



MEMORANDUM

DATE: May 11, 2016

TO: Linn County TSP Project Management Team

FROM: Carl D. Springer, DKS Associates
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SUBJECT: **Linn County Transportation System Plan | P14180-010**
Task 5.1 Technical Memorandum #6 – Forecasting Assumptions & Methodology

Traffic forecasting is an important step in the transportation planning process because it provides estimates of future travel demand. The horizon year for Linn County's transportation system plan (TSP) is 2040. This memorandum describes the forecasting assumptions and methodologies that were used to estimate transportation growth and provide traffic volumes for study intersection and roadways in 2040.

Methodology Overview

The forecasting methodology varies based on the forecasting tools available, as well as the location, characteristic, and jurisdiction of the facility. The following provides a summary of the forecasting tools that were used for the Linn County TSP:

- **For State highways and County facilities in the Corvallis-Albany-Lebanon-Millersburg (CALM) area:** Model growth rates from the CALM regional travel demand model were utilized for areas within the model boundaries.
- **For State highways outside of the CALM area:** Growth Rates derived from the ODOT Future Volume Tables were utilized.
- **For rural County facilities:** A half percent annual growth rate was utilized based on an assessment of ODOT Future Volume Tables and forecasted County population estimates.

Due to significant differences in summer peak volumes and average weekday volumes along many roadways in Linn County, the forecast included projections for both scenarios for the 2040 horizon year. Average weekday volumes are based on the seasonal adjustment factors developed for the existing year volumes, applied to the future forecasted summer peak volumes. The following sections detail the above forecasting methodologies and describe their applicability.

CALM Travel Demand Model

The CALM regional travel demand model¹ was utilized as the primary tool to estimate future travel demand in the Corvallis, Albany, Lebanon and Millersburg areas. The model includes all State highways in the CALM area (I-5, OR 34, US 20, OR 226, OR 99E), and major County roadways, including Peoria Road, Tangent Drive, Riverside Drive, Seven Mile Lane, Rock Hill Drive, Berlin Road, Spicer Drive, Kamph Drive, Knox Butte Road, etc. (see Figure 1). Land use data within the model area is divided into transportation analysis zones (TAZs), which represent the origins and destinations for motor vehicle trips throughout the region. Estimates of trips generated from each TAZ are based on associated land use data. In addition, regional trip growth on facilities connecting to the CALM area is accounted for by extrapolating historic growth trends. The 2010 base and 2040 future scenarios of the CALM model were used for this study.

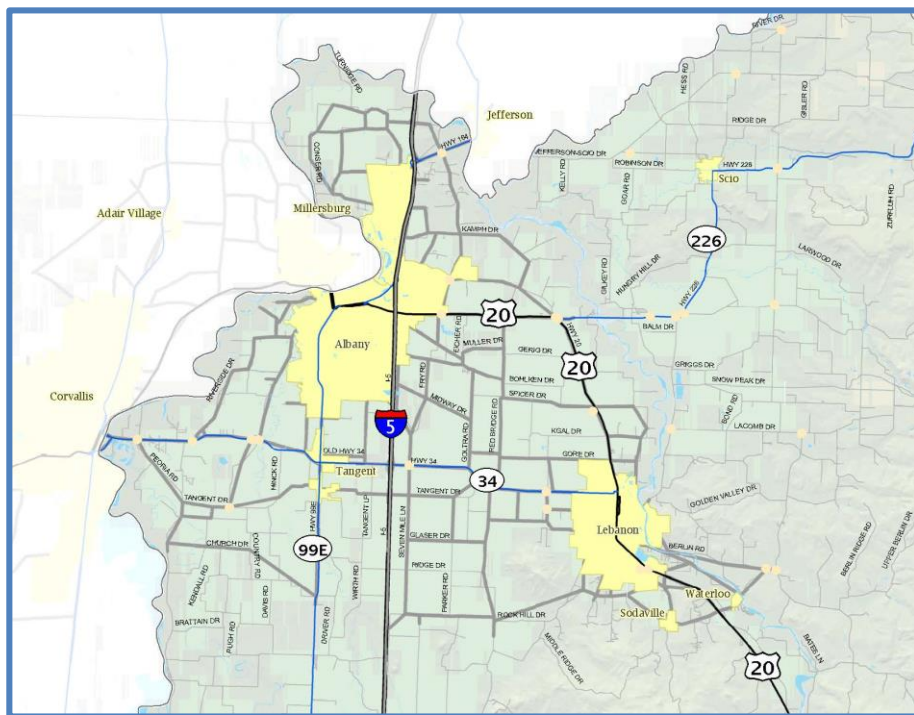


Figure 1: CALM Regional Travel Demand Model Area

¹ The CALM regional travel demand model is managed by the Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU).

Application of Regional Demand Model

As shown in Figure 1, the CALM regional travel demand model has a regional scale and the roadway network includes the primary arterial and collector roadways in the model area. Many local roadways are commonly not included in regional models because they are not significant to regional travel patterns. As a result, regional models like the CALM model have limited accuracy in forecasting circulation and routing on local streets and should be used carefully. Regional models also do not typically have sufficient detail to directly forecast intersection turn movements, even on roadways included in the model. Engineering judgment and manual methods (such as evaluating screen lines) are often needed to “post-process” link-based model results to estimate turn movement volumes and to account for circulation and routing at the local level.

Post-Processing

While the travel demand models were calibrated to local conditions and volumes, raw volumes from the travel demand model were not used for capacity analysis. Rather, motor vehicle turn movement volume forecasts were developed using post-processing methods consistent with the ODOT Procedures Manual². This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design*.

The post-processing methodology involves estimating model growth using the difference method (i.e., volume differences between base and future models), scaling the growth by the number of forecast years (i.e., forecast years divided by difference in model years), and adding these volumes to existing traffic counts³. Traffic growth on links in the travel demand models were applied to individual turn movements using a Fratar method to account for growth on both inbound and outbound links. Engineering judgment is used as part of the post-processing methodology. The result of this process is future year forecasts derived from the CALM regional travel demand model that are calibrated to observed data.

ODOT Future Volume Tables

For urban State highways or County facilities outside of the CALM model boundaries, future traffic growth was estimated based on ODOT’s 2034 future volume tables. Average daily traffic (ADT) volumes are provided for various mile points along State highways for the base year (2012, 2013, or 2014 depending on the location) and future year (2034). These volumes were utilized to determine an expected growth trend, suggesting an annual growth rate to be applied to applicable roadways and intersections in Linn County. The annual growth rate was applied to the seasonally factored base year volumes to develop traffic volumes for 2040.

² *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated May 2015, Chapter 6.

³ The traffic counts for the Linn County TSP study intersections were collected in 2015 and adjusted to average weekday and 30th highest hour conditions, as documented in *Technical Memorandum #5 (Existing Conditions)*.



For State highways outside of the CALM area, annual growth rates derived from the ODOT Future Volume Tables were utilized. For each state highway, an average annual linear growth rate was developed based on count locations outside Urban Growth Boundaries with sufficient statistical confidence values. Table 1 lists the locations used to develop rates for each highway, and the resulting growth rate.

Table 1: Annual Growth Rate Calculations for ODOT Facilities Outside CALM Model Coverage

Applied Locations	Highway Number	Milepoint	Count Location(s)**	Average Annual Growth Rate*
OR 226, east of US 20	211	4.79	0.10 mile north of Fish Hatchery Drive	0.27%
	211	11.99	0.02 mile west of Richardson Gap Road	
	211	16.49	0.02 mile east of Camp Morrison Drive	
OR 22	162	65.48	On Minto Creek Bridge	0.98%
	162	69.44	0.02 mile west of Downing Creek Falls Road	
	162	81.51	0.40 mile northwest of Santiam Highway (US20)	
US 20, south of Sodaville- Waterloo Dr.	16	35.08	2.10 miles east of Quartzville Drive	0.44%
	16	51.47	Upper Soda Automatic Traffic Recorder, Sta. 22-017, 0.91 mile west of Soda Fork Road	
	16	71.72	0.20 mile east of Clear Lake-Belknap Springs Highway (OR126)	
	16	74.5	0.40 mile west of North Santiam Highway (OR22)	
OR 126	16	75.05	0.15 mile east of North Santiam Highway (OR22)	0.29%
	215	0.1	0.10 mile south of Santiam Highway (US20)	
OR 99E, south of Bell Plain Dr.	58	14.73	0.02 mile north of "F" Street	0.53%***
	58	19.29	North city limits of Halsey	
	58	20.31	South city limits of Halsey	
	58	21.64	Halsey Automatic Traffic Recorder, Sta. 22-012, 2.28 miles south of Halsey-Sweet Home Highway No. 212 (OR228)	
OR 228	212	2.3	0.10 mile west of Pacific Highway (I-5)	0.10%
OR 126	215	0.1	0.10 mile south of Santiam Highway (US20)	0.29%

* Annual linear growth rate derived from ODOT 2034 Future Volume Table.

** Only statistically significant locations with R-squared values above 0.50 outside Urban Growth Boundaries were utilized. While ODOT's APM recommends using only data with an R-squared value of 0.75, very few locations had data with an R-squared value that high.

*** No count locations with R-Squared value over 0.03 are available. Due to OR 99E's unique role as an Interstate alternative connection between Albany, Tangent, Halsey, Harrisburg, Junction City, and Eugene, no state highways were determined to have reasonably similar growth profiles.



County Facility Growth Estimates

For rural County facilities (i.e. outside of the UGB), a half percent annual growth rate was utilized. This rate was developed after an evaluation of ODOT volume forecasts, a review of forecasted population estimates from Linn County's 1999 Coordinated 2020 Population Forecast, and the Oregon Office of Economic Analysis Forecast (2010 – 2050)⁴.

The Oregon Office of Economic Analysis produces a county population forecast from 2010 to 2050. For the time period of 2015 to 2040, this forecast shows 1.17% annual linear growth for the county as a whole. Cities and unincorporated areas are not differentiated in this forecast. To determine an approximately relationship between cities and unincorporated areas, Linn County's 1999 Coordinated 2020 Population Forecast was reviewed. It was used as part of the County's current comprehensive plan and describes both overall and unincorporated population growth. For the county as a whole, population growth for the period of 2000-2020 (the only years available) was forecast as 1.23% annual linear growth. For the unincorporated county population, the annual linear growth was forecast as 0.65%, indicating a substantially lower growth rate in the unincorporated area (approximately half). In addition, population growth rates are not a preferred approach to forecasting traffic volume growth, as the population growth rate includes non-drivers who cannot or should not drive, and does not reflect the spatial distribution of population growth. They are used only as a last resort, to inform the forecast where no other data is available.

ODOT volume forecasts were considered since they typically serve similar city-to-city trips as rural county roadways. ODOT's forecasts indicate that all highways within Linn County will experience growth rates no higher than 0.5% annually, with the exception of OR 22. A significant recreational route, OR 22 is not representative of county facilities, as it is a primary connection from I-5 and the Willamette Valley to Bend. Therefore, it OR 22 was excluded from consideration.

Considering the sources above, a conservative annual growth rate of a half percent per year was established for county facilities where no CALM model information is available.

⁴ Forecasts of Oregon's County Populations and Components of Change, 2010 – 2050, Office of Economic Analysis, Department of Administrative Services, State of Oregon

