

LINCOLN METROPOLITAN PLANNING ORGANIZATION



TRAVEL DEMAND MODEL

MODEL DEVELOPMENT AND VALIDATION REPORT

EXECUTIVE SUMMARY

DRAFT

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LSA

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EXECUTIVE SUMMARY

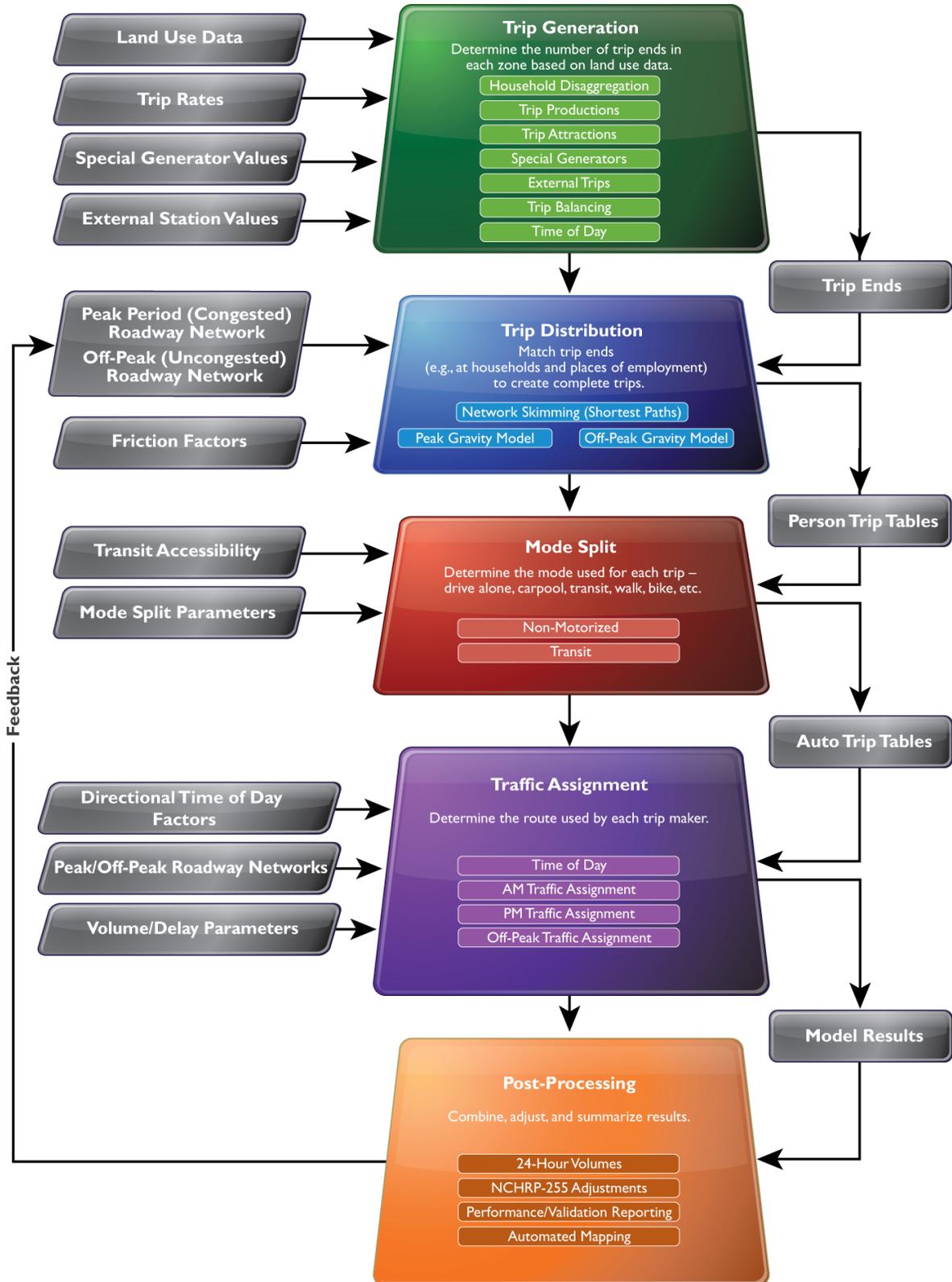
PROCESS OVERVIEW

The Lincoln MPO Travel Model is a tool used by the Lincoln MPO to forecast travel patterns in the City of Lincoln and the surrounding areas in Lancaster County. The primary purpose of the travel model is to support the development of the MPO's long-range transportation plan. The travel model can also be used to test specific land use or roadway changes in the short-term or long-term. The model also includes some limited transit and non-motorized analysis capabilities. The base year selected for the model is 2009, with a forecast year of 2040 and an interim year of 2025.

The Lincoln MPO Model utilizes a traditional four-step modeling process, as demonstrated in the flowchart on the following page. This process addresses all person trips, including trips made using transit and non-motorized modes (walk and bicycle). The updated model includes AM and PM peak periods and an off-peak period, which are combined to produce total daily traffic volumes. Post processing tools produce useful information, such as a summary report, adjusted model volumes, and intersection turn movement estimates. The entire process is automated and can be managed from a scenario management system within the TransCAD software platform. Automation has been implemented using GISDK, TransCAD's programming language.

This document provides detailed information about the processes and parameters contained in the Lincoln MPO Travel Model. Each chapter focuses on a specific model input or model step, beginning with the input roadway network and continuing with descriptions of the four-step modeling process (Trip Generation, Trip Distribution, Mode Split, and Traffic Assignment). Base year model validation measures associated with each of the four model steps are discussed in the corresponding chapters, with a dynamic validation process described in a separate chapter. In addition, a User's Guide is provided under a separate cover. The User's Guide provides detailed information about using the travel model software and datasets.

Lincoln MPO Travel Model Process Flowchart



VALIDATION OVERVIEW

The chapters in this report describe the parameters, process, and validation of each model step. Validation results are summarized here for easy reference.

TRIP GENERATION VALIDATION

While production rates are applied using a cross classified approach, it is often useful to consider simplified trip generation rates (e.g., total average trips per household). Table ES.1 shows summarized total trips per households, with Table ES.2 showing the distribution of trips by purpose in comparison to ranges seen in the TMIP Model Validation and Reasonableness Checking Manual.

Table ES.1: Summarized Trip Productions per Household

Purpose	Total Person Trips	Person Trips per Household	% of Person Trips	Vehicle Trips per Household
HBW	308,634	2.7	18%	2.4
HBS	220,532	2.0	13%	1.4
HBR	185,840	1.6	11%	1.0
HBO	497,450	4.4	29%	2.6
HBNW (Subtotal)	903,822	8.0	53%	5.0
WBO	138,242	1.2	8%	1.0
OBO	370,292	3.3	22%	2.1
NHB (Subtotal)	508,534	4.5	30%	3.1
Total	1,720,990	15.2	100%	10.5

Table ES.2: Distribution of Trips by Purpose

Trip Purpose	TMIP Validation Manual	Lincoln MPO Model (2009) - Total Person Trips	Lincoln MPO Model (2009) - Motorized Person Trips	Lincoln MPO Model (2009) - Motorized Person Trips Excluding HBU
HBW	17.9 - 27.0%	17.3%	17.7%	18.2%
HBNW	47.0 - 53.8%	54.2%	53.7%	52.4%
NHB	22.6 - 31.3%	28.5%	28.5%	29.3%

TRIP DISTRIBUTION VALIDATION

Trip distribution has been calibrated for home-based work (HBW) trips using worker flow data from the 2000 Census Transportation Planning Package (CTPP). Figure ES.1 shows a comparison of model results to observed data. Tables ES.3 and ES.4 demonstrate average modeled trip lengths and intrazonal trip percentages by trip purpose.

Figure ES.1: Trip Length Distribution Curves

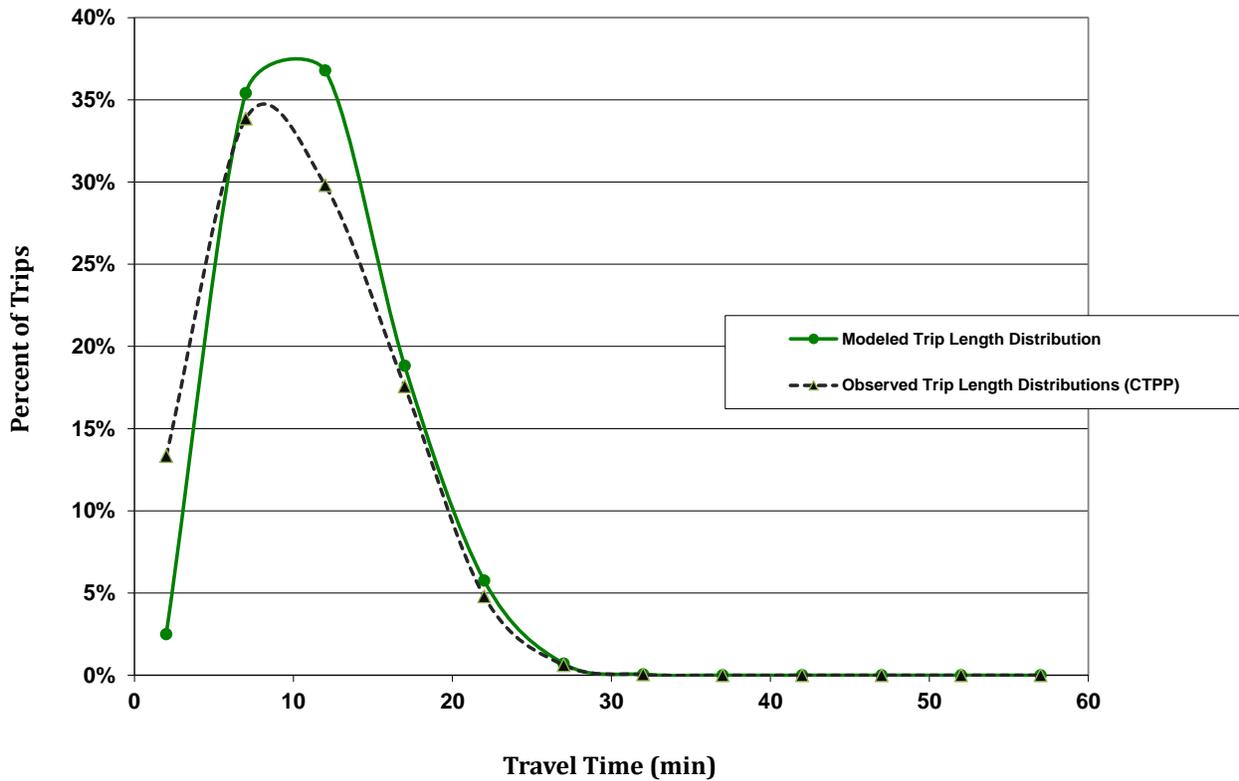


Table ES.3: Modeled Average Trip Lengths

Time Period	Measure	HBS (Low)	HBW (Med)	HBW (High)	HBS	HBR	HBU	HBO	WBO	OBO
Off-Peak	Distance (Miles)	5.6	7.5	8.1	4.5	3.4	4.4	3.5	3.5	3.7
	Time (Minutes)	11.7	14.2	15.2	9.7	7.2	10.8	7.7	7.5	7.9
	Implied Speed (MPH)	28.4	31.5	31.9	29.0	28.1	28.5	24.8	27.6	28.4
Peak	Distance (Miles)	5.7	7.5	8.0	4.5	3.4	4.4	3.5	3.5	3.7
	Time (Minutes)	14.5	15.5	16.5	9.7	7.2	10.8	7.7	7.5	7.9
	Implied Speed (MPH)	23.5	29.1	29.0	28.1	28.5	24.8	27.6	28.4	28.6

Table ES.4: Intrazonal Trip Percentages

Time Period	HBS (Low)	HBW (Med)	HBW (High)	HBS	HBR	HBU	HBO	WBO	OBO
Off-Peak	0.02%	0.29%	0.24%	3.50%	4.31%	0.00%	4.77%	7.39%	8.70%
Peak	0.02%	0.29%	0.34%	3.83%	4.69%	0.00%	5.15%	8.11%	9.44%

MODE SPLIT VALIDATION

Mode split is applied separately for non-motorized and motorized trips. Non-motorized trips were calibrated to a percentage of trips based on CTPP data and a pivot-point analysis using borrowed data. Total transit trips were calibrated to match observed transit ridership data. Mode share targets and results are shown in Table ES.5.

Table ES.5: Mode Share Targets and Results

Mode	HBW	HBS	HBR	HBU	HBO	WBO	OBO	Total
Bicycle Mode Share Targets	1.2%	2.0%	0.7%	19.5%	0.7%	0.9%	0.6%	n/a
Bicycle Mode Share Results	1.0%	1.7%	0.9%	17.7%	0.9%	0.6%	0.5%	1.5%
Bicycle Trip Results	3,036	3,774	1,676	10,861	4,793	793	1,939	26,872
Pedestrian Mode Share Targets	2.9%	1.7%	6.0%	3.5%	6.0%	6.1%	5.5%	n/a
Pedestrian Mode Share Results	2.2%	2.1%	4.6%	5.1%	5.2%	5.6%	5.8%	4.4%
Pedestrian Trip results	6,655	4,866	8,800	3,106	26,690	8,011	22,440	80,568
Transit Trip Target	n/a							4,498
Transit Trip Results	1,827	220	186	1,531	550	36	103	4,453
Transit Trip Shares	0.6%	0.1%	0.1%	2.5%	0.1%	0.0%	0.0%	0.2%

TRAFFIC ASSIGNMENT VALIDATION

Traffic assignment validation is explored in detail in Chapters 5 and 6. The most frequently referenced validation measures are demonstrated in the tables and figures below.

Table ES.6: Regional Activity Validation

Link Type	Number of Counts	Model Volume / Count Volume	Model VMT / Count VMT	Target
Freeway	22	2.5%	-1.4%	+/- 7%
Expressway	16	4.5%	-6.7%	+/- 7%
Principal Arterial	115	2.3%	-2.5%	+/- 10%
Minor Arterial	292	-0.1%	0.7%	+/- 15%
Urban and State Collectors	32	-14.7%	-16.5%	+/- 25%
Rural Collectors and Local Streets	52	-40.4%	-55.6%	n/a
CBD	10	0.9%	-1.1%	n/a
Urban	202	-0.6%	0.5%	n/a
Suburban	199	3.2%	-1.6%	n/a
Rural	118	-5.7%	2.6%	n/a
Total	529	0.5%	0.0%	+/- 5%

Table ES.7: Model % Root Mean Square Error

Link Type	Number of Counts	% RMSE	Validation Target
Freeway	22	10.4%	30%
Expressway	16	13.3%	30%
Principal Arterial	115	16.5%	30%
Minor Arterial	292	29.8%	40%
Urban and State Collectors	32	41.7%	50%
Rural Collectors and Local Streets	52	140.9%	n/a
CBD	10	16.4%	n/a
Urban	202	22.6%	n/a
Suburban	199	24.2%	n/a
Rural	118	37.5%	n/a
Total	529	25.1%	40%

Figure ES.2: Screenline Error Values

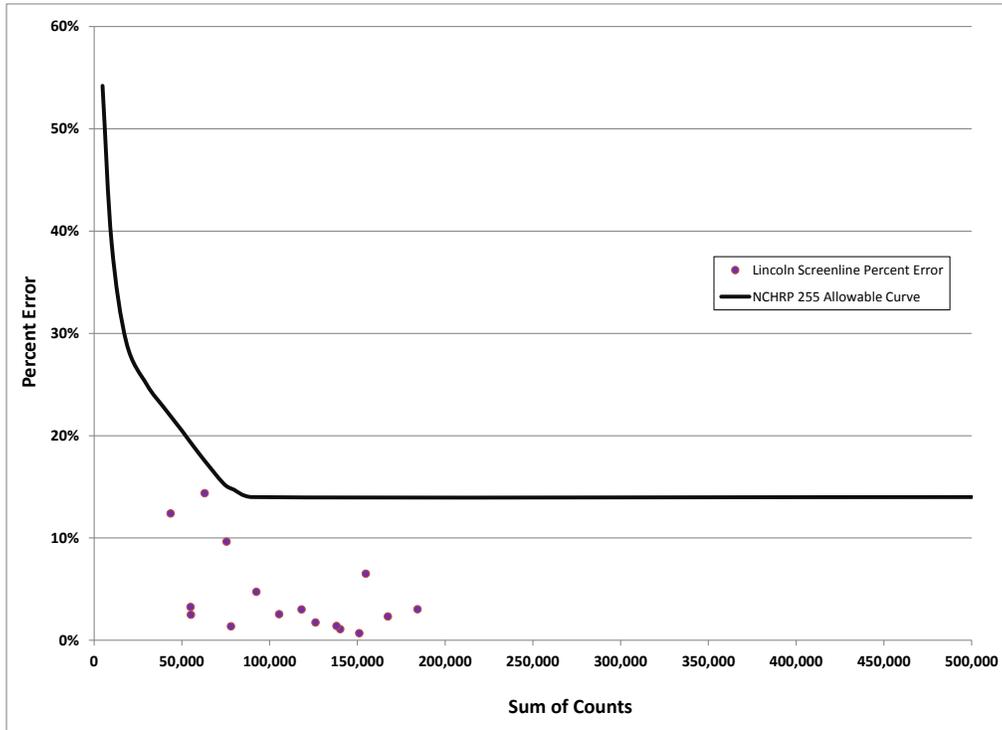


Figure ES.3: Model Count/Volume Comparison

