



MEMORANDUM

DATE: October 26, 2017

TO: Linn County TSP Project Management Team

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SUBJECT: **Linn County Transportation System Plan | P14180-010**
Task 7.5 Technical Memorandum #11: Transportation System Recommendations

This memorandum describes the recommended transportation system investments to best serve travel needs in Linn County through 2040. We applied the methodology for evaluating and prioritizing the planned transportation system (including all recommended projects) into a financially constrained list, based on revenue forecasts presented in Technical Memorandum #3: Funding Assumptions. High priority project lists are identified to support project selection as other funding opportunities arise for Linn County.

The planned system was identified and refined in consultation with the project team using a multi-modal network-wide approach. The projects are focused on addressing existing and future needs identified for the County transportation system, as detailed in Technical Memorandum #10: Develop Transportation System Solutions.

The project list and maps have been updated to reflect updated information since development of Technical Memorandum #10: Develop Transportation System Solutions. The full TSP project list and maps are included in the appendix.

Planning Level Cost Estimates

Planning-level cost estimates have been developed for each TSP project.¹ These estimates are based on project elements and characteristics such as length/extent. Generalized unit costs and contingency factors were applied to the project elements to calculate total cost. The resulting values are intended to give an order of magnitude look at project costs.

The cost estimates for the full project list are included in the appendix, along with the standard unit costs that were applied. Cost estimates are based on reference documents from the County, ODOT, professional experience, and other transportation planning resources.

¹ Technical Memorandum #10: Develop Transportation System Solutions included an appendix listing County-identified areas of interest such as bridges and locations prone to flooding. These locations were not included in the TSP project evaluation, prioritization, or recommendations.

Project Scoring Reflects Transportation Goals and Policies

Projects were scored based on the evaluation criteria established in Technical Memorandum #4: Initial Goals & Policies. The complete project list with evaluation scoring is included in the appendix. The evaluation criteria assign values based on the TSP goals and objectives as refined by project stakeholders and the Project Management Team (PMT). The following adjustments have been applied to the project evaluation criteria since Technical Memorandum #4 to address recommendations by the PMT:

- Apply weightings to each evaluation criteria goal.
- Move the “Health (Active Living)” measure of effectiveness from the Safety goal to the Active Transportation goal.
- Rename the Equity goal to “Access for All”
- Simplify scoring values to “1” for criteria that are met and “0” for criteria that are not.

Table 1 lists the goal weighting recommended by the PMT. The full evaluation criteria definitions are included in the appendix.

Table 1: Evaluation Criteria Goal Weighting

Goal	Weight
Safety	10
Maintain and Preserve	10
Mobility	5
Economy	5
Coordination	4
Active Transportation	2
Transit	2
Access for All	1
Sustainability	1

The scores presented in this memo reflect revised methodology developed by the consultant team and informed by feedback from the PMT. Project evaluation scores were normalized to a range from 0% to 100%.

Projects that received the highest scores tended to be on existing facilities that serve as major regional connections, provide improved multimodal access to communities, or better accommodate freight movement. Projects with the lower scores tended to be highly focused, often addressing a specific concern for one travel mode, such as a spot improvement to improve motor vehicle safety or operations. The scoring methodology favors projects that support multiple goal categories.



High Priority Project List - County

Based on a seven-year average of Linn County transportation funding, the estimated total revenues from dedicated sources through 2040 are expected to be fully allocated towards expenditures to operate and maintain the County transportation system, as detailed in Technical Memorandum #3: Funding Assumptions.

However, Linn County can reasonably assume between \$15 and \$20 million of funding from the state for project related funding beyond the revenues dedicated to operations and maintenance of the existing system. Furthermore, historical precedent and discussions with County staff, indicate that there is a high likelihood that the County will pursue and receive additional outside funding opportunities beyond those provided by ODOT. Therefore the TSP identifies a High Priority Project List that reflects approximately three times the state funding estimate (\$15-20 million) for project funding.

The Linn County High Priority Project List shown in



Table 2a is intended to position the County to be prepared to take advantage of funding opportunities as they arise. This list includes projects that are expected to be led by Linn County.

- A second list of High Priority Project List are expected to be led by ODOT, MPOs, or local jurisdictions. Refer to Table 2b for those projects.

The overall funding required to construct the County-led projects reflects the approximate level of funding (\$50-60M) expected to be made available for transportation improvements in Linn County through 2040. The subset of projects that are identified as financially-constrained reflect the lower level of funding (\$15-20M) that falls within the range of the state funding estimate.

This financially constrained list was developed by selecting the highest-scoring projects that could be implemented for a total cost of less than \$20 million. Out of the total state funding (\$20 million estimate), one percent or \$200,000 is required by state law to be applied for walking and biking infrastructure. The financially constrained list includes pedestrian and bicycle specific infrastructure projects totaling \$4,435,000.

The appendix includes full project information including a more detailed description, project source, and current status for some projects. More information on the project development process is included in Technical Memorandum #10: Develop Transportation System Solutions.



Table 2a: High Priority Project List for Linn County

Category	Project ID	Project Name	Evaluation Score	Cost Estimate
Bike/Ped	BP-31*	Clover Ridge Rd. - Truax Creek Bridge Replacement (County Bridge ID 320-0.82, State Bridge ID 12749)	84%	\$1,350,000
Bike/Ped	BP-32*	Mill City - 1st Ave. Bridge over North Santiam River Maintenance and Improvements	84%	\$1,610,000
Bike/Ped	BP-33*	Mill City - Wall St. Pedestrian Bridge over North Santiam River Improvements	84%	\$1,475,000
Bridges	BR-17*	East Bilyeu Creek Dr. - Neal Creek Bridge Replacement (County Bridge ID 831-1.56, State Bridge ID 12951)	84%	\$1,740,000
Bridges	BR-31*	Lulay Rd. - Neal Creek Bridge Replacement (County Bridge ID 834-0.27, State Bridge ID 12902)	84%	\$1,160,000
Bridges	BR-42*	Old Salem Rd. - Truax Creek Bridge Replacement (County Bridge ID 367-3.19, State Bridge ID 22C08) TO BE CONSTRUCTED by 10/1/18	84%	\$1,260,000**
Bridges	BR-45*	Peoria Rd. - Lake Creek Bridge Replacement (County Bridge ID 2-12.86, State Bridge ID 12266)	84%	\$2,895,000
Bridges	BR-49	Quartzville Rd. - Green Peter Reservoir Bridge Replacement (County Bridge ID 912-9.40, State Bridge ID 12911)	84%	\$13,495,000
Bridges	BR-50*	Quartzville Rd. - South Santiam River Bridge Replacement (County Bridge ID 932-0.23, State Bridge ID 93223)	84%	\$7,715,000
Bridges	BR-54	Riverside Dr. - Calapooia River Bridge Replacement or Repair (County Bridge ID 1-1.00, State Bridge ID 43C30)	84%	\$3,860,000
Bridges	BR-57	Shot Pouch Rd. - South Fork Santiam River Bridge REPLACEMENT (County Bridge ID 910-002,) NOT ON STATE BRIDGE LIST	84%	\$2,000,000
Bridges	BR-59	Stayton-Scio Dr. - N. Santiam River Overflow Bridge Replacement (County Bridge ID 601-0.28, State Bridge ID 14069)	84%	\$2,575,000
Bridges	BR-69	White Oak Rd. - Owl Creek Bridge Replacement (County Bridge ID 118-1.31, State Bridge ID 12257A)	84%	\$2,895,000
Bike/Ped	BP-55	Mt. Home Dr. - Road Surface Improvement	81%	\$3,450,000**
Bike/Ped	BP-42	City of Scio – County Road Sidewalk Repair and Infill	79%	\$865,000
Spot Improvements	SI-76	Flood Closures Maintenance List Program	77%	\$12,500,000



Category	Project ID	Project Name	Evaluation Score	Cost Estimate
Future Studies	FS-18	Update Emergency Route Designations SEE NOTE BELOW TABLE For Expected Corrective Work	75%	\$100,000
Systemic Safety	SS-009	Lyons-Mill City Dr. - Systemic Roadway Departure Improvements	71%	\$181,000
Systemic Safety	SS-010	Marks Ridge Dr. - Systemic Roadway Departure Improvements	71%	\$25,000
Systemic Safety	SS-011	McDowell Creek Dr. - Systemic Roadway Departure Improvements	71%	\$5,000
Systemic Safety	SS-012	Mt Hope Dr. - Systemic Roadway Departure Improvements	71%	\$5,000
Systemic Safety	SS-013	N Main St. - Systemic Roadway Departure Improvements	71%	\$5,000
Systemic Safety	SS-015	Oak St. / Fur Rd. - Systemic Intersection Safety Improvements	71%	\$5,000
Systemic Safety	SS-016	Oak St. / S. 2nd St. (Lebanon) - Systemic Intersection Safety Improvements	71%	\$5,000
Systemic Safety	SS-017	Old Salem Rd. - Systemic Roadway Departure Improvements	71%	\$5,000
Bridges	BR-01	6th St. - Storm Culvert Replacement (Scio)	70%	\$645,000
Bridges	BR-02	Bellinger Scale Rd. - Hamilton Creek Bridge Replacement (County Bridge ID 722-0.27, State Bridge ID 11974)	70%	\$2,680,000
		High Priority List Total (excluding **)		\$59,821,000
		Financially Constrained Subtotal (excluding **)		\$17,945,000

* = Financially Constrained

** = Cost excluded from total. BR-42 is on 2015-2018 ODOT STIP list. BP-55 would be funded as a maintenance project.

Note: ODOT Bridge Section is presently developing a Bridge Replacement List for Addressing Emergency Routes in Linn County. ODOT Bridge Section has identified 116 Bridges in Linn County that are seismic deficient. A plan to address this will be developed in the next 18 months from November 2017 to March 2019. Rough Cost Estimate to address and correct bridges is ~\$120,000,000.



High Priority Project List – Other Jurisdictions

The High Priority Project List for other jurisdictions identifies the 10 highest scoring projects that are expected to be led by ODOT, MPOs, or local jurisdictions. The projects were scored based on the same TSP evaluation criteria applied for County-led projects. The projects do not fit within the County TSP financial framework because they are expected to be led by other jurisdictions. Although the project costs are not included in the County-led project priority list (Table 2a), they are identified as priority improvements that the county supports. Inclusion in the project list does not commit any agency to funding the improvements but does reflect prioritization and support from the County TSP perspective.

The I-5 Interchange and Mainline Capacity Improvement Project from South Jefferson to US 20 (Project CI-10) is a major corridor improvement plan that will be implemented by ODOT as a series of smaller stand-alone projects. Although it is not included in Table 2b, it is supported by the Linn County TSP. The final composition of those projects is not yet defined and will be dependent on funding opportunities and ODOT prioritization.

Table 3b: High Priority Project List for Other Jurisdictions

Category	Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
Bridges	BR-27	OR 99E - Drainage and Culvert Improvement (Halsey)	State	82%	\$1,290,000
Bridges	BR-28	OR 226 - Storm Outlet to Thomas Creek (Scio)	State	82%	\$1,015,000
Spot Improvements	SI-18	I-5 Optimization: Incident Response Program	State	81%	\$2,980,000
Spot Improvements	SI-19	I-5 Optimization: Ramp Metering (Exit 234 NB On-Ramp)	State	81%	\$960,000
Future Studies	FS-17	US 20 Road Safety Audit	State	81%	\$50,000
Spot Improvements	SI-16	I-5 Optimization: Add or Upgrade Traffic Cameras	State	81%	\$1,490,000
Bike/Ped	BP-67	US 20 - Systemic Bicycle Safety Improvements	State	71%	\$1,025,925
Systemic Safety	SS-007	I-5 - Alignment Delineation and Lighting	State	71%	\$912,200
Systemic Safety	SS-018	OR 126 - Centerline Rumble Strips	State	71%	\$7,500

Note: List does not include projects on the 2015-2018 ODOT STIP or currently underway.



Additional High Scoring Projects

Based on historical trends and discussion with County staff, it is clear that project funding opportunities will likely arise during the planning horizon that were not identified during the planning process. Furthermore, the PMT may want to modify the High Priority Project lists to achieve a different balance between the types of projects and geographical locations.

To support these efforts, this section summarizes the 10 highest scoring projects not included in previous lists in each of the identified project categories.

Bicycle/Pedestrian

Table 4: Priority Bicycle and Pedestrian Projects

Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
BP-44	US 20 (East of I-5) - Urban Upgrade (Albany)	State	68%	\$2,070,000
BP-41	OR 226 - Urban Upgrades (Scio)	State	65%	\$2,030,000
BP-53	East County Freight and Recreational Route Designation and Improvements	County	61%	\$21,305,000
BP-14	Park and Recreation Master Plan - Lebanon to Albany Regional Trail	County Parks and Recreation	60%	\$1,000,000
BP-28	OR 99E / South Tangent Dr. - Improve Pedestrian Access (Tangent) on OR 99E	State	59%	\$2,095,000
BP-08	OR 22 - Recreational Bike Trail from Detroit to Mill City and Beyond	Marion County	59%	\$6,830,000
BP-06	Mill City - Canyon Journey Trail Improvements	City	58%	\$1,405,000
BP-48	Maintenance Procedures - More frequent roadway sweeping with bike priority route plan	County	57%	\$10,000
BP-19	Tangent Dr. / Blackberry Ln. - Systemic Intersection Safety Improvements (Tangent)	County	57%	\$15,000
BP-47	Maintenance Procedures - Bike Friendly Chip Seal	County	56%	\$10,000

Corridor Improvements

Table 4: Priority Corridor Improvements

Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
CI-13	I-5 - N. Jefferson – N. Albany	State	73%	\$6,980,000
CI-15	I-5 - Pavement Rehab N. Albany – Halsey	State	73%	\$15,300,000
CI-16	I-5 - Pavement Rehab S. Jefferson – N. Albany (NB)	State	73%	\$6,980,000
CI-29	City of Scio - Pavement Striping Maintenance on County Roads (Scio)	County	70%	\$60,000
CI-10	I-5 - Interchange and Mainline Capacity Improvement Project from South Jefferson to US 20	State	56%	\$66,820,000
CI-02	Columbus St. - Urban Upgrade (Albany)	City	54%	\$2,730,000
CI-05	Ellingson Rd. - Urban Upgrade (Albany)	City	54%	\$5,850,000
CI-06	Ellingson Rd. Extension (Albany)	City	53%	\$4,430,000
CI-39	Clover Ridge Rd. - Corridor Improvements	County	51%	\$2,000,000
CI-26	OR 34 - Access Management	State	51%	\$3,475,000
CI-01	53rd Avenue Extension (Albany)	City	50%	\$17,990,000
CI-04	Dogwood Avenue Extension (Albany)	City	50%	\$3,295,000
CI-22	Lochner-Columbus Connector (Albany)	City	50%	\$2,745,000

Future Studies

Table 5: Priority Future Studies

Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
FS-09*	OR 34 - Road Safety Audit	State	81%	\$50,000
FS-13	Scenic Byway Coordination - Marys Peak to Pacific	State	61%	\$100,000
FS-01	1st Avenue - Mill City Post Office Safety Review	County	61%	\$30,000
FS-05	Linn County - TDM Programs	County	52%	\$1,480,000
FS-19	Linn Benton Loop Enhancements	Oregon Cascades West Council of Governments	46%	\$2,000,000
FS-22	Transit Signal Priority	Albany Area MPO	46%	\$1,200,000
FS-08	Mill City - Coordination of Paving Projects for City Overlay Work	City	35%	\$100,000
FS-11	Promote Enhanced Transit Service for Small Communities in Linn County	County	25%	\$250,000
FS-12	Regional Transit Coordination	County	25%	\$100,000
FS-21	Transit Service between Jefferson, Millersburg and Albany	Albany Area MPO	19%	\$7,000,000

*Project is currently in progress.



Rural Modernization

Table 6: Priority Rural Modernization Projects

Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
RM-01	Seven Mile Ln. - Road Improvements West	County	47%	\$3,000,000
RM-22	City of Sweet Home - Local Roads Shoulder Improvements	City	47%	\$2,395,000
RM-14	OR 228 / Crawfordsville Dr. (east end of Crawfordsville Dr., near Holley) - Improve Sight Distance and Provide Two-Stage Left Turn Bay	State	44%	\$120,000
RM-13	OR 226 near Lyons - Sight Distance Improvements	State	44%	\$3,165,000
RM-15	OR 228 / Crawfordsville Dr. (west end of Crawfordsville Dr., near Crawfordsville) - Improve Sight Distance	State	42%	\$60,000
RM-16	OR 228 / Northern Dr. - Improve Sight Distance	State	42%	\$60,000
RM-08	Foster Dam Rd. and Parking Area - Safety and Access Improvement Project	County	34%	\$1,500,000
RM-21	Sixth Ave. - Road Improvement (Scio)	County	20%	\$700,000

Spot Improvements

Table 7: Priority Spot Improvement Projects

Project ID	Project Name	Primary Jurisdiction	Evaluation Score	Cost Estimate
SI-16	I-5 Optimization: Add or Upgrade Traffic Cameras	State	81%	\$1,490,000
SI-60	US 20 - Lower Sunken Grade Slide Repair	State	77%	\$4,555,000
SI-15	Diamond Hill Dr. / I-5 Interchange - Improve Sight Distance	State	58%	\$6,465,000
SI-32	OR 226 / Kingston Jordan Rd. - Sight Distance Improvements	State	58%	\$25,000
SI-35	OR 228 / Fern Ridge Rd. and Rowell Hill Rd. (north end) - Shoulder and Sight Distance Improvement	State	58%	\$160,000
SI-63	US 20 / Foster Dam Rd. - Railroad Undercrossing Improvement	State	56%	\$2,995,000
SI-64	US 20 / Knox Butte Dr. - Intersection Operations Project	State	52%	\$180,000
SI-74	Slide Area Maintenance List Program	County	50%	\$17,405,000
SI-75	Restricted Roads Improvements List Program	County	50%	\$8,670,000
SI-66	US 20 / OR 226 - Intersection Operations Project	State	47%	\$180,000

Systemic Safety

There are 93 systemic safety projects identified in the TSP (as shown in the appendix project list). Evaluation score results are generally the same for most of these projects. These projects tend to be low-cost and focused on safety improvements. Projects tied for the top evaluation score, of which there were 67, were generally on freight routes or serving local communities. Prioritization of these projects should be performed by County staff based on a qualitative evaluation and implementation process focused on a cost-effective and comprehensive roll-out of the systemic safety improvements.



Bridges

TSP Evaluation

There are 63 bridge projects identified in the TSP (as shown in the appendix project list). Of those projects, 15 are included in the High Priority lists described in Table 2a and 2b. The High Priority bridges are generally those where seismic vulnerabilities have been identified (County bridges) or that currently pose drainage problems to local communities (ODOT bridges). Of the remaining 48 bridge projects, the evaluation score results are generally the same for most of these projects.

County Priority

Based on Linn County Road Department's assessment of sufficiency rating, load rating, and scour, there are 40 priority bridge projects identified in the TSP project list. These are in addition to the 15 bridges identified in the TSP High Priority project list. The priority bridge projects are identified as "Priority Bridges" in the description in the full appendix project list.

ODOT High Priority Pinch Points

Additionally, The ODOT Highway Over-Dimension Load Pinch Points (HOLPP) Study for Region 2 District 4 identified two pinch points that ODOT considers to be high priority. These locations restrict the tall loads which can be critical to both everyday freight movement and disaster response services. The two ODOT high priority pinch points are OR 99E on the Willamette River Bridge in Harrisburg at MP 29.09 (BR-74) and the US 20 / Foster Dam Rd. - Railroad Undercrossing Improvement (SI-63).

Project Phasing and Sequencing Recommendations

Generally, the projects recommended here are independent of each other and there is no special phasing or sequencing needed. There are three exceptions: the I-5 capacity-enhancement project, spot-improvements with recent safety projects, and the systemic safety improvements.

The I-5 Interchange and Mainline Capacity Improvement Project from South Jefferson to US 20 (CI-10) is a major corridor improvement plan that will be implemented by ODOT as a series of smaller stand-alone projects. Although it is not included in Table 2b, it is supported by the Linn County TSP. The final composition of those projects is not yet defined and will be dependent on funding opportunities and ODOT prioritization. Consideration should also be given to implementing the low-cost I-5 Optimization transportation system management and operations (TSMO) projects (SI-16, 17, 18, 19) prior to or concurrently with capital improvement projects.

A number of the recommended spot-improvement projects (SI-11, 22, 47, 48) have seen safety investments installed in the time period after that covered by the crash data used in the TSP process. Therefore, these locations should be monitored for changes in safety performance and projects should only be implemented if safety concerns persist.

Systemic safety projects, as discussed above, will require a qualitative evaluation and implementation process by the County. It is recommended that these projects be incorporated into ongoing maintenance operations and implemented as the opportunity arises.



Performance of the Planned System

The planned system will provide multimodal improvements to the safety, regional mobility, and local access opportunities for Linn County. Mobility performance including planned improvements has been assessed at six intersections where deficiencies were identified in Technical Memorandum #7: Future Conditions. The deficiencies were identified because mobility targets are not expected to be met at these locations during the 2040 design hour p.m. peak hour. Mobility targets are not met when the forecasted traffic demand exceeds the identified threshold ratio compared to available intersection capacity. This measure is called the volume-to-capacity ratio (or v/c ratio).

The following projects were developed in response to these needs:

- SI-07: Denny School Rd. / Oak St. Intersection Improvement. This unsignalized intersection under County jurisdiction is forecast to exceed the mobility target (Level-of-Service D) mobility target for the Oak St. and Hayden Dr. approach critical movements. The improvement evaluation applies additional median space to allow for two-stage left turns and crossings for the eastbound and westbound movements. This would improve intersections to meet the mobility target (LOS D). Final design approval for any intersection improvement would be required by Linn County. (County Project)
- SI-28: OR 164 / Scrael Hill Rd. Intersection Improvement. This unsignalized intersection is forecast to fail to meet the mobility target (v/c of 0.75) for the Scrael Hill Rd. approach northbound left turn in the future forecast.² Final design approval for any intersection improvement would be required by ODOT. (State Project)
- SI-64: US 20 / Knox Butte Dr. Intersection Improvement. This unsignalized intersection is forecast to fail to meet the mobility target (v/c of 0.75) for the Knox Butte Dr. approach southbound left turn in the future forecast.³ Final design approval for any intersection improvement would be required by ODOT. (State & County Project)
- SI-66: US 20 / OR 226 Intersection Improvement. This unsignalized intersection is forecast to fail to meet the mobility target (v/c of 0.75) for the OR 226 approach westbound left turn in the future forecast.⁴ Final design approval for any intersection improvement would be required by ODOT. (State Project)

² The improvement evaluation applies a new right turn lane on Scrael Hill Rd. and a short receiving lane on OR 164. This would reduce the critical movement v/c ratio to 0.44.

³ The improvement evaluation applies separated left turn and right turn lanes on Knox Butte Dr., creating a formalized median space to allow for a two-stage southbound left turn. This would reduce the critical movement v/c ratio to 0.71.

⁴ The improvement evaluation applies separated left and right turn lanes on OR 226, creating a formalized median space to allow for a two-stage westbound left turn. This would reduce the critical movement v/c ratio to 0.50.



- SI-82: OR 34 / Denny School Rd. Intersection Improvement. This unsignalized intersection fails to meet the mobility target (v/c ratio of 0.75) for the Denny School Rd. approach northbound left turn in the existing conditions and future forecast.⁵ Final design approval for any intersection improvement would be required by ODOT. (State Project)
- SI-83: OR 34 / Peoria Rd. Intersection Improvement. This signalized intersection fails to meet the mobility target (v/c ratio of 0.70) in the existing and future forecast conditions. Intersection improvements to meet the mobility target would require major changes to the intersection.⁶ The appropriate solutions at this intersection need to consider the larger context and vision for OR 34 between I-5 and Corvallis. Final design approval for any intersection improvement would be required by ODOT. This corridor should be considered as an area for further study through a future refinement plan. (State Project)

The traffic operations calculations for each of these assumed improvements are included in the appendix. Not all these projects were included in the High Priority (or Financially Constrained) lists; however they are identified for the planned transportation system to identify a potential strategy to meet mobility targets. Final design for any intersection improvement on ODOT highways would require ODOT approval.

⁵ As the intersection does not meet preliminary signal warrants based on 2040 traffic volume forecast, a traffic signal was not considered to be an appropriate solution. The improvement evaluation applies a single lane roundabout while maintaining the bypasses for eastbound right turning and westbound through traffic. This would improve critical approach operations to a v/c ratio of 0.80 in the 30th highest hour and 0.65 in the average weekday p.m. peak hour.

⁶ A v/c ratio of 0.67 could be achieved by widening OR 34 to include additional left turn and through lanes on OR 34.