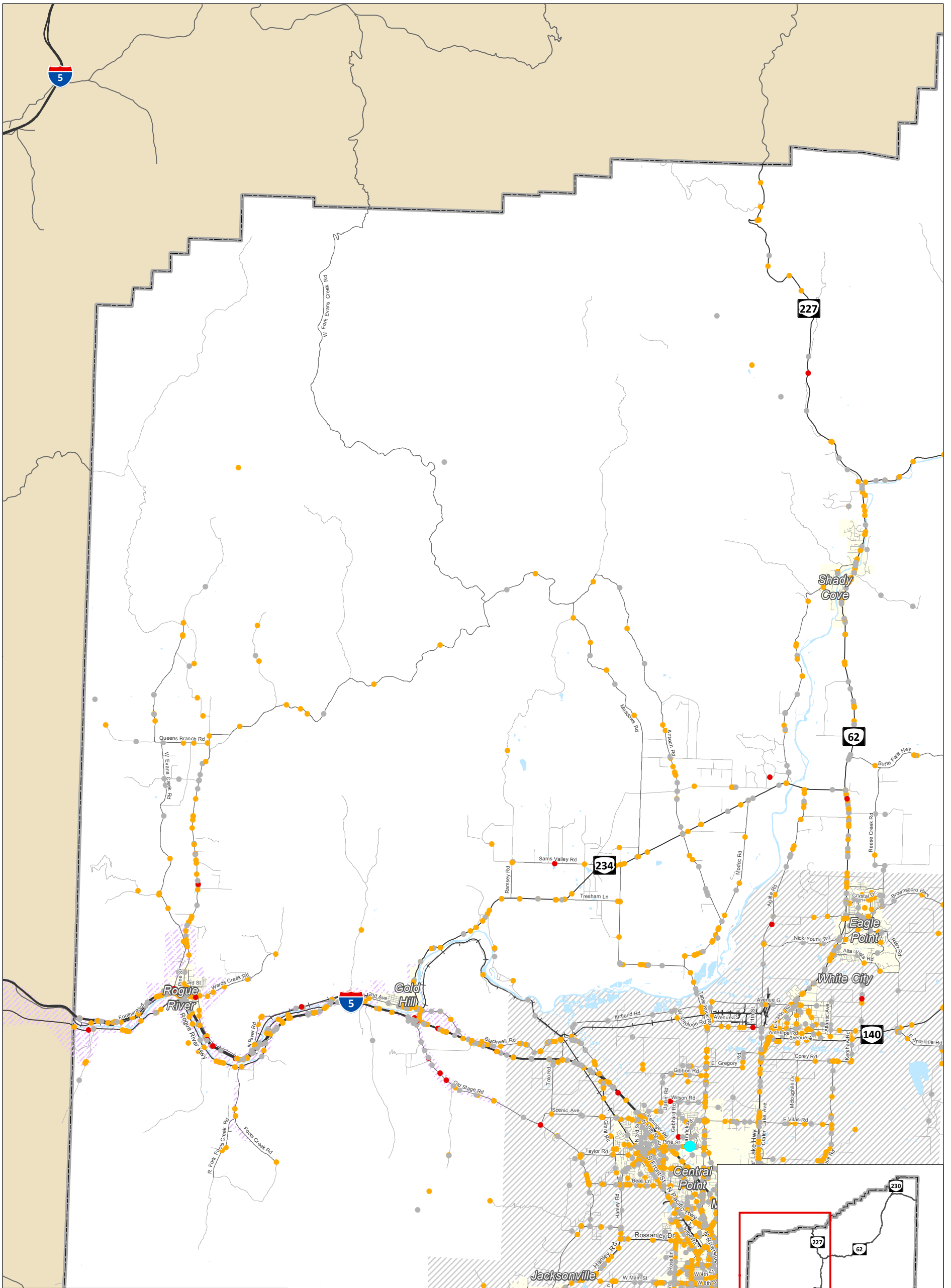
 Middle Rogue MPO  
 Rogue Valley MPO  
 County Boundary



**Crash Sites (2009-2013)  
Jackson County, OR**




**Figure  
5A**

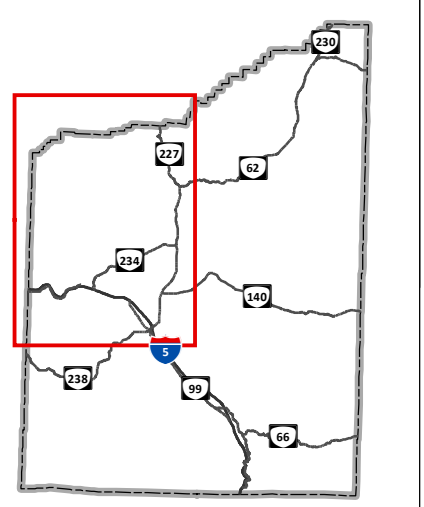
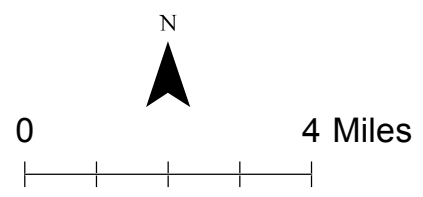
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**Crash Severity**

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)

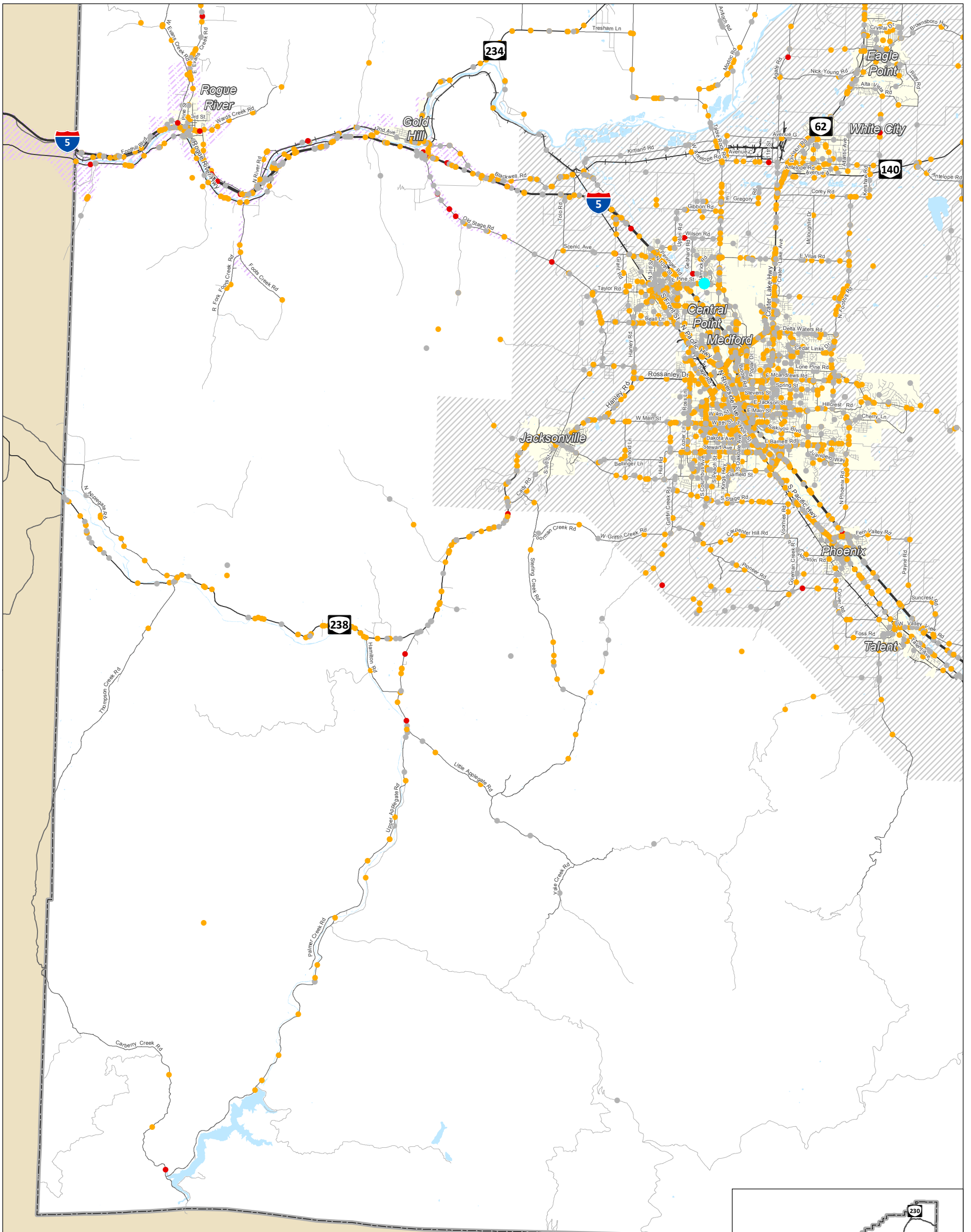
 Middle Rogue MPO  
 Rogue Valley MPO  
 County Boundary



**Crash Sites (2009-2013)  
Jackson County, OR**

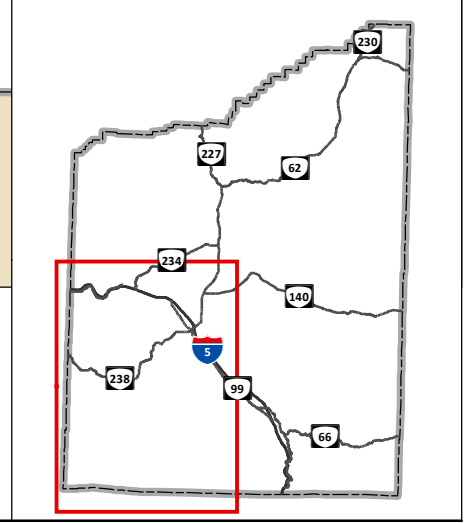
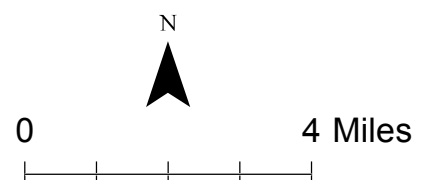
**Figure  
5B**

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**Crash Severity**

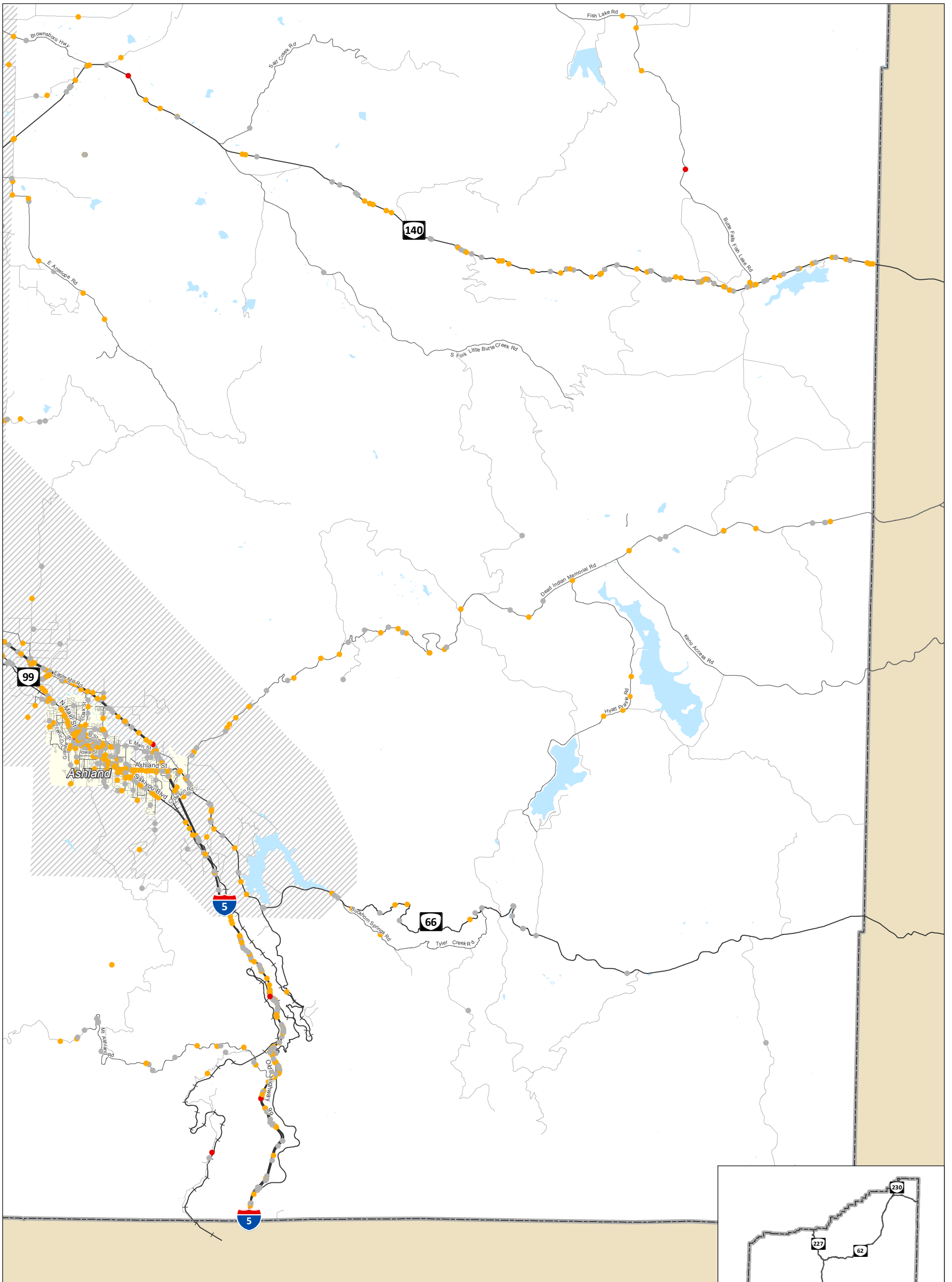
- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)
- ▨ Middle Rogue MPO
- ▨ Rogue Valley MPO
- ⊕ County Boundary



**Crash Sites (2009-2013)  
Jackson County, OR**

**Figure  
5C**

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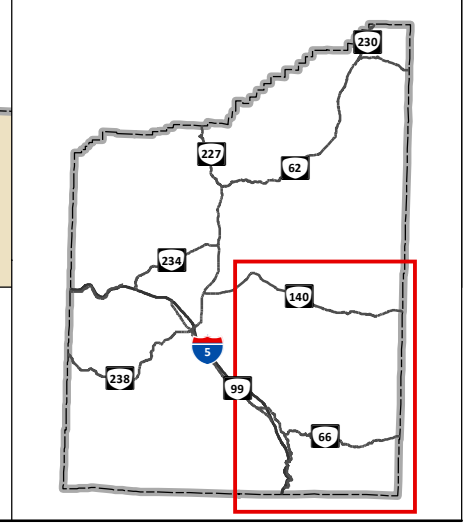
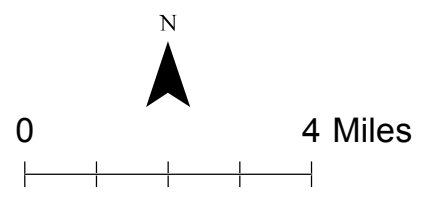
**Crash Severity**

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)

▨ Middle Rogue MPO

▨ Rogue Valley MPO

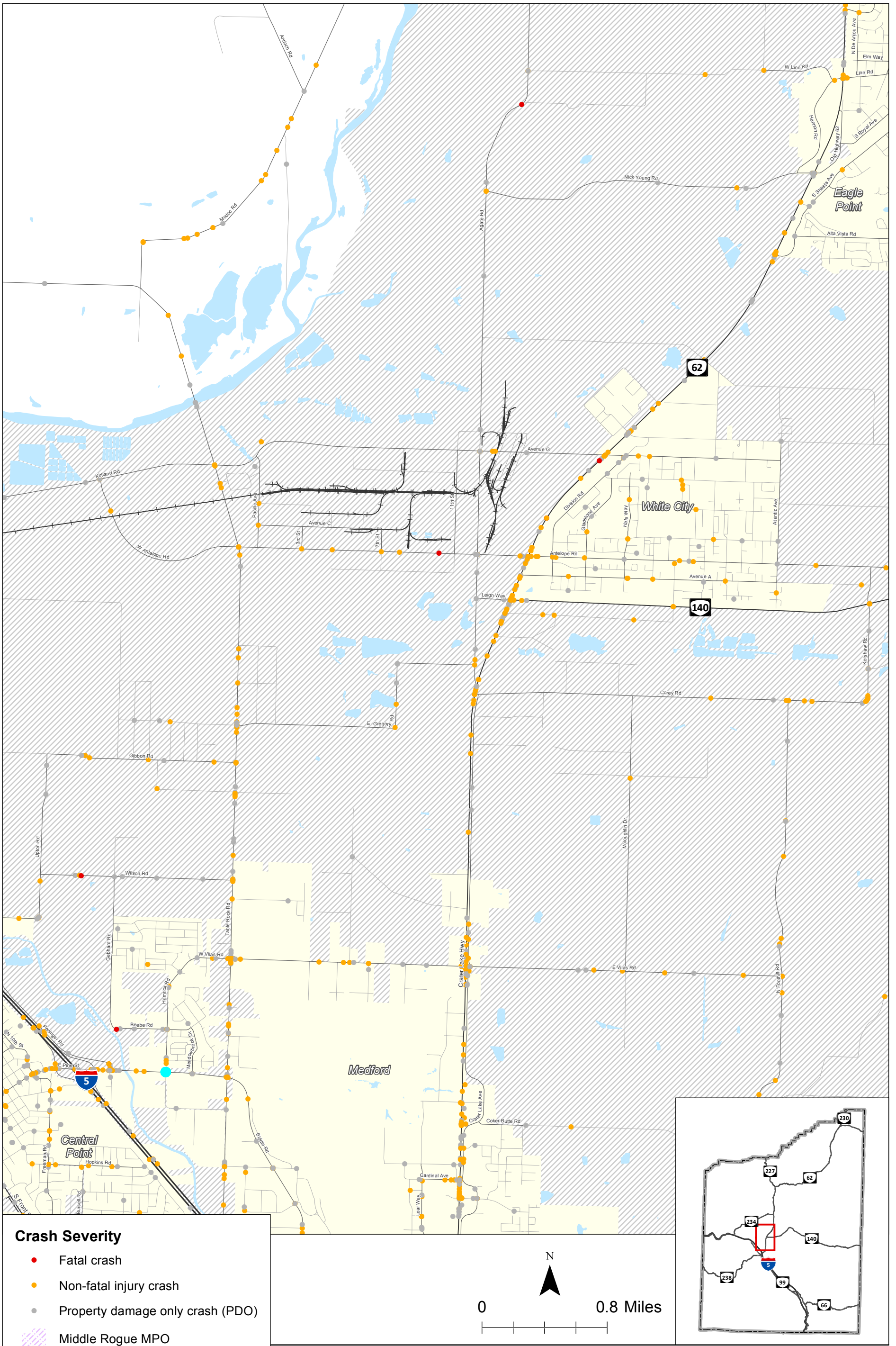
⊕ County Boundary



**Crash Sites (2009-2013)  
Jackson County, OR**

**Figure  
5D**

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**Crash Severity**

- Fatal crash
- Non-fatal injury crash
- Property damage only crash (PDO)
- ▨ Middle Rogue MPO
- ▨ Rogue Valley MPO
- ⊕ County Boundary

**Crash Sites (2009-2013)  
Jackson County, OR**

**Figure  
5E**

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