



720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

MEMORANDUM

DATE: September 17, 2013

TO: Ben Austin, HHPR

FROM: Peter Coffey, PE
Ben Fuller, EIT

SUBJECT: Sherwood TSP Amendment for Roadway Connections—Baler Extension

P#12038-001

This memorandum summarizes the impacts of an amendment to the City of Sherwood Transportation System Plan (TSP)¹ that would modify the planned future street system by adding additional connectivity. Specifically, the amendment would include modifying two maps in the TSP (the “Functional Class” map and “Streets Where ROW is Planned for More Than Two Lanes” map) to include the proposed Baler Way extension from Tualatin-Sherwood Road to the future extension of Adams Avenue. The primary purpose of this study is to develop system connectivity improvements to address traffic capacity and safety issues in the area. The overall impacts of the proposed amendments (traffic volumes and intersection operations) were analyzed and indicated that the proposed amendment would not significantly impact the transportation system and therefore complies with OAR 660-012-0060 (Transportation Planning Rule). Additional transportation system improvements beyond the proposed street extensions would not be required to mitigate system impacts.

BACKGROUND AND CONTEXT

The following section provides background and context for several planning elements: current planning projects, Sherwood’s TSP, and relevant past planning studies.

Current Planning Projects

Washington County has been planning for future corridor improvements to Tualatin-Sherwood Road. Through this planning process, the County is addressing safety and capacity issues on Tualatin-Sherwood Road through the City of Sherwood area. The approach to addressing these issues includes four primary elements:

1. Access Management
2. Roadway Widening
3. Intelligent Transportation Systems (ITS)
4. Off-Corridor Circulation

The roadway widening and access management elements are being addressed as part of the MSTIP 3d Tualatin-Sherwood Road (Adams to Borchers) project, which is currently in design. The ITS element will be evaluated over

¹ *City of Sherwood Transportation System Plan, March 2005.*

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the next year as the County implements improved traffic signal timing along Tualatin-Sherwood Road from Teton Avenue to OR 99W and along OR 99W from the Home Depot intersection to Sunset Boulevard with the possibility of using adaptive signal timing.

This TSP amendment summarized in this memorandum addresses the off-corridor circulation element. This memorandum focuses on the potential Baler Way extension in the area north of Tualatin-Sherwood Road between Highway 99W and Adams Avenue.

Sherwood TSP

Sherwood's TSP was adopted in March 2005.² The TSP provides a framework for a transportation system that guides future growth in Sherwood, including functional class and mapping of existing and planned future roads. The TSP has a planning horizon of year 2020 and is currently being updated to address Metro compliance requirements and include a horizon year of 2035. The proposed amendment to the TSP would include updating Figure 8-1: Functional Class and Figure 8-7: Streets Where ROW is Planned for More Than Two Lanes.

Previous Planning Studies

Several significant planning studies in and around Sherwood have been completed since the TSP was adopted in 2005. These studies include both concept planning for new growth areas (Brookman, Tonquin Employment, Adams, etc.) as well as planning for future transportation corridors (Adams Avenue, 124th Avenue, 99W/I-5 Connector, etc.). Two particular studies that are directly relevant for the proposed TSP amendments are the I-5 to 99W Connector Project³ and Adams Avenue North Concept Plan⁴.

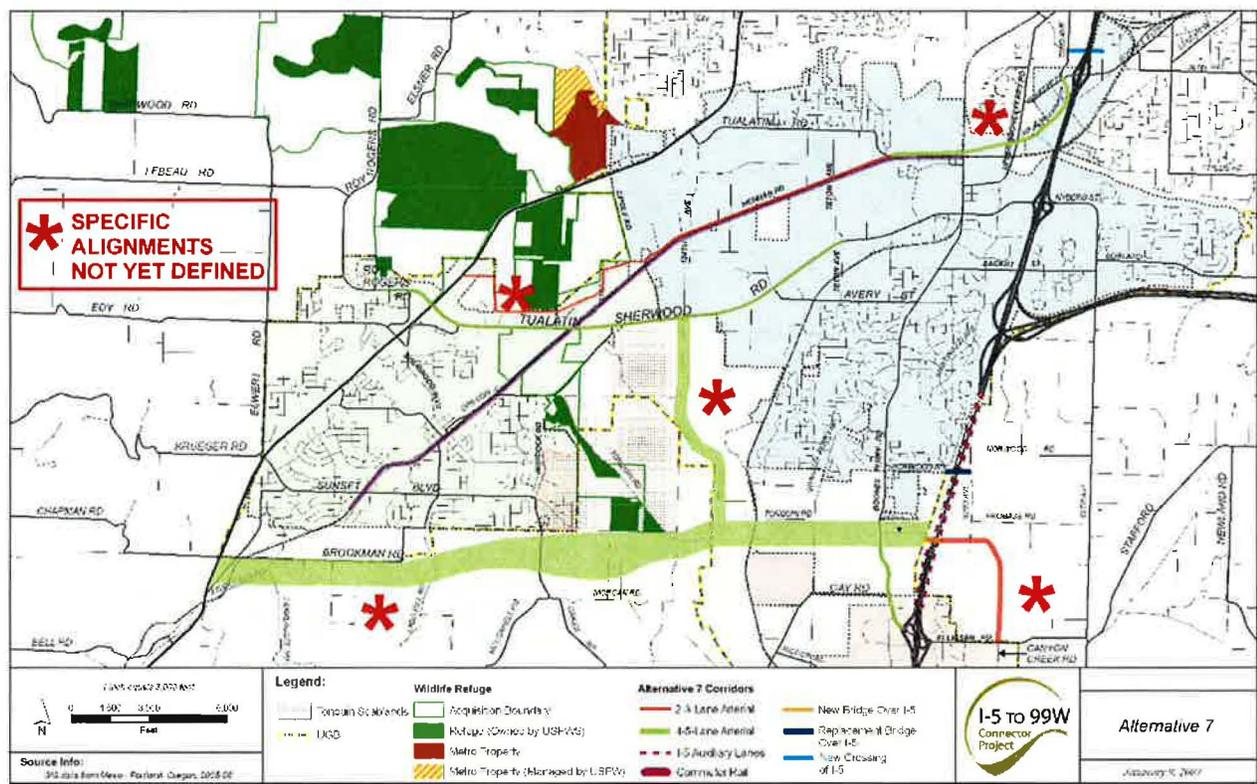
The I-5 to 99W Connector Project analyzed options for improving transportation movements between the I-5 and 99W corridors. The Project Steering Committee recommended Alternative 7, which included a variety of transportation system improvements as shown in Figure 1. These improvements included both a new "Connector" facility south of Sherwood and improvements to the "northern arterial". The northern arterial would be composed of enhancements to existing roads (Herman Road through Tualatin) and new road extensions (between Cipole Road and Adams Avenue through Sherwood). The western terminus of the facility is planned to connect to Adams Avenue, which further connects to both Tualatin-Sherwood Road and Highway 99W. The recommended improvements from the I-5 to 99W study that are not part of the "southern arterial" (green band shown in Figure 1) have since been included in Metro's Regional Transportation Plan (RTP) as financially-constrained project # 11179 (I-5 to 99W replacement projects - Construct improvements consistent with recommendations from I-5/99W connector process).⁵ Improvements related to the "southern arterial" are also included in the RTP in four other projects (right of way, initial construction, connections to other arterials, and widening) but are not included in the financially constrained subset.

² City of Sherwood, Oregon, Ordinance 2005-006, March 15, 2005.

³ I-5 to 99W Connector Project, <http://www.i5to99w.org/index.php>, accessed August 2013.

⁴ *Adams Avenue North Concept Plan*, August 2009.

⁵ 2035 Regional Transportation Plan Final 2035 RTP Project List published October 4, 2010, http://library.oregonmetro.gov/files//2035_rtp_project_list_final_100410.xls, accessed August 2013.



**Figure 1: I-5 to 99W Connector Project Alternative 7
(With Northern Arterial Connecting Herman Road to Adams Avenue)**

The Adams Avenue North Concept Plan provided a concept for future land use types and the transportation system for the area generally bounded by Highway 99W to the west, Tualatin-Sherwood Road to the south, and Adams Avenue to the east and north. The plan included a street network (Figure 2) with the following elements: Adams Avenue connecting Tualatin-Sherwood Road to Highway 99W, a north-south road connecting Adams Avenue (near Home Depot) and providing access to properties, an east-west connection from the north-south road to Adams Avenue, and a potential future road connection from the north-south road southward (which could connect to Baler Way).



Figure 2 – Adams Avenue North Concept Plan and Roadway Network

The proposed amendment to the Sherwood TSP is consistent and compatible with both of the plans (I-5 to 99W Connector and Adams Avenue North Concept Plan) that were completed since the Sherwood TSP. Specifically, the proposed element of an extension of Baler Way is consistent with the road network included in the Adams Avenue North Concept Plan. Planning for a collector connection from Baler Way to the northern arterial terminus at Adams Avenue would provide enhanced connectivity that compliments the recommended improvements from the I-5 to 99W Connector Project.



ASSUMPTIONS AND METHODOLOGY

The proposed TSP amendments were analyzed to determine potential traffic impacts. The following sections describe the assumptions and methodology used to evaluate the transportation system impacts resulting from the potential Baler Way extension.

Scenarios

The following two scenarios for the year 2035 PM peak hour were selected for analysis to determine transportation system impacts that may result from the potential Baler Way extension:

- 1) Baseline Network Scenario
- 2) Baler Extension Scenario

The Baseline Network is consistent with Option 1 for the on-going MSTIP 3d Tualatin-Sherwood Road (Adams to Borchers) project⁶. This project includes widening Tualatin-Sherwood Road between Adams Avenue and Borchers Drive, and would remove the theater/shopping center signal along Tualatin-Sherwood Road. The Baseline Network also assumes most of the financially constrained projects in the 2035 Regional Transportation Plan (2035), which include:

- Widening of Roy Rogers Road from three to five lanes between Borchers Drive and Highway 99W (RTP #10708)
- Widening of Tualatin-Sherwood Road from three to five lanes between Highway 99W and Teton Avenue (RTP #10568)
- Extension of Adams Avenue from Tualatin-Sherwood Road to Highway 99W and signaling the intersection at Tualatin-Sherwood Road/Adams Avenue (RTP #10677)
- Extension of 124th Avenue from Tualatin-Sherwood Road to Tonquin Road (RTP #10736)
- Widening of Tonquin Road from two to three lanes (RTP# 10590)

The Baseline Network is also consistent with the I-5 to 99W Connector Project and the Adams Avenue North Concept Plan. The I-5 to 99W Connector Project would extend Herman Road to the future Adams Avenue extension as a parallel route to Tualatin-Sherwood Road. Other connectivity improvements associated with the I-5 to 99W Connector Project are assumed except for the “I-5/99W Southern Arterial” as it is not included in the financially constrained RTP project list.

The Adams Avenue North Concept Plan identifies guidance for how the area north of Tualatin-Sherwood Road between Highway 99W and Olds Place could develop, and shows the Adams Avenue extension design. The concept plan also identifies potential future road connections within the concept area, which align with the potential Baler extension.

The Baler Extension Scenario includes two roadway segments that were not included in the Baseline Network Scenario. First, Baler Road would be extended as a collector roadway to connect to Adams Avenue at the

⁶ Tualatin-Sherwood Road Project, <http://tsroadproject.com>, accessed August 2013.



northern arterial. Second, a local road to provide access to properties within the Adams Avenue North Concept Area would connect to the proposed Baler extension. All other network elements would be the same as assumed for the Baseline Network Scenario.

Study Area

Figure 3 shows the project study area, planned RTP extensions, and the proposed Baler Way extension. The study area includes four study intersections:

- Highway 99W/Adams Avenue
- Highway 99W/Tualatin-Sherwood Road
- Tualatin-Sherwood Road/Baler Way
- Tualatin-Sherwood Road/Adams Avenue



Figure 3: Study Area

Table 1 summarizes the existing characteristics of the study area roadways including roadway jurisdiction, functional classification, travel lanes, posted speed limit, parking, sidewalks, and bike lanes.



Table 1: Existing Study Area Roadway Characteristics

Roadway	Jurisdiction	Functional Classification	Travel Lanes	Speed Limit	On-Street Parking	Side-walks	Bike Lanes
Highway 99W	ODOT	Statewide, NHS*, Freight Route	4-6 Lanes (Divided)	45 mph	No	No	Shoulders
Tualatin-Sherwood Road	Washington County	Arterial†	3-6 Lanes	35/45 mph**	No	Yes	Yes
Baler Way (North of Langer Drive)	City of Sherwood	Collector†	4 Lanes	25 mph	No	Yes	No
Roy Rogers Road	Washington County	Arterial†	3 Lanes	35 mph	No	Yes	No
Adams Avenue (South of Tualatin-Sherwood Road)	City of Sherwood	Collector†	4 Lanes	25 mph	No	Yes	No
Adams Avenue (North of Tualatin-Sherwood Road)	City of Sherwood	Future Collector†	N/A	N/A	N/A	N/A	N/A

*NHS = National Highway System

**Tualatin-Sherwood Road is 35 mph west of Adams Avenue and 45 mph east

†Aligns with Washington County and City of Sherwood Functional Classification

Access

The functional classification of a street describes how it should be managed and operated with respect to mobility and access. Therefore, the functional classification of roadways and each jurisdiction’s associated policies and standards will impact the development of connectivity options for the study area. The City of Sherwood, Washington County, and ODOT all have access spacing standards for roadways under their jurisdiction that indicate the desired separation between street and driveway intersections. The proposed Baler extension must satisfy these standards.

City of Sherwood

The City of Sherwood only maintains jurisdiction over several collector and local streets within the study area. On collector streets, intersections should be spaced between 100 and 400 feet apart.⁷ There is no access spacing standard for local streets.

Washington County

Washington County access spacing standards for arterials require a minimum of 600 feet between intersections, and a minimum of 100 feet between driveways for collectors.⁸ In addition, Washington County’s Community Development Code specifies that arterial roadways shall only be intersected by collectors or other arterials.⁹

⁷ *City of Sherwood Transportation System Plan*, March 2005, Table 8-12.

⁸ Washington County Community Development Code, Article V: Public Facilities and Services, 501-8.5(B), November 2012.

⁹ *Ibid.*



Therefore, to meet Washington County’s Community Development Code, the proposed extension of Baler Way must be a collector or arterial roadway.

Motor Vehicle Volume Forecasts

The 2035 traffic projections and potential traffic shifts related to the proposed street extensions were developed using the travel demand model applied for the Tualatin-Sherwood Road Project. The refined travel demand model is based on the West Side Metro travel demand model developed by Washington County¹⁰. The model is generally based on Metro’s 2035 Regional Transportation Plan (RTP)¹¹ financially constrained transportation system street network and Metro’s “Beta” land use¹² and contains additional refinements and calibration.

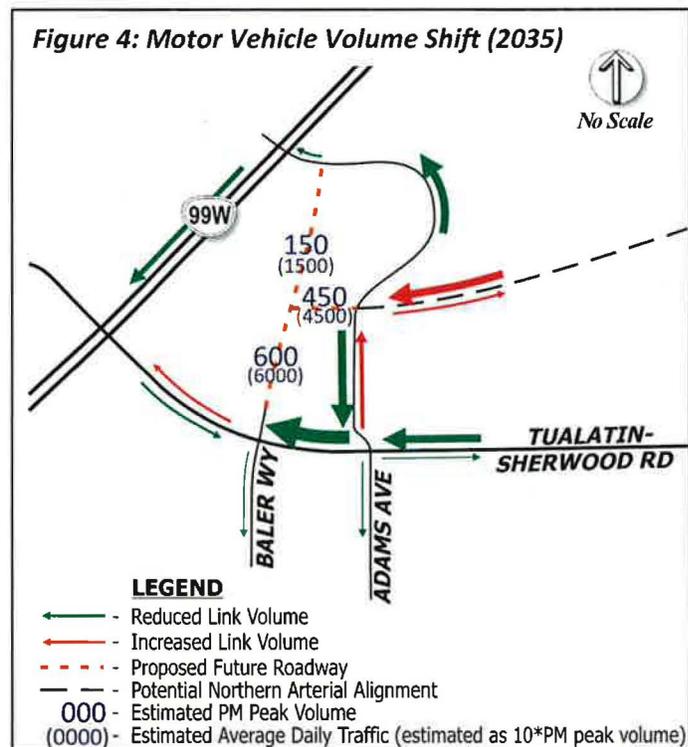
To further refine the forecasts, a sub-area model was developed for the study area that includes all public streets and utilizes HCM node delays for trip assignment in order to evaluate changes in circulation and traffic control. The boundaries for the sub-area model include 124th Avenue at Highway 99W to the northeast, Roy Rogers Road at the UGB to the northwest, Highway 99W at Meinecke Parkway to the southwest, the rail south of Old Town, and 124th Avenue to the east.

FUTURE TRANSPORTATION SYSTEM IMPACTS

The following sections summarize the analysis of potential transportation impacts related to traffic flow and intersections operations resulting from the proposed Baler Way extension.

Traffic Circulation Shifts

Potential traffic shifts that would result from the proposed roadway extensions were estimated using the mesoscopic subarea travel demand model. Figure 4 shows the projected shift in 2035 PM peak hour motor vehicle volume as a result of the Baler Way extension, as well as estimates of PM peak hour volumes along the proposed future roadways. The thickness of the arrows represents the relative change in street traffic volumes. Streets without arrows are not expected to experience significant traffic volume changes. The following general traffic



Note: Arrow thickness represents change in volume

¹⁰ Phone conversation with Steve L. Kelley, Washington County, March 5, 2012.

¹¹ 2035 Regional Transportation Plan. Metro. June 2010.

¹² Administrative Interpretation of 2035 Regional Transportation Plan, No 2012-2, Letter from John Williams, Metro, May 2, 2012.



patterns are anticipated to result from the proposed roadway extensions:

- Westbound traffic on Tualatin Sherwood Road would reduce and shift to the northern arterial to access the proposed roadway connections.
- Northbound traffic destined to properties north of Tualatin-Sherwood Road from Baler Way would instead shift to Adams Avenue (north of Tualatin-Sherwood Road) to access the new roadway connections.
- Southbound traffic on Highway 99W would shift to Adams Avenue and the proposed local road extension in place of accessing properties via Tualatin-Sherwood Road.
- Some eastbound traffic leaving the Adams Avenue Concept Area via Baler Way, Adams Avenue and Tualatin-Sherwood Road would be able to shift to the northern arterial connection. As indicated in Figure 4, this shift would be a lesser magnitude than the westbound shift from Tualatin-Sherwood to the northern arterial.

Traffic volumes resulting from the above traffic shifts are included as attachments with the intersection capacity analysis worksheets.

Intersection Operations

Traffic operations for the two scenarios were analyzed at the study intersections and compared to the applicable jurisdiction's adopted mobility targets.

Mobility Targets

The City of Sherwood, Washington County, and ODOT each have mobility targets for intersections under their jurisdiction. These targets define an acceptable level of mobility through the following performance measures:

- **Level of service (LOS):** A "report card" rating (A through F) based on the average delay (seconds per vehicle) experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand is near or over capacity; this condition is typically evident in long queues.
- **Volume-to-capacity (V/C) ratio:** A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation). It is determined by dividing the peak hour traffic volume by the hourly capacity of a given turn movement, approach leg, or intersection. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. At 1.00, demand is greater than capacity and the turn movement, approach leg, or intersection is oversaturated—this results in excessive queues and long delays.

Intersection Operations

The 2035 PM peak hour study intersection operations were developed based on the *2000 Highway Capacity Manual Methodology*.¹³ The estimated average delay, level of service (LOS) and volume-to-capacity (V/C) ratios are listed in Table 2 for both the Baseline Network and the Baler Extension scenarios.

¹³ *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.



Table 2: 2035 Study Intersection Operations (PM Peak Hour)

Intersection	Mobility Target	Baseline Network Scenario			Baler Extension Scenario		
		Delay	LOS	V/C	Delay	LOS	V/C
Highway 99W/Adams Avenue	V/C ≤ 1.1 ^A	33.2	C	0.97	31.1	C	0.95
Highway 99W/Tualatin-Sherwood Road	V/C ≤ 1.1 ^A	47.8	D	0.98	47.3	D	0.99
Tualatin-Sherwood Road/Baler Way	V/C ≤ 0.99 ^B	19.4	B	0.63	25.8	C	0.67
Tualatin-Sherwood Road/Adams Avenue	V/C ≤ 0.99 ^B	31.4	C	0.82	30.1	C	0.80

^A ODOT mobility target

^B Washington County mobility target

Delay = average stopped delay per vehicle (sec)

Bolded and red indicates intersection exceeds mobility target

As listed in Table 2, the proposed Baler extension is expected to have minimal impacts on study intersections, with the V/C ratio increasing by 0.04 or less at all intersections. Two intersections (Highway 99W/Adams Avenue and Tualatin-Sherwood Road/Adams Avenue) would have improved operations with the proposed extension. As a result, all study intersections are expected to remain within mobility targets, thus satisfying Transportation Planning Rule (TPR) requirements of no significant impact.

FINDINGS

The traffic analysis indicates that the proposed street extension would meet TPR requirements and that it would not result in a significant effect to the transportation system. The key findings of this study are summarized below:

- The proposed TSP amendment includes an extension of Baler Way from Tualatin-Sherwood Road to Adams Avenue at the east as a collector, and a local road connecting the Baler Way extension to Adams Avenue to the north. These proposed modifications to the transportation network are consistent with previous local plans that have been completed since the Sherwood TSP was adopted in 2005.
- The proposed Baler Way extension is expected to have minimal impacts to study intersections; all intersections are projected to meet mobility targets.
- The proposed Baler Way extension will meet access management standards.
- The segment connecting Baler Way at Tualatin-Sherwood Road to the northern arterial at Adams Avenue shall be a collector street. This facility would provide enhanced regional connectivity and connect Baler Way (which is currently a collector south of Tualatin-Sherwood Road) to the proposed northern arterial, which would provide a regional connection.
- The north segment should be a local street as its primary function is to serve local land uses as planned in the Adams Avenue North Concept Plan. There will likely be limited motor vehicle turning movements at the local street intersection with Adams Avenue near Home Depot due to the close spacing to Highway 99W.

Recommended amendments to the Sherwood TSP figures are shown in Figures 5 and 6.

