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## MEMORANDUM

Date: August 14, 2012  
To: Peter Schuytema, ODOT TPAU  
John McDonald, ODOT Region 3  
Brandon Goldman, City of Ashland  
From: Anne Sylvester  
Subject: Traffic Analysis Methodology and Key Assumptions  
cc: Jason Franklin  
Project Number: 277-2395-082  
Project Name: Normal Avenue Neighborhood Plan

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The purpose of this memorandum is to document the methods and assumptions that will be used in the preparation of existing traffic analysis for the Normal Avenue Neighborhood Plan in the City of Ashland. The methodologies used in this memorandum were developed using the guidance in the Oregon Department of Transportation's (ODOT) *Analysis Procedures Manual (APM)* and *Transportation System Plan Guidelines*.

### STUDY AREA

The transportation study area for the Normal Avenue Neighborhood Plan is located to the immediate west of Interstate 5 in the eastern portion of the City of Ashland. The study area is bounded by East Main Street on the north, Walker Avenue on the west, Ashland Street (OR 66) on the south and Tolman Creek Road on the east.

### STUDY INTERSECTIONS

Six intersections are included in the Normal Avenue Neighborhood Plan study area. Three of these intersections were evaluated during preparation of the City's recent Transportation System Plan (TSP) and three additional locations were added as a part of this study. Traffic count data for the intersections included in the TSP (OR 66 at Tolman Creek Road, E. Main Street at Walker Avenue and Ashland Street at Walker Avenue) was collected during September and October of 2009. Counts for the first two intersections were collected over 16 hours between 6 AM and 10 PM. Data was stratified by 15-minute increments from 6 to 9 AM, and from 2 to 6 PM. The count taken at the intersection of Ashland Street and Walker Avenue included 4 hours over the afternoon peak period between 2 and 6 PM.

Counts taken specifically for the Normal Avenue Neighborhood Plan included the intersections of Ashland Street with Normal Avenue, E. Main Street at Clay Street, and E. Main Street at Tolman Creek Road. Data was collected during September of 2011 for the first location, and during April 2012 for the latter two locations. All counts were taken for 16 hours between 6 AM and 10 PM, with data stratified into 15-minute increments during the morning and afternoon peak periods as noted above. Table 1 summarizes the three traffic counts taken for the TSP, as well as the traffic counts taken for the Normal Avenue plan.

All intersection traffic counts included vehicular turning movements, pedestrian movements (with or without marked crosswalks), bicycles, and wheeled pedestrians (wheelchairs, skateboards, etc.).

**Table 1. Traffic Count Summary**

Intersection	Count Date	Count Type	Intersection	Count Date	Count Type
<u>Jurisdiction: ODOT</u>					
OR 66 @ Tolman Creek Road *	9/16/09	16 hour			
<u>Jurisdiction: City of Ashland</u>					
E. Main @ Walker Avenue *	10/7/09	16 hour	E. Main @ Clay Street	4/4/12	16 hour
Ashland @ Walker Avenue *	10/5/09	4 hour	E. Main @ Tolman Creek Rd	4/4/12	16 hour
Ashland @ Normal Avenue	9/26/11	16 hour			

\* Intersection included in TSP.

## IDENTIFICATION OF PM PEAK HOUR

Consistent with the approach used for the City’s TSP, a single PM peak hour was identified for all intersections to be used as the basis for existing and future conditions analysis. Based on communication with ODOT’s Transportation Planning Analysis Unit (TPAU) during development of the TSP, it was determined that data collected between 4:15 to 5:15 PM would be most representative of PM peak hour travel conditions throughout the city. Further communications with TPAU concluded that this time period should also be used to represent PM peak hour conditions for the Normal Avenue plan.

## INTERSECTION OPERATIONAL STANDARDS

### ODOT Facilities

One intersection in the Normal Avenue study area is under the jurisdiction of ODOT – OR 66 (Ashland Street) at Tolman Creek Road. OR 66 is designated as a District Highway from its intersection with Tolman Creek Road eastward through the I-5 interchange.

ODOT uses volume-to-capacity (v/c) ratio standards to assess traffic operations at intersections on state highway facilities. Table 6 of the Oregon Highway Plan (OHP) and Table 10-1 of the Oregon Highway Design Manual (HDM) provide the maximum v/c ratios for all signalized and unsignalized intersections outside of the Portland Metro area. The OHP ratios are used to evaluate existing and future no build conditions, while the HDM ratios are used to evaluate transportation system improvements on state highways. Based on its classification as a District Highway, the signalized intersection of OR 66 at Tolman Creek Road has an OHP v/c standard of 0.95 (based on revisions to the OHP adopted by the Oregon Transportation Commission in December of 2011 which became effective on January 1, 2012)<sup>1</sup>. Its relevant HDM v/c ratio is 0.80.

### City of Ashland Facilities

The remaining five intersections in the study area are all under the jurisdiction of the City of Ashland. Based on discussion included in the TSP, the following operational standards were used:

- Level of service (LOS) D at signalized and all-way stop-controlled intersections if the v/c ratio is not higher than 1.00 for the sum of critical movements.
- LOS E for the poorest operating approach at two-way stop-controlled intersections. Approaches operating at a LOS F where a traffic signal is not warranted were also identified in the TSP.

A summary of the relevant operational standards for the five City intersections in the Normal Avenue study area is presented in Table 2 below.

<sup>1</sup> It should be noted that the TSP used the OHP v/c standards that were in place prior to the OTC’s action in December of 2011. Consequently the v/c threshold cited in the TSP is 0.90.

**Table 2. Operational Thresholds for City Intersections**

Intersection	Traffic Control	Threshold	Intersection	Traffic Control	Threshold
E. Main Street @ Walker Avenue *	TWSC	LOS "E"	E. Main Street @ Clay Street	T with side street stop	LOS "E"
Ashland Street @ Walker Avenue *	Signal	LOS "D"	E. Main Street @ Tolman Creek Road	T with side street stop	LOS "E"
Ashland @ Normal Avenue	TWSC	LOS "E"			

\* Intersection included in TSP.

Note: TWSC means Two-Way Stop-Controlled intersection.

## SEASONAL ADJUSTMENT FACTOR

The ODOT *Analysis Procedures Manual* and the *Transportation System Plan Guidelines* direct that analysis of intersection traffic operations be based on the 30<sup>th</sup> highest hourly volume over the course of an entire year. This means that traffic turning movement counts taken at various times during a year must be adjusted to reflect this time period. For purposes of the Normal Avenue Neighborhood Plan, this adjustment will use the factors published by ODOT in the seasonal trend table as applied to the individual counts at intersections in the study area. The three intersections analyzed as part of the TSP, were previously adjusted as part of the TSP planning process and will not be further adjusted. The three intersections counted specifically for the Normal Avenue plan will be adjusted based on the factors presented in Table 3. Use of the seasonal trend table is only one of the methods used by ODOT to develop 30<sup>th</sup> highest hourly volumes (30 HV), but was determined through conversations with TPAU to be the most appropriate for this application.

The Seasonal Trend Method uses average values from the ODOT Automatic Traffic Recorder (ATR) Characteristic Table for each seasonal traffic trend. Consistent with the TSP, the analysis described in this document uses an average of Summer and Commuter seasonal traffic trend values to derive 30 HV volumes. Table 3 summarizes the average values for both seasonal traffic trends during the months when traffic counts were taken at the three non-TSP intersections (April and September), and the peak period as provided in the ODOT Seasonal Trend Table.

**Table 3. Seasonal Trend Table**

Trend	1-Apr	15-Apr	1-Oct	15-Oct	April Average	Oct Average	ODOT Peak Period Seasonal Factor
Summer	1.05	1.04	0.94	0.98	1.045	0.96	0.83
Commuter	0.96	0.94	0.93	0.93	0.95	0.93	0.90
	<b>Average Seasonal Trend</b>				<b>1.00</b>	<b>0.95</b>	<b>0.87</b>

Based on the data in Table 3, the traffic counts conducted in April 2012 (for E. Main Street at Clay Street and Tolman Creek Road) were adjusted by a factor of 1.15 (1.00/0.87), while the traffic count conducted in September 2011 (for Ashland Street at Normal Street) was adjusted by a factor of 1.09 (0.95/0.87).

## ANALYSIS MODEL PARAMETERS

The traffic operations analysis conducted for the Normal Avenue Neighborhood Plan will be consistent with the analysis methods and assumptions used for the City's TSP. Analysis results for the three TSP intersections will simply be cited as documented in the TSP and/or its appendices. Analysis results for the three new intersections in the study area will be based on the TSP methodological approach which is summarized below.

1. *Intersection/Roadway Geometry* (lane numbers and arrangements, cross-section elements, signal phasing, etc.) will be reviewed through aerial photography and confirmed through a site visit. Analysis models will be built on scaled roadway line work from GIS or aerial photography.
2. *Operational Data* (such as posted speeds, intersection control, parking, transit stops, rail crossings, right-turn on red, etc.) will be verified. Data will be reviewed during a site visit and supplemented by available GIS data, aerials, photos, and the ODOT video log (where applicable).

3. *Peak Hour Factors* (PHF) will be calculated for each intersection and applied to the existing conditions analyses. PHFs of 0.95 will be used for 2034 analysis for higher order streets (arterials), with 0.90 applied to medium order streets (collectors) and 0.85 for local roads. If the existing PHF is greater than these default future values, the existing PHF will be applied.
4. *Traffic Volume* development is described above and resulted in the April counts be adjusted by 15 percent and the September count by 9 percent.
5. *Signal Timing Data* will not be needed as the three new intersections are all stop-controlled for side street traffic.
6. *Traffic Operations*
  - a. For consistency with the TSP, the 2000 Highway Capacity Manual (HCM) methodology will be used for intersection analyses of 30 HV (or design hour) conditions. The existing and future no build analysis will use Synchro software using HCM reports for signalized and stop-controlled intersections. Level of service, delay and volume-to-capacity ratios will be reported at each of the study intersections including those previously analyzed as part of the TSP.
  - b. Queuing analysis methodology will be based on Synchro 95<sup>th</sup> percentile queue lengths. Microsimulation is not proposed as part of the planning effort.

### Traffic Analysis Software and Input Assumptions

Consistent with the TSP, Synchro software version 7 will be used for the intersection analysis. The reported results will be level of service, intersection delay, and v/c ratios generated by the HCM report. Analysis assumptions are listed in Table 4.

**Table 4. Synchro Operations Parameters/Assumptions**

<b>Arterial Intersection Parameters</b>	<b>Existing Conditions</b>
Peak Hour Factor	From traffic counts
Conflicting Bicycles and Pedestrians per Hour	From traffic counts
Area Type	Other
Ideal Saturation Flow Rate for All Movements	1,750 passenger cars per hour green per lane
Lane width	12 feet unless field observations suggest otherwise
Percent Heavy Vehicles	From traffic counts by movement, as available
Percent Grade	Estimated based on field observations
Bus Blockages	None
95 <sup>th</sup> Percentile Vehicle Queues	Synchro HCM summary output

### FORECAST YEAR VOLUME DEVELOPMENT

As future year analysis is not scoped as part of this work effort, no methodology discussion has been developed. If and when future year analysis is authorized, a supplement to this memorandum will be prepared to address future conditions.