INTERIM DRAFT

OR62 Expressway at Vilas Road: Interchange Area Management Plan Traffic Analysis

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EXECUTIVE SUMMARY

The purpose of this analysis is to support ODOT Region 3 in the preparation of an Interchange Area Management Plan (IAMP) for a proposed interchange located at the OR62 Expressway and Vilas Road (aka Vilas Interchange). In the 2012 **"I-5 to Dutton Road Final Environmental Impact Statement" (FEIS)** it was proposed to build a new highway from the I-5/OR62 Interchange in Medford to approximately Dutton Road north of White City in Jackson County. In 2009, the Oregon Legislature enacted the Jobs and Transportation Act (JTA) which earmarked funds for the OR62 project. These funds are insufficient to cover the entire project, so for the purpose of this analysis a unique scenario is created for the JTA funded section as well as the Full design, as defined in the bullet points below. Both will be a four-lane, access-controlled bypass extending north from near I-5 in Medford and include grade separation with free-flowing movements at the southern terminus.

- **JTA Expressway:** Extends from the intersection of OR62 and Delta Waters Avenue north only to the southern boundary of White City connecting to existing OR62 at an intersection near Corey Road (without an interchange). Construction of this project was just recently completed in May 2019.
- **Full Expressway:** Extends north from an interchange at Agate Road and the OR62 Expressway to an interchange at Dutton Road and Crater Lake Highway north of White City connecting with an interchange.

The proposed Vilas Interchange is located on the northern edge of Medford within the urban growth boundary; however, Vilas Road is maintained by Jackson County. The study area is bounded to the west by Hamrick Road, to the east by Crater Lake Avenue, to the north by Wilson Road, and to the south by Commerce Drive.

Construction of the JTA Expressway improvements were just recently completed in May 2019, so they are included in the "No-build" scenario. Also included in all scenarios, except the "No-build/No-mitigation" and "No-build/Mitigated", are all planned Regional Transportation Plan (RTP) and Transportation System Plans' (TSP) Tier 1 (funded) improvements in the project area and vicinity. These planned improvements are identified in the Rogue Valley Metropolitan Plan Organization (RVMPO) 2017-2042 RTP, 2018 City of Medford TSP update[1], the Central Point TSP, and the Jackson County TSP. **Here "No-build" only indicates that no OR62/Vilas Road interchange is built.**

1. **No-build/No-mitigation (NBNM)** represents the base conditions for the project area. No interchange is included. No modifications were made. The lane geometry, intersection control type, and bike/pedestrian facilities are left as is.

[1] Adopted by Medford City Council December 6, 2018

The mitigations applied to the No-build/No-mitigation scenario to create the No-build/Mitigated scenarios and also the mitigations applied to scenarios deemed "viable" and carried forward as potential solutions are listed in Appendix B.

2. **No-build Mitigated (NBM)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet applicable operational standards. Also signals were added where Preliminary Signal Warrants (PSW) have been met.

3. **No-build Tier 1 (NBT1)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet city and county standards. Also signals were added where PSW have been met. The Tier 1 improvements from the RVMPO RTP, the 2018 City of Medford TSP update, the Central Point TSP, and the Jackson County TSP within the study area were included.

4. **No-build Tier 2 (NBT2)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet city and county standards. Also signals were added where PSW have been met. The Tier 1 and the Tier 2 projects from the RVMPO RTP, the 2018 City of Medford TSP update, the Central Point TSP, and the Jackson County TSP within the study area were included.

5. **JTA Expressway Interchange Build Tier 2 (JTAT2)** is a replica of the NBT2 scenario except that the Tight Diamond Interchange at Vilas Road was included and unique intersection mitigations were applied to meet city and county v/c, LOS, and MMLOS standards.

6. **Full Expressway Interchange Build Tier 2 (FullT2)** is a replica of the JTAT2 scenario except that not only was the Tight Diamond Interchange at Vilas Road included, but also the entire Full Build design. Also unique intersection mitigations were applied to meet city and county v/c, LOS, and MMLOS standards.

The 30th highest hour volumes used in this analysis were developed mostly using the 24-hour and 16-hour 2014 counts previously taken for the FEIS, the 2017 Jackson County Transportation System Plan (TSP) counts, and local Traffic Impact Analyses. Also, in August 2018 a new count was obtained at the intersection of Hamrick Road and Biddle Road/Pine Road to incorporate traffic generated by the Costco which opened in November 2017.

To create the future year 2040 volumes, the existing 2015 Design Hourly Volume (DHV) was post-processed using the Rogue Valley MPO v4.3 travel demand model. At intersections where counts were not available, such as on the new OR62 Expressway route, the volumes from the 2035 SD Full Build Synchro file from the FEIS analysis were used. These 2035 volumes were also adjusted to future year 2040 to match the rest of the

segments in this process. The post-processing followed the National Cooperative Highway Research Program (NCHRP) Report 255/765 guidelines.

In 2040, with the Tight Diamond Interchange at Vilas Road, almost all of the mainline free-flow segments, ramps, and merge/diverge sections are projected to meet the ODOT Highway Design Manual (HDM) volume-to-capacity (v/c) standards.

Two especially problematic intersections are Hamrick Road and Table Rock Road with Biddle Road. Hamrick Road and Biddle Road is over capacity without not only the recommended intersection mitigations, but also a minimum of the Tier 1 projects. Table Rock Road and Biddle Road is over capacity without not only the recommended intersection mitigations, but alos a minimum of the Tier 1 projects and does not meet the standard without the addition of the Tier 2 projects. Improvements will require a TSP amendment.

In the JTA Expressway No-build Interchange No-mitigation (NBNM) scenario queuing problems are mainly westbound on Vilas Road across most of the study area. With mitigations, the Tier 2 No-build scenario (NBT2) improves. There are less blocked intersections and turn storage bays. The realignment and signalization of the Airway Drive / Peace Lane and Vilas Road intersection significantly reduces the northbound and southbound turn lane percent time blocked on those roadways. Generally, the queuing issues just get shifted around without a single solution existing to mitigate all of the issues; however, adding four-lanes to Vilas Road and including the other Tier 2 projects decreases the network delay and total travel time as well as increasing the speed.

Consistent for both Interchange Build scenarios, there is significant queuing between the northbound and southbound ramps extending east and west. The northbound queues on Hamrick Road are increased to over half a mile. The queues at Vilas Road intersections with Crater Lake Avenue and Crater Lake Highway are only slightly shorter. The OR62 interchange introduces significant intersection blockage.

The NBNM scenario has the most crashes of the No-build scenarios. The JTA Build crash occurrence is less than the Full Build. Overall, the additional intersections introduced by the Build Interchange scenarios results in higher crash frequencies.

A Multimodal Level of Service Analysis was used to determine the need and potential for multimodal mitigations. In the No-build scenarios, adding a sidewalk generally improves the pedestrian LOS to C or better, except for along Pine Street / Biddle Road, Table Rock Road, and Crater Lake Highway. This is also true along Vilas Road in the Build scenarios. Separated multi-use paths are suggested for these locations. The transit LOS is poor because it is determined by limited frequencies. Frequencies are partly determined by funding and land use density, so this reflects the best available service.

Overall, the JTA Interchange Build scenario (JTAT2) has the best results, of the build scenarios, in all measures except overall number of stops. The No-build scenario with Tier 2 Projects (NBT2) performed even better. It has only two blocked intersections and

only four blocked turn storage bays which is an improvement from the NBNM. The overall network travel time is much better with the inclusion of the Tier 2 projects. NBT2 has the lowest overall network travel time of any scenario. The number of locations over capacity is decreased from seven to one. In fact, NBT2 performed better than the build scenarios in almost every measure.

The worst functioning scenario is the Full Build (FullT2) which, for some measures, creates conditions worse than the NBNM. With the increased volume present due to not only the interchange, but also the cul-de-sacing of Gregory Road, extremely long queues and significant intersection and turning bay blockages exist.

The mitigated No-build scenarios are the best performing alternatives with the shortest overall network travel times, low intersection and turning bay blockage and only a couple of locations exceeding capacity. The interchange causes a 2% volume increase at the intersection of Table Rock Road and Vilas Road and a 24% decrease at the Vilas Road intersection with Crater Lake Highway. So in order to support the interchange, the funded Tier 1 projects will need to be constructed, the Tier 2 projects will need to be funded and constructed, and additional necessary intersection mitigations will need to be designed, funded and constructed. Also, a high level cost estimate indicates that the interchange precipitates annual costs totalling over $20 milion (even excluding the cost of the interchange itself) due to additional delay, fuel consumption, emissions, and crashes.

BACKGROUND INFORMATION

The purpose of this analysis is to support ODOT Region 3 in the preparation of an Interchange Area Management Plan (IAMP) for a proposed interchange located at the OR62 Expressway and Vilas Road (aka Vilas Interchange). In the 2012 **"I-5 to Dutton Road Final Environmental Impact Statement" (FEIS)** it was proposed to build a new highway from the I-5/OR62 Interchange in Medford to approximately Dutton Road north of White City in Jackson County. In 2009, the Oregon Legislature enacted the Jobs and Transportation Act (JTA) which earmarked funds for the OR62 project. These funds are insufficient to cover the entire project, so for the purpose of this analysis a unique scenario is created for the JTA funded section as well as the Full design, as defined in the bullet points below. Both will be a four-lane, access-controlled bypass extending north from near I-5 in Medford and include grade separation with free-flowing movements at the southern terminus.

- **JTA Expressway -** Extends from the intersection of OR62 and Delta Waters Avenue north only to the southern boundary of White City connecting to existing OR62 at an intersection near Corey Road (without an interchange). Construction of this project was just recently completed in May 2019.
- **Full Expressway -** Extends north from an interchange at Agate Road and the OR62 Expressway to an interchange at Dutton Road and Crater Lake Highway north of White City connecting with an interchange.

The JTA Expressway construction was completed in May 2019. The project goals include reducing congestion and improving safety on existing OR62 in Medford and north through White City by redirecting traffic to the expressway. This study focuses exclusively on the feasibility and potential implications of an interchange with the OR62 Expressway at Vilas Road.

This is Phase 2 of this analysis. Phase 1 was completed after the July 2018 TAC meeting. In the Phase 1 analysis, all scenarios considered both a two-lane and four-lane Vilas Road treatment. In this current Phase 2 analysis, widening Vilas Road to four through lanes is a City of Medford Tier 2 project. This simplified the analysis by determining Vilas Road to be two through lanes for Tier 1 scenarios and four through lanes for Tier 2 scenarios. A roundabout interchange type was initially considered at the ramp terminal; however, the analysis demonstrated the roundabout to be a non-viable solution because one or both of the ramps are over capacity in every scenario. All of the analyses related to the dismissed scenarios are in Appendix A.

The project is located on the northern edge of Medford within the urban growth boundary; however, Vilas Road is maintained by Jackson County (Figure 1). The study area is bounded to the west by Hamrick Road, to the east by Crater Lake Avenue, to the north by Wilson Road, and to the south by Commerce Drive (Figure 2).

Figure 1: Vicinity Map

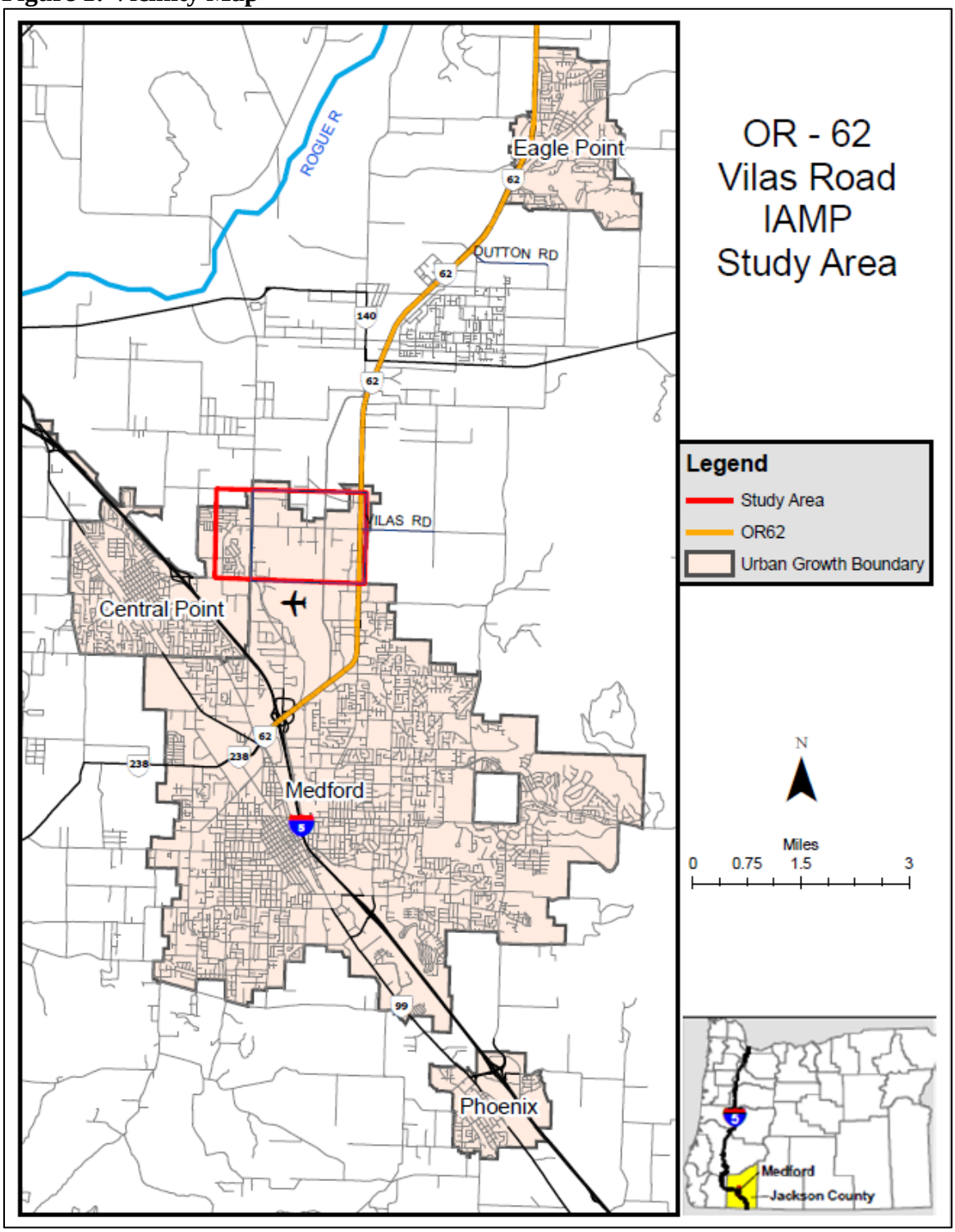
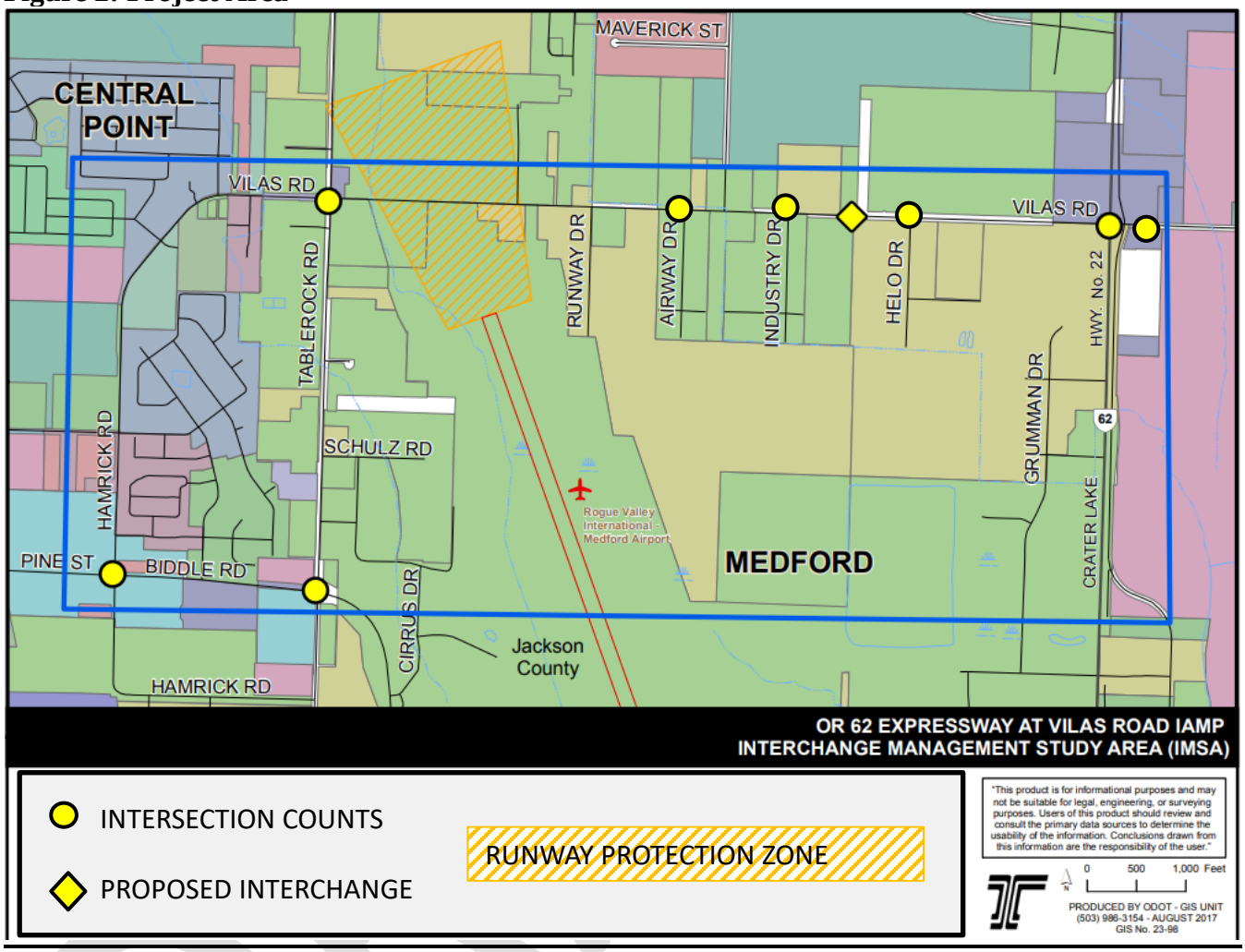


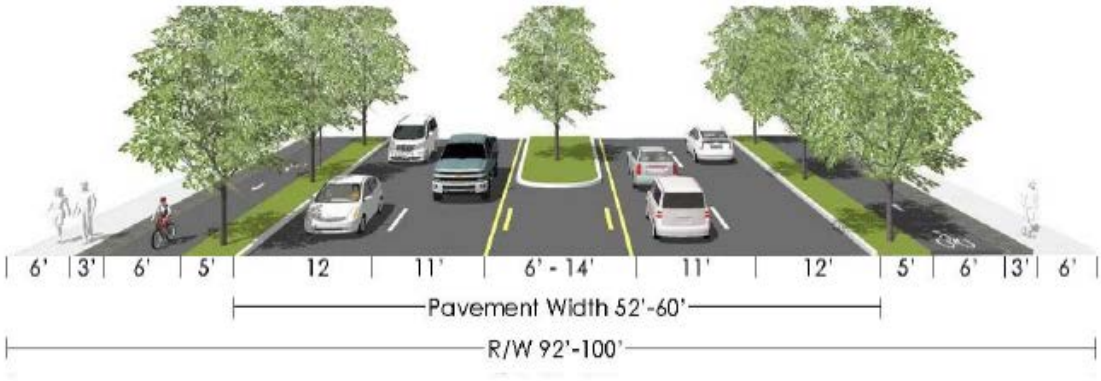
Figure 2: Project Area



A Runway Protection Zone (RPZ) is present on the north end of the Rogue Valley International – Medford Airport which overlaps an approximately 1,500 feet long section of Vilas Road from approximately Rainbow Drive to the Upton Slough (Figure 2). The FAA defines an RPZ as a trapezoidal area off the end of the runway end that serves to enhance the protection of people and property on the ground, as well as to provide adequate space for aircraft to safely maneuver for take-offs and landings. The pavement along this stretch of Vilas Road may not be widened; however, the current paved width can accommodate a four lane cross section and may be restriped, which is adequate for the travel lanes for all proposed scenarios. However, Vilas Road is classified as a Minor Urban Arterial and according to the 2018 Medford TSP Functional Classification Design Standards, 100 feet of right-of-way is required to accommodate a five-lane road section, bicycle facilities, and detached sidewalks with a landscaped planter strip (Figure 3). Google Earth reflects a 60 feet wide existing cross section. A potential design option to accommodate the existing cross section would be 11 foot travel lanes, a three foot median, five foot planter strip, and an eight foot multi-use shared path. This does not meet Medford's design standards, so likely more Right of Way (ROW) would need to be

acquired within the RPZ. FAA approval for additional work on Vilas Road will require a "Notice of Proposed Construction" permit.

Figure 3: City of Medford 2018-2038 TSP Major Arterial/Regional Arterial Functional Classification Standards (Low Stress for 40 mph and Higher)



Operational Standards

To evaluate the operational standards for the JTA Expressway "No-build" Interchange scenarios, the 1999 Oregon Highway Plan (OHP) Volume to Capacity Ratio (v/c) targets for a Metropolitan Plan Organization (MPO) were used. The only intersection this causes a different v/c standard to be used than in the Interchange Build scenarios is Vilas Road and Crater Lake Highway (CLH) which has a v/c target of 0.85 for the JTA Expressway "No-build". This is because the ramp terminals and the OR62 Expressway obviously do not exist in the JTA Expressway "No-build" Interchange scenarios and the other intersections follow county or city standards, not the ODOT Highway Design Manual (HDM).

To evaluate the JTA Expressway and Full Expressway "Build" Interchange Scenarios, the 2012 ODOT HDM standard of 0.75 is used for the Interstate Highways and Statewide (NHS) Expressways within an MPO when appropriate. Otherwise the Jackson County 0.95 v/c, the City of Central Point LOS D, or the City of Medford LOS D standard is used. It is possible that some intersections currently under Jackson County (or ODOT) jurisdiction may change over time to the City of Medford due to increased volumes, future annexations, UGB expansions, etc. For this reason the LOS D requirement is considered in addition to the v/c. Table 1 summarizes the OHP, HDM, and local v/c standard/target applicable to each intersection.

Table 1: Build Scenario v/c Standards / Targets for each intersection

Intersection	Standard/Target			
	ODOT (V/C Ratio)		Local	
	OHP[1]	HDM[2]	V/C Ratio	LOS
OR62	0.85	0.75	NA	NA
Vilas Rd & Table Rock Rd[7]	NA	NA	0.95[3]	D[5]
Vilas Rd & Airway Dr/Peace Ln	NA	NA	0.95	D[4]
Vilas Rd & Lear Wy	NA	NA	0.95	D[4]
Vilas Rd & Crater Lake Hwy	0.85	0.75	NA	D[4]
Vilas Rd & Crater Lake Ave	NA	NA	0.95	D[4]
Table Rock Rd & Biddle Rd[7]	NA	NA	0.95[3]	D[5]
Biddle Rd & Hamrick Rd	NA	NA	NA	D[5]

[1] Oregon Highway Plan. The 0.85 target applicable to most intersections is based on the classification of OR62 as a "Freight Route on a Statewide Highway" and "Statewide Expressway" and location within a metropolitan planning organization area inside an urban growth boundary. See Table 6 of the OHP, as amended December 21, 2011. Used for all "No-build" scenarios.
[2]ODOT Highway Design Manual. Used for all build scenarios.
[3]Jackson County standard
[4]City of Medford standard
[5]Central Point standard
[7]West leg under Central Point standard is LOS D

SCENARIO DEFINITIONS & DESCRIPTIONS

The IAMP traffic analysis includes six progressive scenarios with unique combinations of geometry and level of RVMPO Regional Transportation Plan (RTP) / Medford, Central Point, and Jackson County Transportation System Plan (TSP) projects included. For this reason, it is critical to clearly define and name these scenarios.

The JTA Expressway which currently exists is included in all scenarios, including those that are described as "No-build".

1. **No-build/No-mitigation (NBNM)** represents the base conditions for the project area. No interchange was included. No modifications were made. The lane geometry, intersection control type, and bike/pedestrian facilities were left as is. This scenario exists for comparative purposes only.

In all other scenarios, available mitigations were used in an attempt to meet the v/c and LOS standards/targets for all intersections. The mitigations applied to the NBNM scenario to create the No-build/Mitigated scenarios are listed in Appendix B. Also listed are the mitigations applied to all scenarios deemed "viable" and carried forward as potential solutions. The mitigations identified as necessary to meet the intersection v/c and LOS standards will require a TSP amendment.

2. **No-build Mitigated (NBM)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet city and county v/c, LOS, and MMLOS standards. Also signals were added where Preliminary Signal Warrants (PSW) have been met.

3. **No-build Tier 1 (NBT1)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet city and county v/c, LOS, and MMLOS standards. Also signals were added where PSW have been met. The Tier 1 improvements from the 2017–2042 RVMPO RTP, the proposed 2018 City of Medford TSP update[2], the Central Point TSP, and the Jackson County TSP within the study area were included (see Table 2). Refer to Appendix C for map and complete list of Tier 1 projects.

[2] Adopted by Medford City Council December 6, 2018

Table 2: Tier 1 Projects within Interchange Management Study Area (IMSA)

Project ID	Location	Description	Jurisdiction
216	E. Pine St & Hamrick Rd	On the south leg a left turn only lane and a thru/right turn lane is created. Add a channelized southbound right turn on the north leg. On the West leg a 750' acceleration lane.	Central Point
218	E. Pine St & Table Rock Rd	Widen west approach to add second eastbound left turn lane.	Central Point
219	Table Rock Rd & Vilas Rd	Widen to increase capacity, add eastbound lane & shared through-right turn movement	Central Point
R54	Table Rock Road from Lone Pine Creek to Pine Street-Biddle Road	Widen to 3-lane urban minor arterial standard with sidewalks and bike lanes from Lone Pine Creek to Airport Road and to 5-lane urban minor arterial standard from Airport Road to Biddle Road	Jackson County
I2	Table Rock Road/Biddle Road	Widen the south leg of Table Rock Road to a five-lane cross section and optimize the signal timing/phasing	Jackson County
I3	Table Rock Road/Vilas Road	Monitor traffic operations at the intersection following construction of the OR62 Bypass. If issues persist, install a second separate left-turn lane and a separate right-turn lane at the westbound approach and optimize the signal timing/phasing	Jackson County
I39	Crater Lake Ave & E Vilas Rd	Re-align Crater Lake Ave to the east and install traffic signal	Medford
I40	Crater Lake Hwy & Vilas Rd	Monitor needs after construction of Crater Lake Highway Bypass	Medford
R2	E Vilas Road from east Medford City limits to McLoughlin Drive	Improve to 2-lane rural major collector standard (no new travel lanes) 0.9 miles	Jackson County

4. **No-build Tier 2 (NBT2)** is a replica of the NBNM scenario except that the lane geometry and bike / pedestrian facilities were modified attempting to meet city and county v/c, LOS, and MMLOS standards. Also signals were added where PSW have been met. In addition to the funded Tier 1 projects, the tentative, unfunded Tier 2 projects within the study area were included (see Table 3). There are other Tier 2 projects that were added into the model runs that were not in the direct study area (Table 4). The effects of these were included. Also, refer to Appendix C for map and complete list of Tier 2 projects. While it would have been preferable to analyze each Tier 2 project individually to isolate the effects, the projects were analyzed as a "bundle" of necessary intersection mitigations.

Table 3: Tier 2 Projects within Interchange Management Study Area (IMSA)

Project ID	Location	Description	Jurisdiction
467	Lear Way, Coker Butte Rd to Vilas Rd	Construct new major collector roadway (includes center turn-lane, bike facilities, and sidewalks)	Medford
627	Crater Lake Ave, Coker Butte Rd to northern UGB	Construct new major collector roadway (includes center turn-lane, bike facilities, and sidewalks)	Medford
628	Lear Way, Vilas Rd to northern city limits	Construct new minor collector roadway (includes one lane each direction, bike facilities, and sidewalks)	Medford
632, R91	Vilas Road, Table Rock Rd to eastern UGB	Widen to major arterial standard including two lanes in each direction, center turn-lane, bike facilities, and sidewalks	Medford
I43	Vilas Rd & Airway Dr or Industry Dr	Install traffic signal or roundabout when warranted	Medford
I44	Vilas Rd & Lear Wy	Install traffic signal or roundabout when warranted	Medford

Table 4: Tier 2 Projects in Model Runs but Outside Direct IMSA

Project ID	Location	Description	Jurisdiction
234	E-W Hamrick Rd. extension (south of E. Pine St.)	Extend Hamrick Rd. westerly to intersect with Penninger Rd. (collector standards).	Central Point
495	Coker Butte Road, International Way to Lear Way	Upgrade to minor arterial roadway (includes center turn-lane, bike facilities, and sidewalks)	Medford
629	Airway Dr / Industry Dr, Vilas Rd to Coker Butte Rd	Construct new major collector roadway (includes center turn-lane, bike facilities, and sidewalks)	Medford
630	Springbrook Road, Coker Butte Rd to Vilas Rd	Construct new major collector roadway (includes center turn-lane, bike facilities, and sidewalks)	Medford
631	East-West collector between Coker Butte Road and Vilas Road, Crater Lake Highway to eastern UGB	Construct new minor collector roadway (includes one lane each direction, bike facilities, and sidewalks)	Medford

5. **JTA Expressway Interchange Build Tier 2 (JTAT2)** is a replica of the NBT2 scenario except that the Tight Diamond Interchange at Vilas Road was included and unique intersection mitigations were applied to meet city and county v/c, LOS, and MMLOS standards.

6. **Full Expressway Interchange Build Tier 2 (FullT2)** is a replica of the JTAT2 scenario except that not only was the Tight Diamond Interchange at Vilas Road included, but also the entire Full Build design. Also unique intersection mitigations wee applied to meet city and county v/c, LOS, and MMLOS standards.

Two-lane or Four-lane Vilas Road scenarios included either two or four through lanes on Vilas Road. Widening Vilas Road to four through lanes is a City of Medford Tier 2 project; therefore, Vilas Road was two through lanes for Tier 1 scenarios and four through lanes for Tier 2 scenarios. Because there is a Two-Way-Left-Turn- Lane (TWLTL) present, the actual cross sections would be three or five lanes; however, a TWLTL has no bearing on the analysis as there is no way to analyze or simulate its presence.

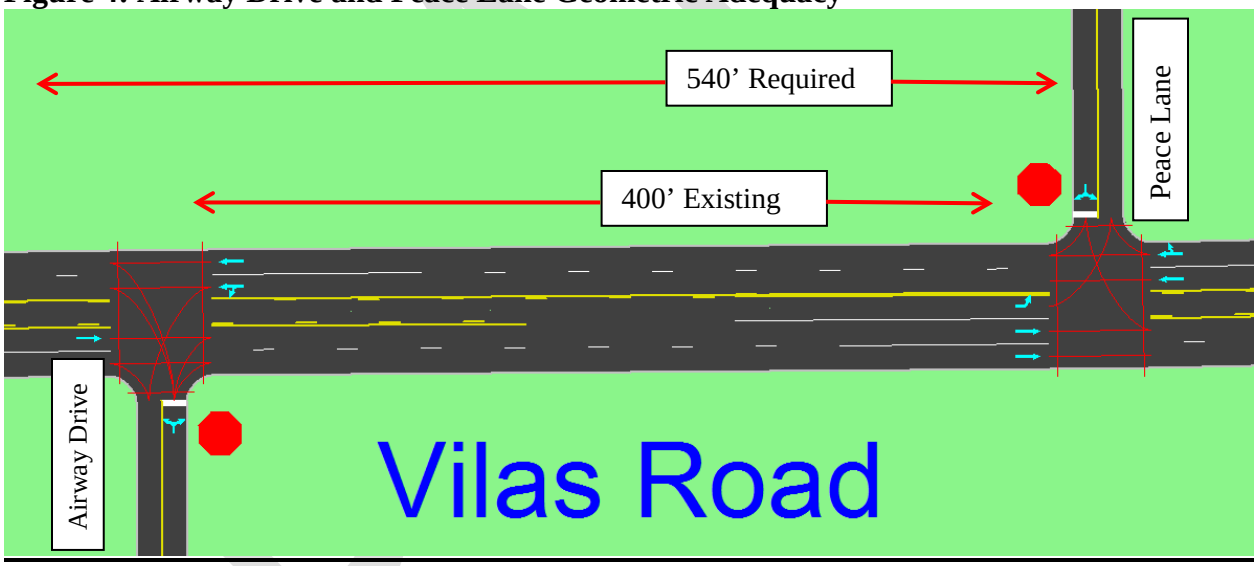
Jackson County Jail (JAIL_JTAT2 and JAIL_FullT2) scenarios conduct a reduced sensitivity analysis on the two scenarios which include the interchange, to evaluate the impacts of a proposed jail. The proposed location for a new jail is in an undeveloped area south of East Vilas Road, between Crater Lake Highway and the new OR62 Expressway. The construction of the jail is in the very preliminary phases given that even initial

consideration is dependant upon the passing of a taxing service district in November 2019. Currently just a v/c and LOS analysis is performed and more detailed analyses would be done when (if) the land use process commences. Methodology details can be found in Appendix D.

- For all scenarios with four through lanes on Vilas Road:
  Peace Lane has been realigned to intersect with Vilas Road at Airway Drive. The individual intersections would cease to function without the realignment because there is not enough space between the two intersections to accommodate the required turn lanes and legal turning movements from one street to the other. Figure 4 depicts a four-lane Vilas Road scenario and the left turn lanes are at maximum length with the 400 feet of linear space available. See Appendix E for details of this analysis.

- In all alternative scenarios except "No-build/No-mitigation" the lane geometry and bike / pedestrian facilities are modified attempting to meet v/c, LOS, and MMLOS standards. Also signals are added where PSW have been met.

Figure 4: Airway Drive and Peace Lane Geometric Adequacy



Scenario Naming Convention

The following naming convention has been implemented to aid in communication and will be used throughout the rest of the document and is shown in Table 5 below.

Table 5: Scenario Names and Descriptions

Name	OR62 Phase	# of Vilas Rd through lanes	Interchange Type	RTP/TSP Projects Included	Peace realigned with Airway	Industry Drive Cul-de-saced
NBNM	JTA	2	None	None	N	N
NBM	JTA	2	None	None	N	N
NBT1	JTA	2	None	Tier 1	N	N
NBT2	JTA	4	None	Tier 1&2	Y	N
JTAT2	JTA	4	Tight Diamond	Tier 1&2	Y	Y
FullT2	Full Build	4	Tight Diamond	Tier 1&2	Y	Y

VOLUME DEVELOPMENT

Design Hour Volumes (DHVs) were developed using mostly the 2014 counts previously taken for the FEIS, the Jackson County TSP, and local development projects by the Region 3 Traffic Section. It was necessary to obtain additional peak 3-hour turning movement counts at the intersections of Airway Drive and Industry Drive with Vilas Road in November 2017. In August 2018, a new count was obtained at the intersection of Hamrick Road and Biddle Road/Pine Road to incorporate traffic generated by the Costco which opened November 2017. See Appendix F for the full Costco Volume Revision methodology. All of the traffic counts were adjusted to a common 2015 base year to create inputs for the future volume development. The counts are available in Appendix G. Also, the complete process is documented in Appendix G for Existing Volume and Appendix H for Future Volume.

ANALYSIS RESULTS

Volume Change with Interchange Construction

With the construction of the interchange there are inherent shifts in traffic volumes. As expected, north of Vilas Road on Crater Lake Highway (CLH) and Crater Lake Avenue (CLA) there is a volume decrease (about 53% and 15% respectively) because traffic is reallocated to the new OR62. Vilas Road volumes decrease about 20% from the East Project Limit to the interchange caused by the through traffic traveling between north of the study area (White City area) and south of the study area being removed from the segment between the interchange and CLH. The volume on Vilas Road west of the interchange remains relatively unchanged because traffic continues to travel from the west to the interchange.

The Tier 1 Projects only affected a few locations. South of Biddle Road, Hamrick Road is reduced 36% while the volume on Table Rock Road is increased 29%. The Jackson County Project R54 which widens Table Rock Road to a five-lane urban minor arterial probably attracts the volume to Table Rock Road from Hamrick Road.

As expected, the volumes generally increase and are shifted around with the inclusion of the Tier 2 projects as they add greater connectivity which makes the network more attractive. This increase is seen across Vilas Road where there is a 65% increase from Table Rock Road to Industry Drive, and 47% increase to Lear Way. This is partially caused by the widening of Vilas Road to four through lanes adding capacity. Also, City of Medford projects construct Lear Way as well as a new major collector roadway connecting Coker Butte Road to Vilas Road via Industry Drive. This new connection contributes to the 75% increase on Industry Drive.

Adding the Full Interchange Build to the JTA Interchange Build does not change the volume very much. CLH and CLA North of Vilas Road increase 19% and 27%, respectively. This is because the Full Build North Bound does not allow access to Corey Road, Gregory Road, or Gramercy Drive (i.e.-once on the expressway there is limited access prior to north terminus) so traffic with that destination must us CLA and CLH.

These changes are diagramed in Appendix I. Note that the percentages depicted on the diagrams are averaged two-way values. As this is a PM peak period analysis, some directional peaking occurs.

Mainline & Merge/Diverge/Weave Segments

In 2040, almost all of the mainline free-flow segments, ramps, and merge/diverge sections in the study section are projected to be operating acceptably which can be seen in Table 6. HCS 2010 freeway modules are used to determine the v/c on these segments. These analysis outputs are available in Appendix J. On the OR62 northbound mainline

north of the interchange the v/c is slightly elevated for the Full Interchange Build. The northbound on-ramp is over the standard in both JTA and Full Interchange Build. This is an analysis of an afternoon peak period, so higher v/c may be caused by the increased afternoon northbound commuter traffic to White City.

Table 6: Year 2040 OR62 Mainline and Merge/Diverge/Weave v/c ratios[1]

OR62 Segment and Merge/Diverge Location										
Scenario	**Mainline South of Interchange**		**Mainline North of Interchange**		**Between Ramps**		**Diverge - Off Ramps**		**Merge - On Ramps**	
	NB	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
JTA Build										
JTAT2	0.51	0.40	0.74	0.62	0.48	0.38	0.52	0.64	**0.76**	0.41
Full Build										
FullT2	0.51	0.36	**0.78**	0.59	0.47	0.34	0.53	0.61	**0.81**	0.37

[1]Black-shaded cells indicate that the ODOT HDM 0.75 v/c standard has been exceeded.

Signalized Intersections

Tables 7a and 7b show the v/c ratio and LOS results for all of the signalized intersections. Synchro 9 was used to determine these values and the capacity reports are available in Appendix K. Two especially problematic intersections are the Hamrick Road and Table Rock Road intersections with Biddle Road. The intersection of Hamrick Road and Biddle Road is over capacity without both the recommended intersection mitigations as well as a minimum of the Tier 1 projects. Table Rock Road and Biddle Road is over capacity without both the recommended intersection mitigations as well as a minimum of the Tier 1 projects and does not meet the standard without the addition of the Tier 2 projects. Suggested improvements will require a TSP amendment.

Table 7a: Year 2040 Signalized Intersection v/c Ratios and LOS values[1]

Scenario	Intersection								
	Vilas Rd &								
	Table Rock Rd	Peace Ln	Airway Dr	Industry Dr	SB Ramp	NB Ramp	Lear Wy	CLH	CLA
No-build[3]									
NBNM	**1.08 E**	NA[2]	NA[2]	NA[2]	NA	**NA**	NA	**1.27 F**	NA[2]
NBM	**0.97 D**	NA[2]	NA[2]	0.83 B	NA	NA	NA	**1.19 F**	0.46 B
NBT1	0.95 D	NA[2]	NA[2]	0.87 B	NA	NA	NA	**0.96[5] D**	0.60 B
NBT2	0.83 D	NA[4]	0.93[4] B	0.89 B	NA	NA	0.78 B	**0.96 E**	0.49 B
JTA Build									
JTAT2	0.94 D	NA[4]	0.86 C	NA[6]	0.70 B	0.61 C	0.83 B	**0.84[5] D**	0.42 B
Full Build									
FullT2	0.84 D	NA[4]	0.90 C	NA[6]	0.75 D	0.69 F	0.86 B	**0.81[5] D**	0.29 B

[1]Black-shaded cells indicate that the ODOT HDM 0.75 v/c standard, the Jackson County 0.95 v/c standard, the City of Central Point LOS D standard, or the City of Medford LOS D standard has been exceeded.
[2]Unsignalized intersections are listed in Table 10 by both Major and Minor movements.
[3]No-build scenarios for Crater Lake Highway and Vilas Rd intersection use the OHP v/c standard of 0.85 for No-build and HDM standard of 0.75 for Interchange Build. If it is transferred to Jackson County jurisdiction LOS D may be used. The rest of the scenarios use the HDM, City of Medford, City of Central Point or Jackson County standards.
[4]When Vilas Road is widened to four lanes, Peace Lane is realigned to intersect Vilas Road at Airway Drive creating a single intersection.
[5]If jurisdiction is transferred to Jackson County the standard of LOS D would be met.
[6]Industry Drive is cul-de-saced and reconnected with Airway Drive upon construction of the interchange per FEIS design.

Table 7b: Year 2040 Signalized Intersection v/c Ratios and LOS values[1]

Scenario	Intersection: Biddle Rd & Hamrick Rd	Intersection: Biddle Rd & Table Rock Rd
No-build[3]		
NBNM	**1.61 F**	**1.41 F**
NBM	**1.38 F**	**1.02 D**
NBT1	0.72 C	**0.96 D**
NBT2	0.90 D	0.94 D
JTA Build		
JTAT2	0.87 D	0.91 D
Full Build		
FullT2	0.89 D	0.95 D

[1]Black-shaded cells indicate that the ODOT HDM 0.75 v/c standard, the Jackson County 0.95 v/c standard, the City of Central Point LOS D standard, or the City of Medford LOS D standard has been exceeded.
[2]Unsignalized intersections are listed in Table 10 by both Major and Minor movements.
[3]No-build scenarios for Crater Lake Highway and Vilas Rd intersection use the OHP v/c standard of 0.85. If it is transferred to Jackson County jurisdiction LOS D may be used. The rest of the scenarios use the HDM, City of Medford, City of Central Point or Jackson County standards.
[4]When Vilas Road is widened to four lanes, Peace Lane is realigned to intersect Vilas Road at Airway Drive creating a single intersection.
[5]If jurisdiction is transferred to Jackson County the standard of LOS D would be met.
[6]Industry Drive is cul-de-saced and reconnected with Airway Drive upon construction of the interchange per FEIS design.

Unsignalized Intersections

Table 8 depicts the unsignalized intersection v/c ratios listed in a major movement / minor movement format. Synchro 9 is used to determine these values and the capacity reports are available in Appendix K. At almost all intersections, the LOS of the minor movement is unacceptable at E or F indicating that improvements are needed. Preliminary Signal Warrant (PSW) criteria was used to evaluate if intersections should be signalized. The output tables from the PSW analysis are in Appendix L. PSW's are from the Manual of Uniform Traffic Control Devices (MUTCD). Table 9 shows the 2040 PSW status for the unsignalized intersections in the study area

Table 8: Year 2040 Unsignalized Intersection Operations[1]

Scenario	v/c	LOS[4]	Critical Movement[2]	Control
Vilas Rd & Peace Ln				
NBNM	0.12 / 0.74	**B / E**	EBL / SBL	TWSC[3]
NBM	0.12 / 0.45	**B / E**	EBL / SBL	TWSC[3]
NBT1	0.12 / 0.72	**B / F**	EBL / SBL	TWSC[3]
Vilas Rd & Airway Dr				
NBNM	0.04 / 0.50	**B / E**	WBL / NBLR	TWSC[3]
NBM	0.04 / 0.36	**B / E**	WBL / NBL	TWSC[3]
NBT1	0.04 / 0.39	**B / E**	WBL / NBL	TWSC[3]
Vilas Rd & Industry Dr				
NBNM	0.04 / 0.50	**B/E**	WBL / NBLR	TWSC[3]

[1]Values for intersection are listed by MAJOR movement / MINOR movement
[2]Eastbound Left (EBL), Southbound Left (SBL), Northbound Left (NBL), Westbound Left (WBL), Northbound Left Right (NBLR).
[3]Two Way Stop Control (TWSC)
[4]Black shaded cells indicate that the City of Medford Standard LOS D has been exceeded.

Table 9: Year 2040 Preliminary Signal Warrants Met[1]

Scenario	Intersection				
	Vilas Rd &				
	Peace Ln	Lear Wy	Crater Lake Ave	Airway Dr	Industry Dr
No-build					
NBNM	N	N/A	**Y**	N	**Y**
NBM	**N**	N/A	**Y**	N	**Y**
NBT1	**Y**	N/A	**Y**	N	**Y**
NBT2	**N/A[2]**	**Y**	**Y**	**Y[2]**	**Y**
JTA Build					
JTAT2	**N/A[2]**	**Y**	**Y**	**Y[2]**	**N/A[3]**
Full Build					
FullT2	**N/A[2]**	**Y**	**Y**	**Y[2]**	**N/A[3]**

[1]Black shaded cells indicate that preliminary signal warrants (PSW's) have been met. Meeting PSW's does not guarantee that a traffic signal will be installed. Region Traffic staff will need to perform an intersection traffic control study in which the Region Traffic Engineer will forward the recommendation to the State Traffic Engineer's office. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal will be installed on a state highway.
[2]A Functional Area Calculation (APM v2 4.8.1) is performed to evaluate closely spaced intersections. It is determined that Peace Lane will need to be realigned with Airway Drive and signalized. See Appendix E for calculation details.
[3]Industry Drive is cul-de-saced and reconnected with Airway Drive upon construction of the interchange per FEIS design.

Jackson County Jail Sensitivity Analysis

Jackson County Jail (JAIL-JTAT2 and JAIL-FullT2) scenarios (see Table 10) conduct a reduced sensitivity analysis on the two scenarios which include the interchange, to evaluate the impacts of a proposed jail. The proposed location for a new jail is in an undeveloped area south of East Vilas Road, between Crater Lake Highway and the new OR62 Expressway. The construction of the jail is in the very preliminary phases given that even initial consideration is dependent upon the passing of a taxing service district in November 2019. Currently just a v/c and LOS analysis is performed and more detailed analyses would be done when (if) the land use process commences. Methodology details can be found in Appendix D.

Table 10: Jail Sensitivity Analysis Scenarios Names and Descriptions

Name	OR62 Phase	# of Vilas Rd through lanes	Interchange Type	RTP Projects Included	Peace realigned with Airway	Industry Drive Cul-de-saced
Jail - JTAT2	JTA	4	Tight Diamond	Tier 1 and 2	Y	Y
Jail - FullT2	Full Build	4	Tight Diamond	Tier 1and 2	Y	Y

Tables 11a and 11b show the v/c ratio and LOS results for all of the signalized intersections for the Jail scenarios. Synchro 9 was used to determine these values and the capacity reports are available in Appendix K. It can be seen the the Jail has a minimal effect on the scenraios. In Jail-JTAT2, the v/c is slightly elevated at the intersection of Lear Way and Vilas Road, but the standard is still met. In Jail- FullT2, traffic is shifted away from CLH to Table Rock Road. This causes the intersections of Table Rock Road with both Vilas Road and Biddle Road to be slightly over standard while the intersection at CLH meets the standard when it previously did not. The model assigns traffic volumes based on travel time. This shift in volume away from the east side of the study area may be due to the increased volume generated by the jail at Lear Way causing CLH to have a longer travel time than the route along Table Rock Road causing the model to allocate more traffic to Table Rock Road.

Table 11a: Year 2040 Jail Sensitivity Analysis Signalized Intersection v/c Ratios and LOS values[1]

Scenario	Intersection								
	Vilas Rd &								
	Table Rock Rd	Peace Ln	Airway Dr	Industry Dr	SB Ramp	NB Ramp	Lear Wy	CLH	CLA
JTAT2	0.94 D	NA[4]	0.86 C	NA[6]	0.70 B	0.61 C	0.83 B	**0.84[5] D**	0.42 B
JAIL JTAT2	0.92 D	0.81 A	0.80 B	NA[6]	0.74 D	0.61 D	0.94 B	**0.86[5] D**	0.28 B
FullT2	0.84 D	NA[4]	0.90 C	NA[6]	0.75 D	0.69 F	0.86 B	**0.81[5] D**	0.29 B
JAIL FullT2	**0.96 D**	0.85 B	0.91 B	NA[6]	0.75 C	0.75 C	0.83 C	0.71 C	0.29 B

Table 11b: Year 2040 Jail Sensitivity Analysis Signalized Intersection v/c Ratios and LOS values[1]

Scenario	Intersection	
	Biddle Rd &	
	Hamrick Rd	Table Rock Rd
JTAT2	0.87 D	0.91 D
JAIL JTAT2	0.86 D	0.87 D
FullT2	0.89 D	0.95 D
JAIL FullT2	0.91 D	**0.97 D**

[1]Black-shaded cells indicate that the ODOT HDM 0.75 v/c standard, the Jackson County 0.95 v/c standard, the City of Central Point LOS D standard, or the City of Medford LOS D standard has been exceeded.
[2]Unsignalized intersections are listed in Table 10 by both Major and Minor movements.
[3]No-build scenarios for Crater Lake Highway and Vilas Rd intersection use the OHP v/c standard of 0.85. If it is transferred to Jackson County jurisdiction LOS D may be used. The rest of the scenarios use the HDM, City of Medford, City of Central Point or Jackson County standards.
[4]When Vilas Road is widened to four lanes, Peace Lane is realigned to intersect Vilas Road at Airway Drive creating a single intersection.
[5]If jurisdiction is transferred to Jackson County the standard of LOS D would be met.
[6]Industry Drive is cul-de-saced and reconnected with Airway Drive upon construction of the interchange per FEIS design.

95th Percentile Queuing

Appendix M contains the 2040 95th percentile queuing figures for the project area. Queues shown on figures are a combination of stopped vehicles and vehicles traveling at seven or less miles per hour. The reported queues were created by averaging ten random Sim Traffic micro-simulations together. The Sim Traffic reports are available in Appendix N.

The extensive queue on eastbound Pine Street / Biddle Road toward Hamrick Road is a result of traffic entering the study area from Central Point to the west headed to the residential area located north and east of the intersection and also to access Table Rock Road northbound.

The JTA Expressway No-build Interchange with mitigations (NBT1 and NBT2) improve the queuing in some locations, but not others. Generally the queuing issues just get shifted around without a single solution existing to mitigate all of the issues. For example, allocating more traffic signal green time to the eastbound through movement (EBT) at Pine Street / Biddle Road and Hamrick Road reduces queues on Pine Street, but this causes the southbound through movement (SBT) on Hamrick Road to have very long queues. Similarly, increasing the northbound through (NBT) green time at Table Rock Road and Biddle Road would improve the northbound queues, but cause the already long westbound to increase. Similar examples exist throughout the network. Westbound across Vilas Road still has queue lengths extending across most of the study area. The inclusion of the Tier 2 projects and the realignment of Peace Lane with Airway Drive improves queing on the east side of the study area and reduces the number of blocked intersections; however, Vilas Road east and west bound still has long queues. Without the Tier 2 projects, the queueing consistently blocks intersections westbound across the study area.

An additional measure for queuing is the percent time blocked for turn storage bays and intersections. Blocking times of five percent or greater are considered significant and are included in the following tables. Together these two parameters give a comprehensive view of the queuing: queue length figures show extent of queuing and percent time blocked shows how much of the peak hour there is blockage.

In the NBNM scenario, Vilas Road westbound at Table Rock Road blocks Airway Drive 58% and through Peace Lane and Industry Drive almost 10% of the time. The west and east bound left turn bays at the intersections of Table Rock Road and Biddle Road as well as Hamrick Road and Biddle Road are blocked over 75% of the time. These results are summarized in Table 12.

Table 12: NBNM Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		83
	WB	WBL		76
	NB	NBL		25
	SB	SBR		26
Crater Lake Hwy & Vilas Rd	EB	EBL		57
		EBR		6
	WB		Crater Lake Ave	51
	NB	NBL		63
		NBR		43
	SB	SBR		48
		SBL		70
Vilas Rd & Peace Ln	WB		Industry Dr	8
Crater Lake Ave & Vilas Rd	WB	WBLTR		73
	NB	NBLTR		63
Table Rock Rd & Vilas Rd	EB	EBR		16
	WB		Airway Dr	58
		WBL		43
		WBR		60
	NB	NBL		7
	SB	SBL		13
Table Rock Rd & Biddle Rd	EB	EBL		84
	WB	WBL		75
		WBR		63
	SB	SBL		72
	NB	NBL		18
		NBR		66
Industry Dr & Vilas Rd	WB	WBL		33
Airway Dr & Vilas Rd	WB		Peace Ln	8

With mitigations the queuing benefits are mostly realized on the north-south study area movements, especially on CLA as seen in Table 13.

Table 13: NBM Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		86
	WB		Table Rock Rd	7
		WBL		97
		WBR		17
	NB	NBL		17
Airway Dr & Vilas Rd	WB	WBL		45
	NB	NBL		50
Crater Lake Hwy & Vilas Rd	EB	EBL		58
		EBR		40
	WB	WBL		8
	NB	NBL		50
		NBR		53
	SB	SBR		58
		SBL		55
Vilas Rd & Peace Ln	SB	SBL		58
		SBR		10
Table Rock Rd & Vilas Rd	EB	EBL		7
	WB		Airway Dr	47
		WBL		50
		WBR		50
	NB	NBL		9
	SB	SBR		5
Table Rock Rd & Biddle Rd	WB	WBL		78
		WBR		58
	SB	SBL		71
		SBR		19
	NB	NBL		26
Industry Dr & Vilas Rd	WB	WBL		38

The Tier 1 No-build scenario (NBT1) changes are seen in Table 14. Two significant Tier 1 projects occur in the southwest quadrant of the study area at the intersections of Biddle Road with Hamrick Road and Table Rock Road. Accordingly, queuing is reduced at those two intersections. However, the queuing westbound on Vilas Road, northbound on Airway Drive, and Industry Drive, and southbound on Peace Lane worsens.

Table 14: NBT1 Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		10
	WB	WBR		12
	NB	NBL		18
Airway Dr & Vilas Rd	WB		Peace Ln	9
		WBL		76
	NB	NBL		68
Crater Lake Hwy & Vilas Rd	EB	EBL		45
	WB	WBL		8
		WBR		7
	NB	NBL		73
		NBR		35
	SB	SBR		54
		SBL		51
Vilas Rd & Peace Ln	SB	SBL		85
		SBR		6
	WB		Industry Dr	11
Table Rock Rd & Vilas Rd	EB	EBL		53
	WB		Airway Dr	59
		WBL		49
		WBR		59
	NB	NBL		12
	SB	SBL		7
Table Rock Rd & Biddle Rd	WB	WBL		71
		WBR		50
	SB	SBL		67
		SBR		17
	NB	NBL		33
Industry Dr & Vilas Rd	WB		Crater Lake Hwy	27
		WBL		69
	NB	NBL		48

With mitigations the Tier 2 No-build scenario (NBT2) improves as seen in Table 15. There are only 2 blocked intersections. The realignment and signalization of the Airway Drive / Peace Lane and Vilas Road intersection significantly reduces the northbound and southbound turn lane percent time blocked that is displayed with only the Tier 1 projects. The improvements are largely due to the Tier 2 project which widens Vilas Road from two through lanes to four.

Table 15: NBT2 Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		70
	WB	WBR		11
	NB	NBL		20
Lear Way & Vilas Rd	EB	EBL		25
		EBR		18
	WB	WBL		10
		WBR		11
Crater Lake Hwy & Vilas Rd	EB		Lear Way	14
		EBL		63
		EBR		9
	NB	NBL		70
		NBR		6
	SB	SBR		47
		SBL		41
Vilas Rd & Peace Ln/Airway Dr	WB	WBL		38
Table Rock Rd & Vilas Rd	EB	EBL		5
	WB		Airway Dr	45
		WBL		45
		WBR		13
	NB	NBL		16
		NBR		19
	SB	SBL		35
Table Rock Rd & Biddle Rd	WB	WBL		74
		WBR		47
	SB	SBL		49
		SBR		19
	NB	NBL		43
Industry Dr & Vilas Rd	WB	WBL		31
	NB	NBL		36

The construction of the interchange causes significant queuing between the northbound and southbound ramps extending east and west (see Table 16). The eastbound queue extends from the north bound ramps to almost a mile past Table Rock Road onto Hamrick Road. The west bound Vilas Road queue is even worse spanning the entire study area from Table Rock Road to CLH.

Table 16: JTAT2 Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		22
Lear Way & Vilas Rd	WB		Crater Lake Hwy	9
		WBL		35
Crater Lake Hwy & Vilas Rd	EB	EBR		9
	NB	NBL		48
	SB	SBR		26
		SBL		12
Vilas Rd & Peace Ln/Airway Dr	EB		Table Rock Rd	16
		EBL		35
		EBR		52
	WB		SB Ramps	18
		WBL		45
		WBR		47
	NB	NBR		6
Table Rock Rd & Vilas Rd	EB	EBL		9
		EBR		47
	WB		Peace Ln/Airway Dr	22
		WBL		39
		WBR		13
	NB	NBL		11
		NBR		19
	SB	SBL		65
Table Rock Rd & Biddle Rd	WB	WBL		59
		WBR		37
	SB	SBL		45
		SBR		27
	NB	NBL		36
		NBR		27
SB Ramps & Vilas Rd	EB		Peace Ln / Airway Dr	10
		EBR		8
	WB		NB Ramps	12
NB Ramps & Vilas Rd	EB		SB Ramps	34
	WB		Lear Way	23
		WBR		80

The Full Expressway Build Interchange increases the queuing due to several network changes creating a geometry different than just the JTA Expressway Build Interchange (see Table 17). The cul-de-sacing of Gregory Drive, north of the study area, causes trips using Table Rock Road in the JTA Build to be distributed on eastbound Vilas Road to the northbound interchange ramp. Additionally, the Full Build does not allow access on to Corey Road or Gregory Road. To access the industrial area located there, vehicles must use CLH or CLA. Both of these changes cause more volume on east bound Vilas Road The already unstable network has long queues so these changes cause the turn bay average percent time blocked to increase. Additionally, the queues at the Biddle Road intersections are longer. Without the Full Build, Central Point traffic may choose to access White City via a route which circumvents Vilas Road by accessing Table Rock Road north of Vilas Road to Antelope Road. Analysis demonstrates that this is a faster route with the JTA build, but with the Full Build it is faster to make the trip via Vilas Road.

Table 17: FullT2 Significant Turn Bay and Intersection Blockages

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Hamrick Rd & Biddle Rd	EB	EBL		33
Lear Way & Vilas Rd	WB		Crater Lake Hwy	15
		WBL		60
Crater Lake Hwy & Vilas Rd	NB	NBL		61
	SB	SBR		25
		SBL		11
Vilas Rd & Peace Ln/Airway Dr	EB		Table Rock Rd	43
		EBL		48
		EBR		81
	WB		SB Ramps	41
		WBL		54
		WBR		55
	NB	NBL		47
		NBR		19
	SB	SBL		76
Table Rock Rd & Vilas Rd	EB	EBL		62
		EBR		62
	WB		Peace Ln/Airway Dr	33
		WBL		47
		WBR		11
	NB	NBL		5
		NBR		64
	SB	SBL		76

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average % Time Blocked
Table Rock Rd & Biddle Rd	EB	EBL		24
	WB	WBL		58
		WBR		54
	SB	SBL		34
	NB	NBL		45
SB Ramps & Vilas Rd	EB		Peace Ln / Airway Dr	35
		EBR		81
	WB		NB Ramps	32
	SB		OR62	33
NB Ramps & Vilas Rd	EB		SB Ramps	28
	WB		Lear Way	36
		WBR		80

Crash Analysis Summary

The purpose of the crash analysis is to determine the relative predicted crash frequency amongst the scenarios. The following tables depict the total crashes for each scenario. The total is a sum of the Fatal and Injury (FI) and the Property Damage Only (PDO) crashes. The Highway Safety Manual (HSM) predictive spreadsheet tool for urban / suburban arterials is used for intersections and segments outside of the interchange. The Enhanced Interchange Safety Analysis Tool (ISATe) is used for the OR62 mainline segments, the ramps, and ramp terminals. The HSM and ISATe tables are in Appendix O. The arterial and interchange predicted crashes were summed and are reported in Table 18 below. The No-build Tier 2 Scenario (NBT2) has the most crashes of the No-build Scenarios.

As expected, the No-build Scenarios produce the lowest crash frequency. There is a 13% increase in crashes per year with the construction of the JTA Build Interchange and 30% with the Full Build beyond NBT2.

Table 18: Total Predicted Crash Frequency (crashes/year)

Scenario	Source	Total	FI[4]	PDO[3]
NBNM	HSM[1]	82	26	56
	Total	82	26	56
NBM	HSM	77	24	53
	Total	77	24	53
NBT1	HSM	76	24	52
	Total	76	24	52
NBT2	HSM	107	34	73
	Total	107	34	73
JTAT2	ISATe	33	12	21
	HSM	88	28	60
	Total	121	40	81
FullT2	ISATe	35	13	22
	HSM	104	33	71
	Total	139	46	93

[1]HSM is the Highway Safety Manual predictive spreadsheet tool for urban / suburban arterials and is used for intersections and segments outside of the interchange.
[2]ISATe is the Enhanced Interchange Safety Analysis Tool used for the OR62 mainline segments, the ramps, and ramp terminals.
[3]PDO is Property Damage Only
[4]FI is Fatal and Injury in the HSM tool and the sum of fatal, incapacitating injury, non-incapacitating injury, and possibly injury fields in the ISATe tool.

Multimodal Level of Service Analysis

For this analysis the APM v2 Chapter 14 Simplified Multimodal Level of Service (MMLOS) is applied. This is based on the HCM 2010 MMLOS methodologies. The Simplified MMLOS Calculator spreadsheet tool available on the ODOT Planning and Technical Guidance webpage is used. The directional characteristics of each segment within the study area are entered to reflect the current conditions using Google Earth, including parameters such as number of lanes, sidewalk width, speed limit, and directional volume. A directional Pedestrian, Bicycle, and Transit LOS or LOS range is output for each segment. When the LOS was below D (E or F) potential multimodal mitigations were considered. The v/c or queue length mitigation recommended for several facilities is to widen the roadway. With widening, a sidewalk will likely be added. The No-build scenarios will be analyzed without a sidewalk and the build cases will be assumed to include the needed six-foot wide sidewalk. The existing bike lane will be included.

In summation, if a segment is recommended to be widened, then bike/ped facilities will be assumed to be included. If no widening occurs, Google Earth will be used to document "as-is" conditions; however, even with no widening it is assumed that bike/ped facilities will be added between the ramps.

Along Airway Drive, a five-foot wide sidewalk is present along both the east and west sides of the developed section. The north and south ends of the segment are undeveloped and a sidewalk is not present. This will be reported as no sidewalk because that would be the most restrictive characteristic along the entire roadway. Peace Lane was realigned with Airway Drive in scenarios where Vilas Road has been widened to four through lanes (scenarios including Tier 2 projects). Currently there are no sidewalks, but here it will also be assumed that they will be included. The construction of Lear Way both north and south of Vilas Road is assumed to include sidewalks.

To mitigate the NBNM to a No-build mitigated scenario, adding a sidewalk generally improves the pedestrian LOS to C or better, except for along Pine Street / Biddle Road, Table Rock Road, and Crater Lake Highway. This is because the LOS is driven by two-lanes of traffic in each direction with higher posted speeds and volumes. This also applies to Vilas Road for scenarios with four through lanes on Vilas Road as well as for the build scenarios; however, as noted in the Background Information Section, the stretch of Vilas Road located roughly between the Upton Slough and Rainbow Drive is in an RPZ and will need a "Notice of Proposed Construction" permit from the FAA in order to add the recommended, as well as 2018 Medford TSP Standard required (Figure 3), pedestrian facilities. The details of the specific mitigations are in Appendix P.

To improve the bicycle LOS, first a bike lane or paved shoulder was added. While this did help on some roadway sections, a shoulder is only appropriate for rural areas and a bike lane is a minimal accommodation, not very acceptable by most users; facilities with greater separation are preferred. When this did not improve the LOS, a separated shared

use path is suggested. The Shared Path Calculator spreadsheet tool is used to evaluate the resulting LOS. The following assumptions are made in the use of this calculator:

- Literature suggests a 20% factor to cover the peak period. The study area has a low bike and ped volume which does not have a large variance between intersections. For this reason, it is assumed that adding a separated multi-use path will have the same effect on the LOS on all segments. The bike and pedestrian LOS becomes an A wherever this mitigation is implemented.
- Directional Split = 0.52 based on actual counts as well as APM guidance to use 0.50 – 0.55.
- PHF=1
- 12' path width
- No marked centerline

A separated multi-use path is the recommended mitigation along Pine Street / Biddle Road from the west project limit to the east project limit on the north side of the roadway. It creates a useful eastward extension from the existing north-south Bear Creek Greenway. A separated path is also needed along Table Rock Road from Biddle Road to the North project limit; however, this is probably not feasible because the roadway is completely developed by commercial and industrial use. CLH is similarly developed, but a Tier 2 project proposes a re-alignment of CLA 1,000 feet to the east of its current location running parallel to CLH. This would provide an ideal spot to locate the recommended separated multi-use path.

The Rogue Valley Transportation District (RVTD) route schedules are used to populate the transit tab to calculate the transit schedule speed and frequency inputs. See Appendix Q for route schedules and methodology documentation. The transit LOS is poor because it is determined by limited frequencies. Service every hour or so will always have a low LOS. CLH has a higher LOS because service is offered twice per hour. Frequencies are partly determined on funding and land use density, so this reflects the best available service and does not imply that the service is "bad".

As can be seen in Table 19, segments in the No-build / No-mitigation Scenario are primarily at an unacceptable LOS level. With the mitigation strategy described in the preceding paragraphs, it is possible to improve every segment to an acceptable LOS, with the exception of Table Rock Road from Biddle Road north to the North Project Limit (Table 20). The recommended mitigation by segment and the MMLOS output tables are in Appendix P.

Table 19: NBNM Simplified MMLOS Segment LOS Output Summary[1]

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS	Transit LOS
Vilas Rd	W	E Project Limit-Crater Lake Ave	C-E	**F**	n/a
Vilas Rd	E	Crater Lake Ave-E Project Limit	C-E	**F**	n/a
Vilas Rd	W	Crater Lake Ave-Crater Lake Hwy	**E**	**F**	n/a
Vilas Rd	E	Crater Lake Hwy-Crater Lake Ave	**E**	**F**	n/a
Vilas Rd	W	Crater Lake Hwy-Industry Dr	C	C-D	n/a
Vilas Rd	E	Industry Dr-Crater Lake Hwy	**E**	C-D	n/a
Vilas Rd	W	Industry Dr-Peace Ln	C	C-D	n/a
Vilas Rd	E	Peace Ln-Industry Dr	**E**	C-D	n/a
Vilas Rd	W	Peace Ln-Airway Dr	C	C	n/a
Vilas Rd	E	Airway Dr-Peace Ln	**E**	C	n/a
Vilas Rd	W	Airway Dr-Table Rock Rd	C	C-D	n/a
Vilas Rd	E	Table Rock Rd-Airway Dr	**E**	C-D	n/a
Vilas Rd	W	Table Rock Rd-W Project Limit	C	C-D	n/a
Vilas Rd	E	W Project Limit-Table Rock Rd	C-E	C-D	n/a
Pine St/Biddle Rd	W	E Project Limit-Table Rock Rd	**E**	**F**	**F**
Pine St/Biddle Rd	E	Table Rock Rd-E Project Limit	**E**	**F**	**F**
Pine St/Biddle Rd	W	Table Rock Rd-Hamrick Rd	**E**	**E-F**	n/a
Pine St/Biddle Rd	E	Hamrick Rd-Table Rock Rd	**E**	**E-F**	n/a
Pine St/Biddle Rd	W	Hamrick Rd-W Project Limit	**F**	C-E	n/a
Pine St/Biddle Rd	E	W Project Limit-Hamrick Rd	**E**	**E-F**	n/a
Hamrick Rd	N	S Project Limit-Pine St/Biddle Rd	B	C	n/a
Hamrick Rd	S	Pine St/Biddle Rd-S Project Limit	B-C	B	n/a
Hamrick Rd	N	Pine St/Biddle Rd-Beebe Rd	**E**	C-D	n/a
Hamrick Rd	S	Beebe Rd-Pine St/Biddle Rd	**E**	C-D	n/a
Table Rock Rd	N	S Project Limit-Biddle Rd	**E**	C-D	n/a
Table Rock Rd	S	Biddle Rd-S Project Limit	**E**	C-D	n/a
Table Rock Rd	N	Biddle Rd-Vilas Rd	**E**	**E-F**	**F**
Table Rock Rd	S	Vilas Rd-Biddle Rd	**E**	**E-F**	**F**
Table Rock Rd	N	Vilas Rd-N Project Limit	**E**	**E-F**	**F**
Table Rock Rd	S	N Project Limit-Vilas Rd	**E**	**E-F**	**F**
Airway Dr	N	S Project Limit-Vilas Rd	B-C	**F**	n/a
Airway Dr	S	Vilas Rd-S Project Limit	B-C	**F**	n/a
Peace Ln	N	Vilas Rd-N Project Limit	C-E	**F**	n/a
Peace Ln	S	N Project Limit-Vilas Rd	C-E	**F**	n/a
Industry Dr	N	S Project Limit-Vilas Rd	B-C	C-D	n/a
Industry Dr	S	Vilas Rd-S Project Limit	B-C	C-D	n/a
Crater Lake Hwy	N	S Project Limit-Vilas Rd	**F**	C-E	D
Crater Lake Hwy	S	Vilas Rd-S Project Limit	**F**	C-E	D

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS	Transit LOS
Crater Lake Hwy	N	Vilas Rd-N Project Limit	**F**	C-E	C
Crater Lake Hwy	S	N Project Limit-Vilas Rd	**F**	**E-F**	C
Crater Lake Ave	N	S Project Limit-Vilas Rd	**E**	**F**	n/a
Crater Lake Ave	S	Vilas Rd-S Project Limit	**E**	**F**	n/a
Crater Lake Ave	N	Vilas Rd-N Project Limit	C-E	**F**	n/a
Crater Lake Ave	S	N Project Limit-Vilas Rd	C-E	**F**	n/a

[1]Black-shaded cells indicate that the LOS is E or worse.

Table 20:NBM Simplified MMLOS Segment LOS Output Summary[1]

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS	Transit LOS
Vilas Rd[3]	W	E Project Limit-Crater Lake Ave	C-E	C-D	n/a
Vilas Rd[3]	E	Crater Lake Ave-E Project Limit	C-E	C-D	n/a
Vilas Rd[2, 3]	W	Crater Lake Ave-Crater Lake Hwy	C	C-D	n/a
Vilas Rd[2, 3]	E	Crater Lake Hwy-Crater Lake Ave	C	C-D	n/a
Vilas Rd	W	Crater Lake Hwy-Industry Dr	C	C-D	n/a
Vilas Rd[2]	E	Industry Dr-Crater Lake Hwy	C	C-D	n/a
Vilas Rd[2]	W	Industry Ln-Peace Ln	C	C-D	n/a
Vilas Rd[2]	E	Peace Ln-Industry Dr	C	C-D	n/a
Vilas Rd	W	Peace Ln-Airway Dr	C	C-D	n/a
Vilas Rd[2]	E	Airway Dr-Peace Ln	C	C-D	n/a
Vilas Rd	W	Airway Dr-Table Rock Rd	C	C-D	n/a
Vilas Rd[2]	E	Table Rock Rd-Airway Dr	C	C-D	n/a
Vilas Rd	W	Table Rock Rd-W Project Limit	C	C-D	n/a
Vilas Rd[2]	E	W Project Limit-Table Rock Rd	C	C-D	n/a
Pine St/Biddle Rd[4]	W	E Project Limit-Table Rock Rd	A	A	**E**
Pine St/Biddle Rd[4]	E	Table Rock Rd-E Project Limit	A	A	**E**
Pine St/Biddle Rd[4]	W	Table Rock Rd-Hamrick Rd	A	A	n/a
Pine St/Biddle Rd[4]	E	Hamrick Rd-Table Rock Rd	A	A	n/a
Pine St/Biddle Rd[4]	W	Hamrick Rd-W Project Limit	A	A	n/a
Pine St/Biddle Rd[4]	E	W Project Limit-Hamrick Rd	A	A	n/a

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS	Transit LOS
Hamrick Rd[3]	N	S Project Limit-Pine St/Biddle Rd	B	B	n/a
Hamrick Rd	S	Pine St/Biddle Rd-S Project Limit	B-C	B	n/a
Hamrick Rd[2]	N	Pine St/Biddle Rd-Beebe Rd	C	C-D	n/a
Hamrick Rd[2]	S	Beebe Rd-Pine St/Biddle Rd	C	C-D	n/a
Table Rock Rd[2]	N	S Project Limit-Biddle Rd	C	C-D	n/a
Table Rock Rd[2]	S	Biddle Rd-S Project Limit	C	C-D	n/a
Table Rock Rd	N	Biddle Rd-Vilas Rd	**E**	**E-F**	**F**
Table Rock Rd	S	Vilas Rd-Biddle Rd	**E**	**E-F**	**F**
Table Rock Rd	N	Vilas Rd-N Project Limit	**E**	**E-F**	**F**
Table Rock Rd	S	N Project Limit-Vilas Rd	**E**	**E-F**	**F**
Airway Dr[3]	N	S Project Limit-Vilas Rd	B-C	C-D	n/a
Airway Dr[3]	S	Vilas Rd-S Project Limit	B-C	C-D	n/a
Peace Ln[3]	N	Vilas Rd-N Project Limit	C-E	C-D	n/a
Peace Ln[3]	S	N Project Limit-Vilas Rd	C-E	C-D	n/a
Industry Dr	N	S Project Limit-Vilas Rd	B-C	C-D	n/a
Industry Dr	S	Vilas Rd-S Project Limit	B-C	C-D	n/a
Crater Lake Hwy[4]	N	S Project Limit-Vilas Rd	A	A	C
Crater Lake Hwy[4]	S	Vilas Rd-S Project Limit	A	A	C
Crater Lake Hwy[4]	N	Vilas Rd-N Project Limit	A	A	B
Crater Lake Hwy[4]	S	N Project Limit-Vilas Rd	A	A	B
Crater Lake Ave[3]	N	S Project Limit-Vilas Rd	C-E	C-D	n/a
Crater Lake Ave[2, 3]	S	Vilas Rd-S Project Limit	C	C	n/a
Crater Lake Ave[3]	N	Vilas Rd-N Project Limit	C-E	C-D	n/a
Crater Lake Ave[3]	S	N Project Limit-Vilas Rd	C-E	C	n/a

[1]Black-shaded cells indicate that the LOS is E or worse.

[2]A sidewalk is added to these segments, outside of generalized assumptions, to improve LOS.

[3]A bicycle lane/shoulder is added to these segments, outside of generalized assumptions, to improve LOS.

[4]A shared use bike path is added using the Shared Path Calculator tool to determine new LOS.

The MMLOS analysis was performed for all of the scenarios and those tables are shown in Appendix P. The MMLOS improvements beyond those already stated are:

NBT2 requires a separated multi-use path on Vilas Road from Crater Lake Avenue to the west project limits.

The construction of the interchange in both the JTA and the Full Build will require the separated multi-use path on Vilas Road across the entire study area from the east project limit all the way to the west which is identified as a project in the City Of Medford Leisure Services Plan.

Other Operational Performance Measures

The overall simulation measures of effectiveness (MOE) are a network level assessment of the functionality of each scenario. Lower values for travel time (TT), delay, and number of stops indicate higher efficiency while a higher value for speed indicates a more efficient scenario. As can be seen in Table 21, the Tier 1 and Tier 2 projects and proposed mitigations improve the efficiency of the NBNM scenario for every MOE except for the number of stops with the Tier 2 projects. NBT2 has a 9% increase in stops from the NBNM. This is expected because the number of stops increase as more roadways are added or more control is added such as AWSC or new signals, which stop traffic flows which previously did not stop.

The addition of the interchange increases the overall travel time and delay by about 35% and the number of stops by 23%. These are measures of efficiency of the network which can be seen to deteriorate in the Interchange Build Scenarios.

Table 21: Year 2040 Overall Simulation Measures of Effectiveness[1]

Scenario	Travel Time (vehicle-hours)	Speed (mph)	Delay (vehicle-hours)	Number of Stops
No-build				
NBNM	2,200	11	1,600	28,600
NBM	1,900	13	1,300	29,400
NBT1	1,500	17	800	23,700
NBT2	1,500	19	800	31,200
JTA Build				
JTAT2	2,000	20	1,100	38,300
Full Build				
FullT2	2,500	13	1,700	36,100

[1]A stop is recorded every time a vehicle drops below 7 mph (crawl speed). A vehicle might have multiple stops on a single intersection approach.

Cost Benefit

A high level cost estimate is created for each scenario (in 2017 dollars). This captures the capital cost generated for each scenario for all necessary intersection mitigations required within the study area to meet the design standards. The Tier 1 RTP and TSP project costs are not included because funding has already been allocated; however, the Tier 2 project costs are included in the totals because funding will need to be identified. The mitigation costs are for physical improvements such as turn lanes, striping, traffic signals, sidewalks, ADA ramps, etc, but do not include elements such as right-of-way or drainage.

The annual cost generated by delay, fuel use, emissions, and crash with associated costs (added delay, fuel, and CO_2) is estimated. This net "year of construction" cost is compared for each step up in scenario mitigations – i.e., the additional cost created when the Tier 2 projects are added to the Tier 1 projects, or when the interchange is added in addition to the Tier 1 and Tier 2 projects. The results of this analysis can be seen in Table 22. Especially noteworthy is that the addition of the interchange to the Tier 1 and Tier 2 projects precipitates almost $21 million in additional annual costs while just adding the Tier 2 projects to the existing Tier 1 projects only adds about $2 million. Further details are in Appendix R.

Table 22: Change in Net Cost between Progressive Scenarios

Scenario Step	Capital Costs for Additional Improvements	Annual Savings with Mitigations	Net Change at Year 1
NBNM to NBM	$11,200,000	$17,900,000	$6,700,000
NBM to NBT1	$1,900,000	$29,400,000	$31,300,000
NBT1 to NBT2	$27,500,000	-$1,900,000	-$29,400,000
NBT2 to JTAT2	$180,000	-$20,600,000	-$20,500,000
JTAT2 to FullT2	N/A	-$35,100,000	-$35,100,000

SCENARIO SUMMARY & COMPARISON

The performance of the No-build / No-mitigation (NBNM) scenario is improved with appropriate mitigations (NBM) as well as the addition of the Tier 1 projects (NBT1) and Tier 2 projects (NBT2), as can be seen in Table 23.

The two mitigated No-build scenarios NBT1 and NBT2 performed better than the build scenarios in almost every measure, although NBT2 did perform the worst for crashes and number of stops. Table 24 ranks the No-build scenarios with the inclusion of the build scenarios. The overall network travel times of NBT1 and NBT2 are better than the build scenarios by at least 500 hours and similarly the overall delay is lower than the build scenarios by at least 300 hours. These measures of efficiency indicate that the the network is more efficient without the interchange.

Without the Tier 2 projects, there is extensive queuing on Vilas Road across the entire study area causing frequent occurrences of intersection and turn bay blockages. The increased travel routes provided by the Tier 2 projects distribute the volume throughout the network thereby reducing the queuing. These projects also cause more locations to meet standards. The realignment of Peace Lane with Airway Drive triggered by the Tier 2 project widening of Vilas Road also contributes to improved performance in this scenario.

The worst functioning alternative is FullT2 which, for some measures, creates conditions worse than the NBNM. With the increased volume present due to the interchange and the full construction of the expressway to north of White City, extremely long queues and significant intersection and turning bay blockages exist. Generally the Tier 2 scenarios perform better than those without these projects included.

Table 23: JTA Expressway No-build Interchange Alternative ONLY Comparison for 2040 Results[1]

Measure	NBNM	NBM	NBT1	NBT2
Number of locations over standards[2]	**7**	**6**	4	1
Number of locations over capacity[3]	**7**	**5**	2	1
Number of turn storage bays blocked more than 50% of the peak hour	**15**	10	**12**	4
Number of intersections blocked by queues	**4**	2	**4**	2
Overall average network speed (mph)	**11**	**13**	17	19
Overall network travel time (hr)	**2,200**	**1,900**	1,500	1,500
Overall delay (vehicle-hours)	**1,600**	**1,300**	800	800
Overall number of stops	28,600	**29,400**	23,700	**31,200**
Number of predicted crashes[4]	**82**	77	76	**107**
Number of segments with MMLOS worse than D	**34**	6	**10**	6

[1]The black to gray shading depicts the two best and the two worst performing scenarios. The black shaded cell is the worst up the gradient to the best performing scenario is the lightest shade of gray.
[2]Determined by OHP, HDM, City, or County Standards and Targets
[3]Defined as v/c > 1.0 or LOS E or F
[4]The No-build Scenarios do not include the OR62 mainline output from ISATe so here are shaded just relative to each other.

The JTA Expressway No-build Interchange with Tier 2 projects (NBT2) has the overall best results and JTA Build Interchange with Tier 2 projects (JTAT2) has the best results of the Build Interchange scenarios in all measures except for the overall number of stops (Table 24). Especially noteworthy is that there are eight intersections blocked by queues in JTAT2 which is 50% higher than any of the No-build scenarios. JTAT2 has only one less blocked intersection than the other build scenario (eight versus nine). Additionally, JTAT2 has the highest number of stops.

The No-build / No-mitigation (NBNM) scenario is improved in a number of ways by the inclusion of the Tier 2 projects (NBT2). The number of locations over capacity is reduced 85% due to the mitigations as well as the increased network distributing the overall volume. The number of turn storage bays blocked more than 50% of the peak hour is reduced 70% and the number of intersections blocked by queues is cut in half. The overall average network speed is increased by 8 mph, the overall network travel time

is decreased by 700 hours, and the overall network delay is decreased by 50%. The overall number of stops is increased, which would be expected with the inclusion of additional intersections. The number of predicted crashes is reduced by about 30%.

Table 24: Viable Alternative Comparison for 2040 Results[1]

Measure	NBNM	NBM	NBT1	NBT2	JTAT2	FullT2
Number of locations over standards[2]	**7**	**6**	4	1	2	3
Number of locations over capacity[3]	**7**	**5**	2	1	0	1
Number of turn storage bays blocked more than 50% of the peak hour	**15**	10	12	4	4	**14**
Number of intersections blocked by queues	4	2	4	2	**8**	**9**
Overall average network speed (mph)	**11**	**13**	17	19	20	15
Overall network travel time (hr)	**2,200**	1,900	1,500	1,500	2,000	**2,500**
Overall delay (vehicle-hours)	**1,600**	**1,300**	800	800	1,100	**1,300**
Overall number of stops	28,600	29,400	23,700	31,200	**38,300**	**36,100**
Number of predicted crashes	82	77	76	107	**121**	**139**
Number of segments with MMLOS worse than D	**34**	6	**10**	6	8	8
Economic Value[4]	N/A	2	1	3	**4**	**5**

Measure	NBNM	NBM	NBT1	NBT2	JTAT2	FullT2
Total number of Worst	**6**	0	0	0	1	**4**
Total number of 2nd Worst	**1**	4	1	0	3	**3**
Total number of 2nd Best	1	2	0	2	1	1
Total number of Best	0	2	5	6	3	0

[1]The black to gray shading depicts the two best and the two worst performing scenarios. The black shaded cell is the worst up the gradient to the best performing scenario is the lightest shade of gray.
[2]Determined by OHP, HDM, City, or County Standards and Targets
[3]Defined as v/c > 1.0 or LOS E or F
[4]Change in total value between each progressive scenario step

Crash frequency is another important parameter to consider. Overall, the JTA Expressway No-build Interchange (NBT1 and NBT2) scenarios have the lowest predicted crash frequencies. Table 25 lists all of the scenarios' predicted crash frequencies from least crashes per year to the most.

The Tier 1 JTA Expressway No-build Interchange and the JTA Expressway No-build Interchange Mitigated Scenarios (NBT1 and NBM) produce the lowest crash frequency at 76 and 77 crashes per year respectively; however, the OR62 mainline is not included in these values. There are 80% less crashes in the NBT1 than FullT2, the scenario with the highest predicted crash rate. JTAT2 has the lowest predicted crash rate of the Build scenarios. NBT1 has about 60% less predicted crashes than this lowest Build scenario value.

Table 25: Total Predicted Crash Frequency (crashes/year) for all scenarios listed from least to greatest predicted crashes.

Scenario	Total	FI
NBT1	76	24
NBM	77	24
NBNM	82	26
NBT2	107	34
JTAT2	121	40
FullT2	139	46

The intersections of Hamrick Road and Table Rock Road with Biddle Road are over capacity (even with mitigations) until the Tier 1 RTP and TSP projects are added, the worst being the No-build/No-mitigation. The intersection of CLH with Vilas Road is over standard in every scenario. This intersection is a standalone issue with or without any Vilas Road interchange improvements. The build scenarios do lower the v/c and LOS, but generally not enough to meet standards. It is likely that jurisdiction of CLH will be

transferred to Jackson County. The County only requires an LOS D which is less stringent than the v/c of 0.85 (OHP) or 0.75 (HDM). Upon jurisdication transfer, the standard would be met in both build scenarios (JTAT2 and FullT2) and the NBT1.

The construction of an interchange does little to improve the intersection performance measures (v/c and LOS's). When mitigations do reduce the v/c or LOS, the standard is met only by a small margin. This indicates that the network has very little reserve capacity available. Given that the analysis is based on the existing comprehensive plans, the assumed land use and employment rates must be maintained. The existing land use is industrial. It is likely that an interchange will attract commercial entities which typically create much higher traffic volumes. The network does not have the reserve capacity for additional demand. A land use or employment change would potentially require a study for intersection grade separation. Furthermore, access restrictions would need to be implemented on Vilas Road to prevent further exacerbation of long queues.

CONCLUSIONS

With no-mitigation, the entire study area will have extensive queuing and congestion. The mitigated JTA Expressway No-build Interchange scenario (NBT2) is the best performing alternative with only one location over capacity, the shortest overall network travel time, and the lowest intersection and turning bay blocking.

NBT2 functions better than JTAT2. Upon interchange construction, extensive intersection mitigation will be required and the annual costs precipitated by additional delay, fuel consumption, emissions, and crashes total over $20 milion (even excluding the cost of the interchange itself). Therefore, the JTA Expressway No-build Interchange scenario (NBT2) is the best overall functioning scenario.