CAMBRIDGE SYSTEMATICS

North I-25 Parallel Arterial Study

Traffic Forecasting

technical report

prepared for

CDOT

prepared by

Cambridge Systematics, Inc.

April 17, 2020

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1801 Broadway, Suite 1100
Denver, CO 80202

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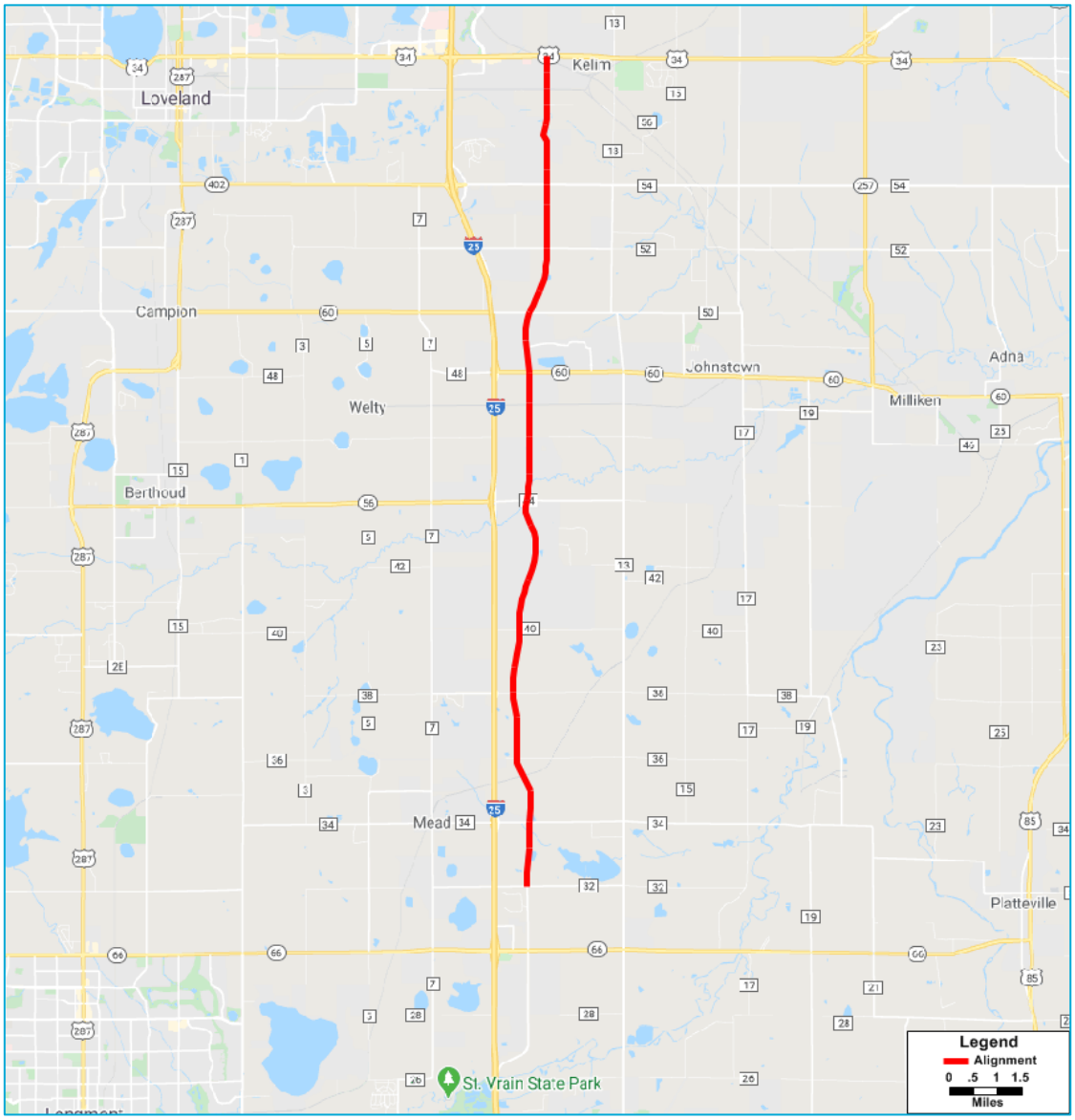
1.0 Introduction

This report presents the traffic/travel forecasting for the North I-25 Parallel Arterial Study. The travel forecasts for this study are based on same modeling system that was used to evaluate alternative improvements on I-25 between SH 66 and just north of SH 402 (I-25 Segments 5 and 6). This modeling system is a based on the North Front Range Metropolitan Planning Organization (NFRMPO) Regional Travel Model (Model), 2012 base year. This modeling tool estimates roadway traffic volumes by vehicle class (e.g., personal automobiles and trucks) for a network of links and nodes in the study area. Network links represent the study area roadways and network nodes represent intersections. The study area is east of I-25 between SH 66 and US 34, with the alignment being considered from north of SH 66 to south of US 34. **Figure 1.1** shows the study area and alignment for the County Road 9.5 extension.

Figure 1.1 Study Area

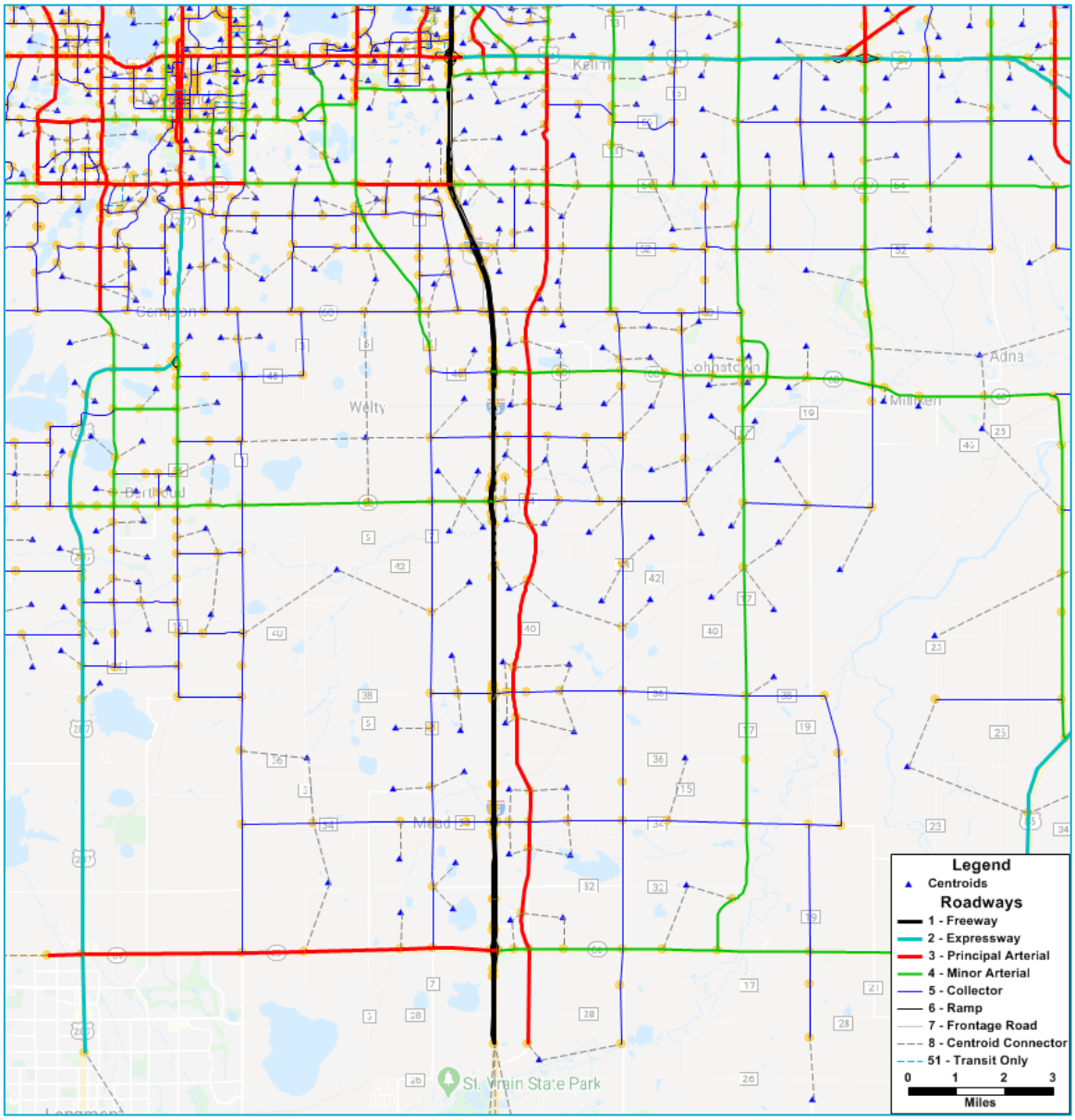


2.0 Model Input Assumptions

2.1 Roadway Network Input Modifications

The roadway network from the I-25 Segment 5 & 6 Study served as a source for the roadway networks used in this study. On I-25, express lanes are assumed for both segments 5 and 6, from SH 66 to SH 402, as well as from SH 402 to SH 14. The roadway network was reviewed and detail was added in the study area. The proposed arterial was added as a 4-lane principal arterial with a 45 mph speed limit. In addition, US-34 was updated to reflect the recommended alternative identified in the US-34 Planning and Environmental Linkage (PEL) Study. **Figure 2.1** shows the resulting roadway within the study area.

Figure 2.1 Updated Network



2.2 Updated Socioeconomic Data Assumptions

The travel model requires socioeconomic data (SED) consisting of household and employment totals at the traffic analysis zone (TAZ) level. For most of the modeling area, TAZ assumptions contained in the NFRMPO 2012 base year model and carried forward into the I-25 Segment 5 and 6 model were retained. In the immediate study area, TAZs were disaggregated into smaller zones as shown in **Figure 2.2**. An initial estimate of disaggregated SED was provided to adjacent jurisdictions for review and comment. Feedback was requested from Weld County, Johnstown, Berthoud, Mead, and Larimer County. Responses from jurisdictions ranged from general comments and guidance to detailed forecasts contained in adopted or proposed plans. The Town of Mead provided a detailed Transportation Plan that contained specific household and employment forecasts at a disaggregate zone level.

Forecasts were also updated to reflect proposed growth in the Thompson River Ranch neighborhood, along with the proposed Great Plains and Wilson Ranch developments. **Figure 2.3** identifies TAZs in each of these developments, as well as zones included in the Town of Mead Transportation Plan. Detailed base and forecast year SED resulting from the update are shown In **Appendix A**.

Figure 2.2 Updated TAZ Structure

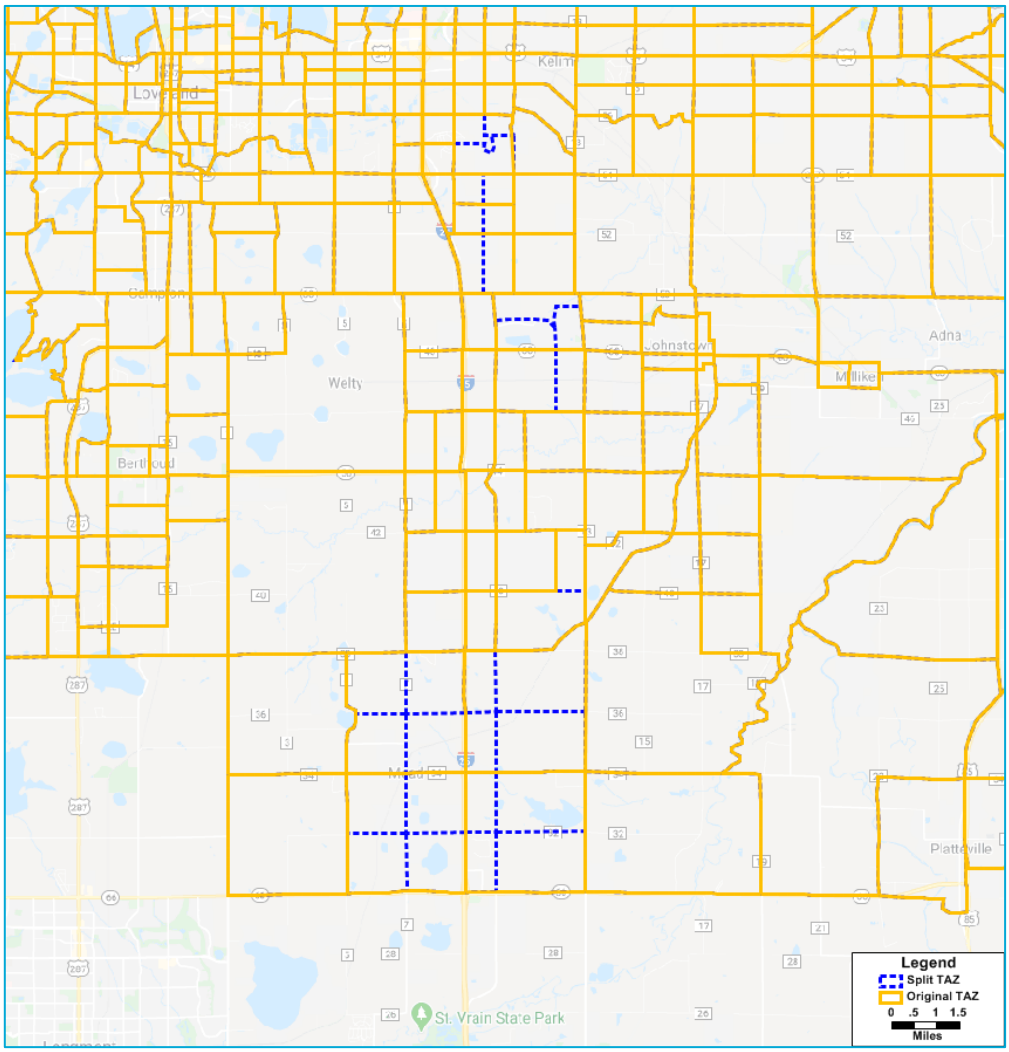
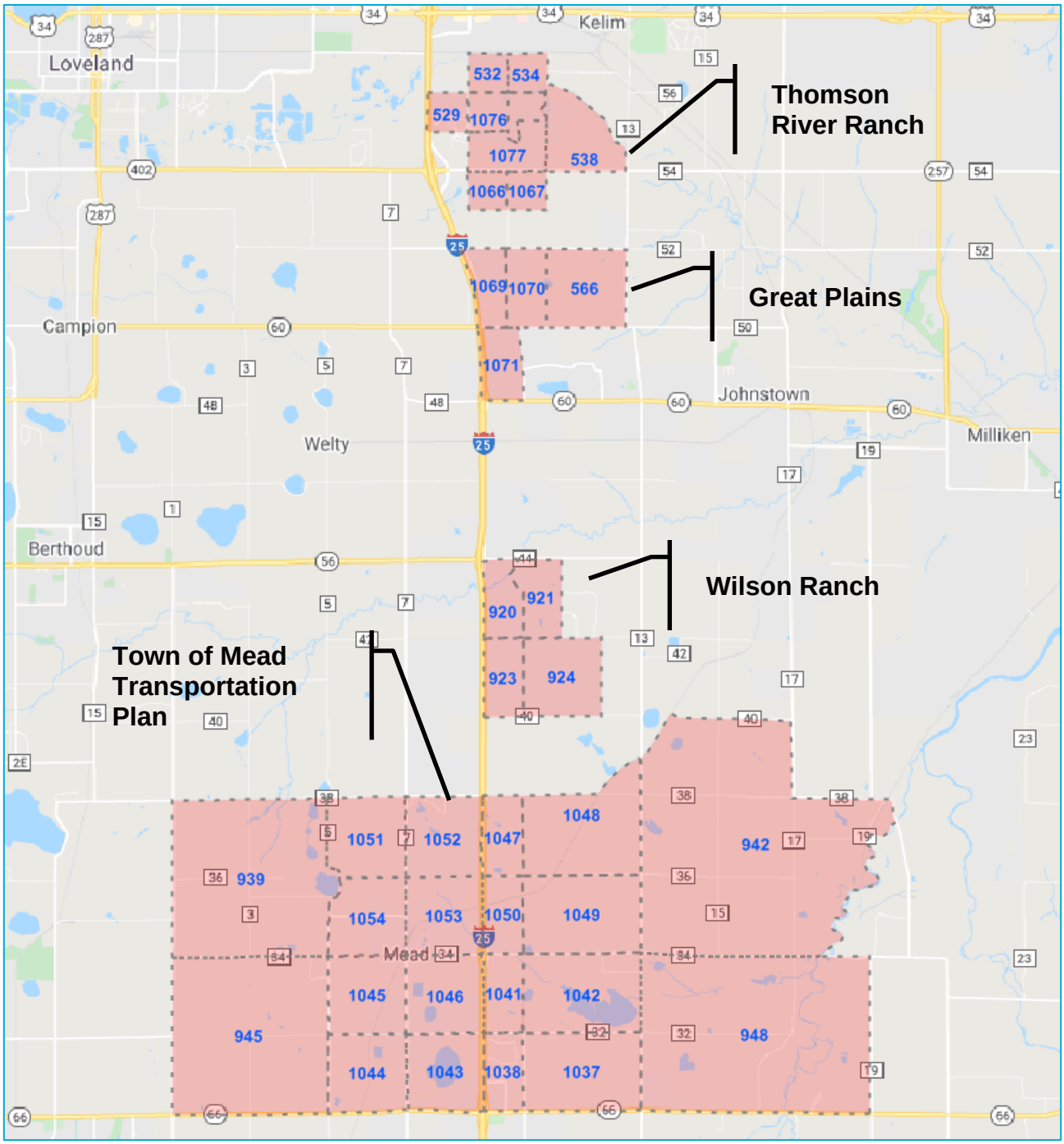


Figure 2.3 Zones updated to reflect specific planned developments

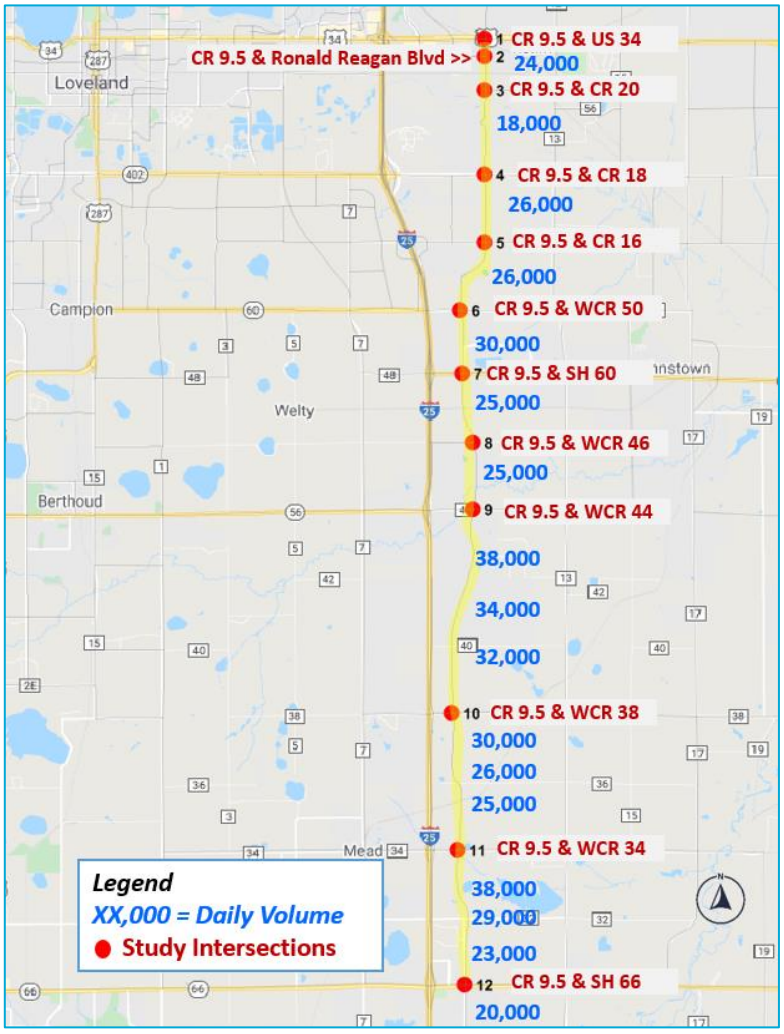


3.0 Traffic Forecasts

The travel model was run with the preferred alternative for County Road 9.5 under updated 2040 conditions. Resulting two-way daily traffic volumes ranged from 18,000 to 38,000 vehicles, as shown in **Figure 3.1**. The highest volumes of about 38,000 daily vehicles are seen in the mid-section of the corridor. **Appendix B** provides detailed volumes for all roadways in the study area, including the proposed segment of County Road 9.5.

To support preliminary design and right of way preservation for the proposed County Road 9.5, turn movement volumes shown in **Appendix C** were extracted from the travel model. The *I-25 Parallel Arterial Intersection Analysis Memo* (Michael Baker International, April 2020) has more detailed information on the resulting recommended intersection configurations and right-of-way requirements at the study intersections. Existing turning movement volumes were not available so turning movement data extracted from the model reflect raw modeled turning movements. One exception is intersection 12 at SH-66, which was adjusted to account for edge effects related to an external station located just south of SH-66.

Figure 3.1 Study Area Intersections and 2040 Forecast Volumes



Note: Forecast volumes have been rounded to thousands and reflect raw modeled volumes.

4.0 Comparison of NIPA and Segment 5 & 6 Study

This section of the report compares aspects of this analysis (NIPA scenario) to analysis performed to support the I-25 Segment 5 & 6 study.

4.1 Socioeconomic Data Comparison

As mentioned in **Section 2.2**, socioeconomic data was updated for four areas. About 11,700 households and 11,800 employment were added to zones within the study area. Household and employment numbers for these four areas are shown in **Table 4.1** and **Table 4.2**. A detailed zone level comparison is provided in **Appendix D**.

Table 4.1 2040 Household Comparison

	Seg 5 & 6	NIPA	Difference	% Difference
Thompson River Ranch Development	2,871	1,923	-948	-33%
Great Plains Development	1,763	2,984	1,221	69%
Wilson Ranch Development	1,000	4,000	3,000	300%
Town of Mead Transportation Plan	1,584	10,023	8,439	533%
Total	**7,218**	**18,930**	**11,712**	**162%**

Table 4.2 2040 Employment Comparison

	Seg 5 & 6	NIPA	Difference	% Difference
Thompson River Ranch Development	332	1,443	1,111	335%
Great Plains Development	1,314	323	-991	-75%
Wilson Ranch Development	246	1,507	1,261	513%
Town of Mead Transportation Plan	2,453	12,823	10,370	423%
Total	4,345	16,096	11,751	270%

4.2 Traffic Volume Comparison

A comparison of traffic volumes between the two studies generally shows more traffic resulting from the additional land uses assumed in the NIPA scenario. A comparison of volumes across a set of screenlines shown in **Figure 4.1** is summarized in **Table 4.3**. Higher volumes cross each screenline, with larger increases towards the southern end of the study area. This is consistent with the larger overall change in land use assumptions associated with the Town of Mead Transportation Plan.

Figure 4.1 Screenlines for Traffic Volume Comparison

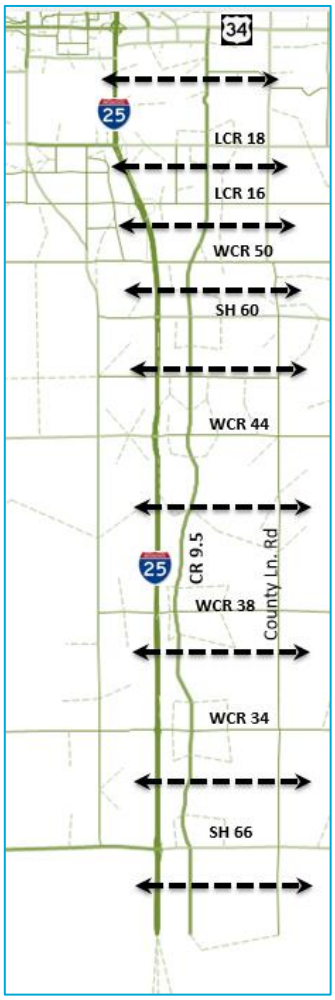


Table 4.3 Screenline Volume Comparison

Screenline Location	Seg 5 & 6	NIPA	Difference	% Difference
Between US 34 and LCR 18	153,203	153,471	268	0%
Between LCR 18 and LCR 16	139,265	152,912	13,647	10%
Between LCR 16 and WCR 50	135,897	149,649	13,753	10%
Between WCR 50 and SH 60	140,401	156,929	16,528	12%
Between SH 60 and WCR 44	133,753	160,161	26,407	20%
Between WCR 44 and WCR 38	134,715	179,034	44,319	33%
Between WCR 38 and WCR 34	139,297	182,148	42,851	31%
Between WCR 34 and SH-66	149,403	181,667	32,264	22%

Traffic is higher on most east-west arterials in the NIPA scenario, which is again consistent with the land use additions described previously. In a pattern similar to that seen in the screenline analysis, these arterials show a pattern of larger increases south of SH 60. Volumes on each east-west arterial are shown in **Table 4.4**.

A comparison of volumes on I-25, the east frontage road, and proposed arterial shows a slight decrease in I-25 traffic north of SH 60 in the NIPA analysis. South of SH 60, I-25 volumes are slightly higher in the NIPA scenario. Frontage road traffic in the NIPA scenario is reduced in most locations. This is expected due to closure of sections of the frontage road under this scenario. Comparisons are shown in **Table 4.5**, with more detailed volumes provided in **Appendix E**.

Table 4.4 Comparison of Volumes on East-West Arterials

Arterial Name	Seg 5 & 6	NIPA	Difference	% Difference
US 34	58,418	66,833	8,415	14%
LCR 18	26,423	14,397	(12,026)	-46%
LCR 16	13,644	14,420	776	6%
WCR 50	11,617	14,813	3,196	28%
SH 60	34,681	35,909	1,228	4%
WCR 44	12,545	19,893	7,348	59%
WCR 38	10,262	22,865	12,603	123%
WCR 34	5,194	36,322	31,128	599%
SH-66	13,193	28,441	15,247	116%

Table 4.5 2040 Traffic Volume Comparison by Facility

Segment	Seg 5 & 6			NIPA			Difference			% Difference		
	I-25	FR	CR 9.5	I-25	FR	CR 9.5	I-25	FR	CR 9.5	I-25	FR	CR 9.5
US 34 to LCR 18	117,906	11,055	12,443	113,049	8,840	18,482	(4,857)	(2,214)	6,039	-4%	-20%	49%
LCR 18 to LCR 16	117,288	5,603	4,485	115,439	1,878	25,957	(1,849)	(3,725)	21,473	-2%	-66%	479%
LCR 16 to WCR 50	118,619	3,287	7,563	117,290	1,964	25,742	(1,330)	(1,323)	18,179	-1%	-40%	240%
WCR 50 to SH 60	118,619	6,922	7,129	117,290	-	30,676	(1,330)	(6,922)	23,547	-1%	n/a	330%
SH 60 to WCR 44	121,747	5,632	-	129,063	-	24,974	7,316	(5,632)	24,974	6%	n/a	n/a
WCR 44 to WCR 38	124,631	5,150	-	134,724	2,757	33,739	10,092	(2,393)	33,739	8%	-46%	n/a
WCR 38 to WCR 34	124,631	11,864	-	134,724	15,881	26,290	10,092	4,017	26,290	8%	34%	n/a
WCR 34 to SH-66	140,967	5,841	-	147,669	2,587	29,018	6,702	(3,253)	29,018	5%	-56%	n/a

Note: Red text indicates sections of the frontage road that are removed in the NIPA scenario.

Appendix A. Updated Socioeconomic Data Assumptions

Figure A.1 SED Assumptions – Thompson River Ranch vicinity

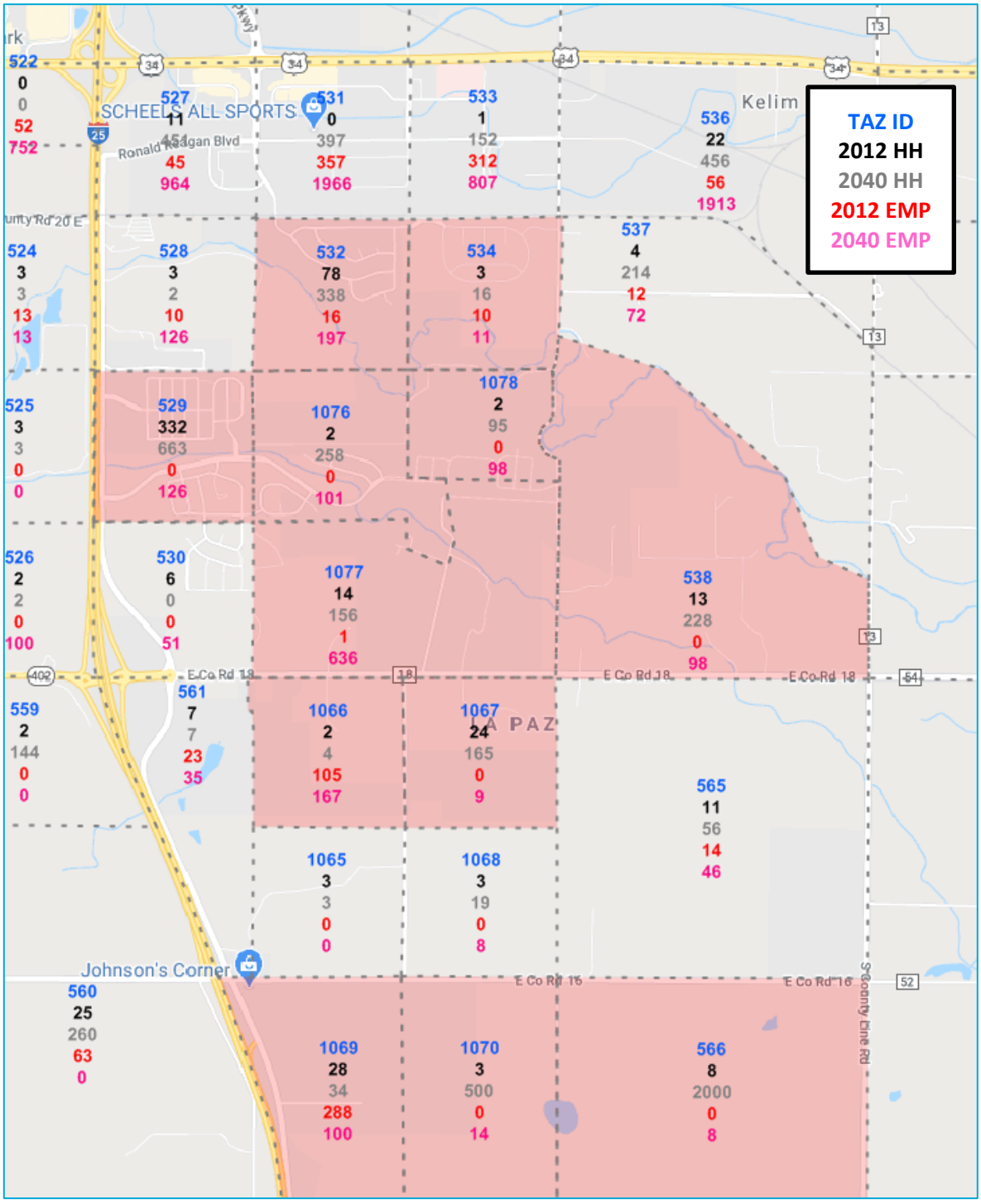


Figure A.2 SED Assumptions – Great Plains Vicinity

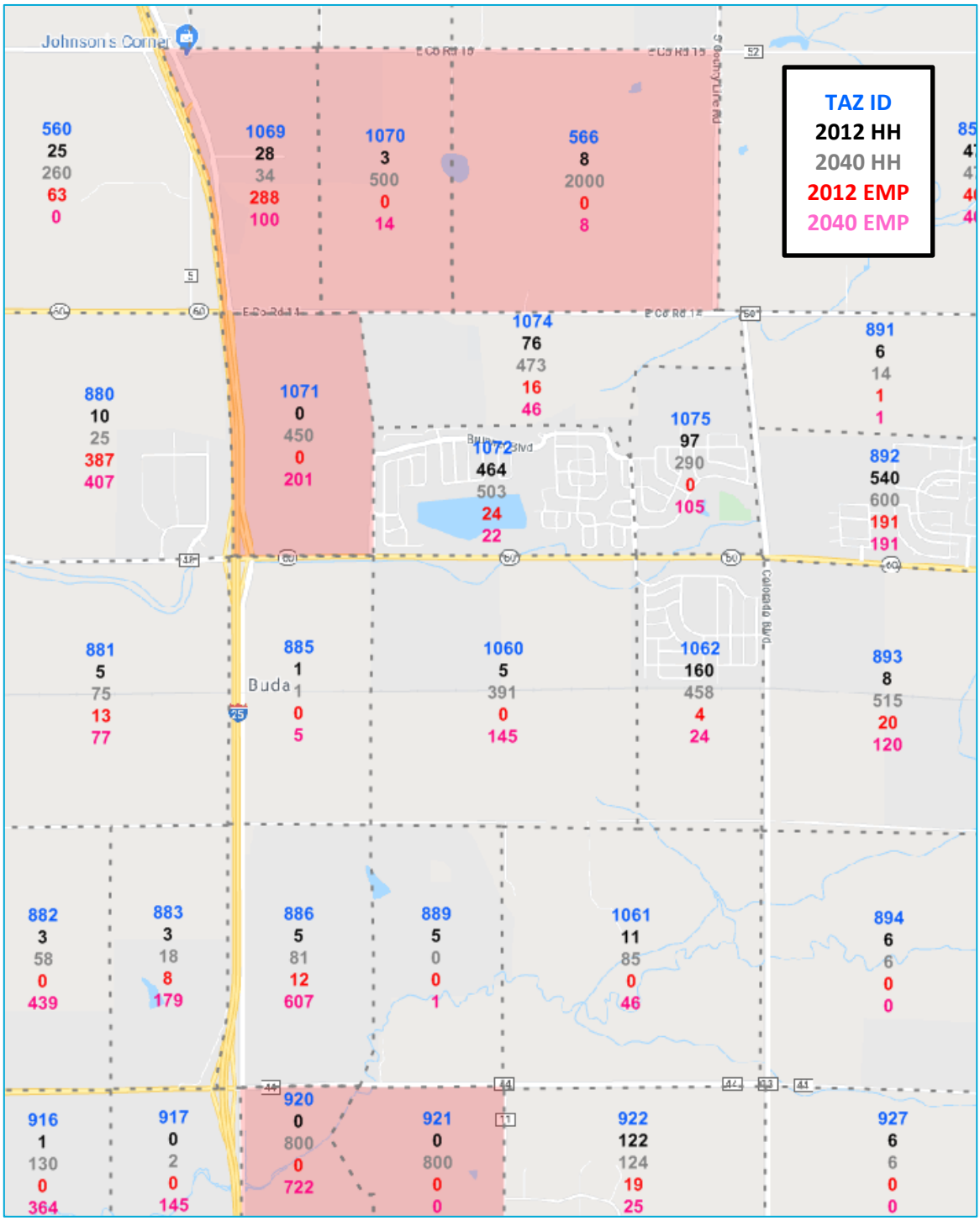
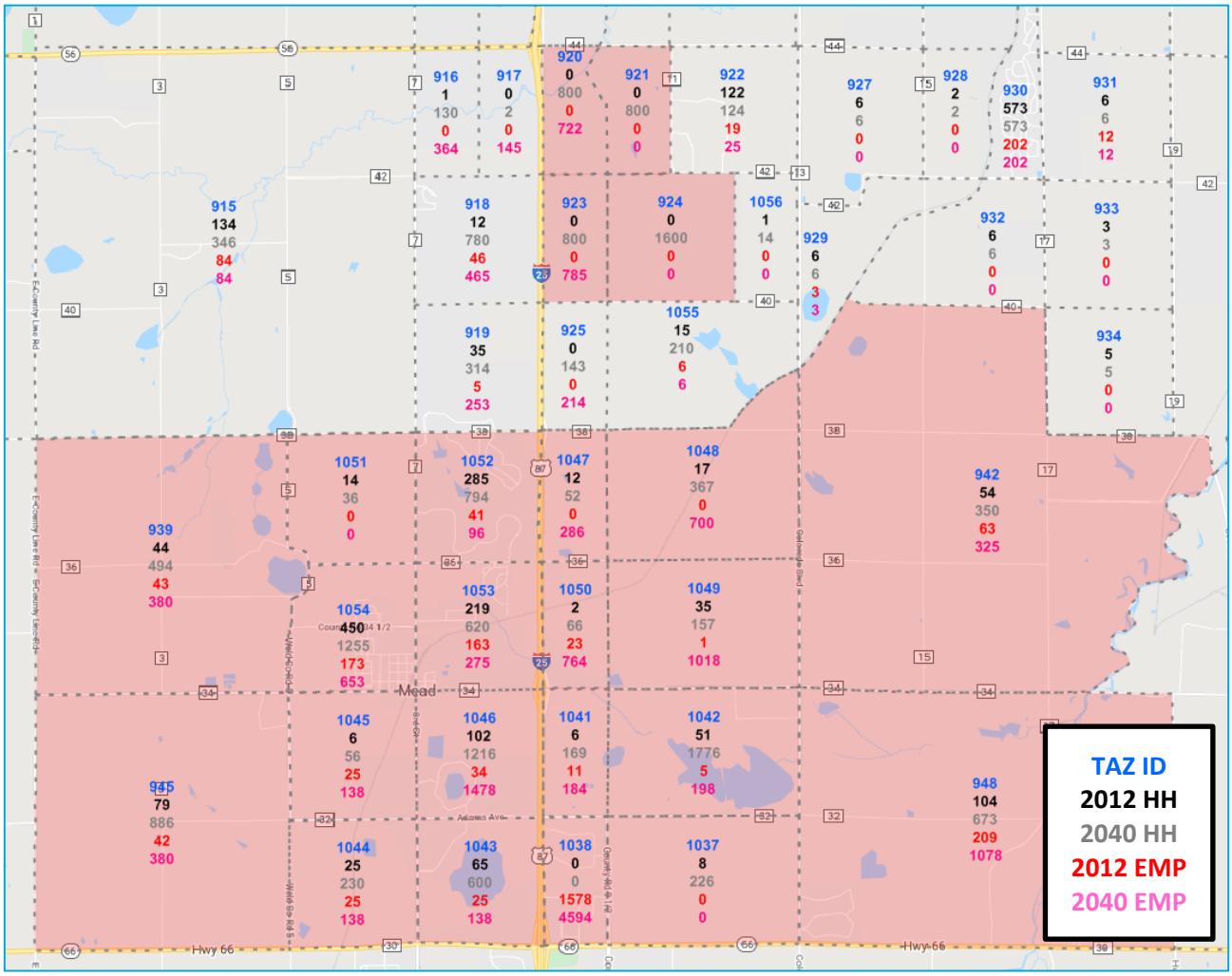


Figure A.3 SED Assumptions – Wilson Ranch and Town of Mead Vicinity



Appendix B. Detailed 2040 Modeled Roadway Volumes

Modeled roadway volumes are provided as a separate PDF file to allow detailed review of volumes.

Attachment: NIPA_Volume_Maps.pdf

Appendix C. Modeled Turning Movements

Figure C.1 2040 AM Peak Hour turning Movements

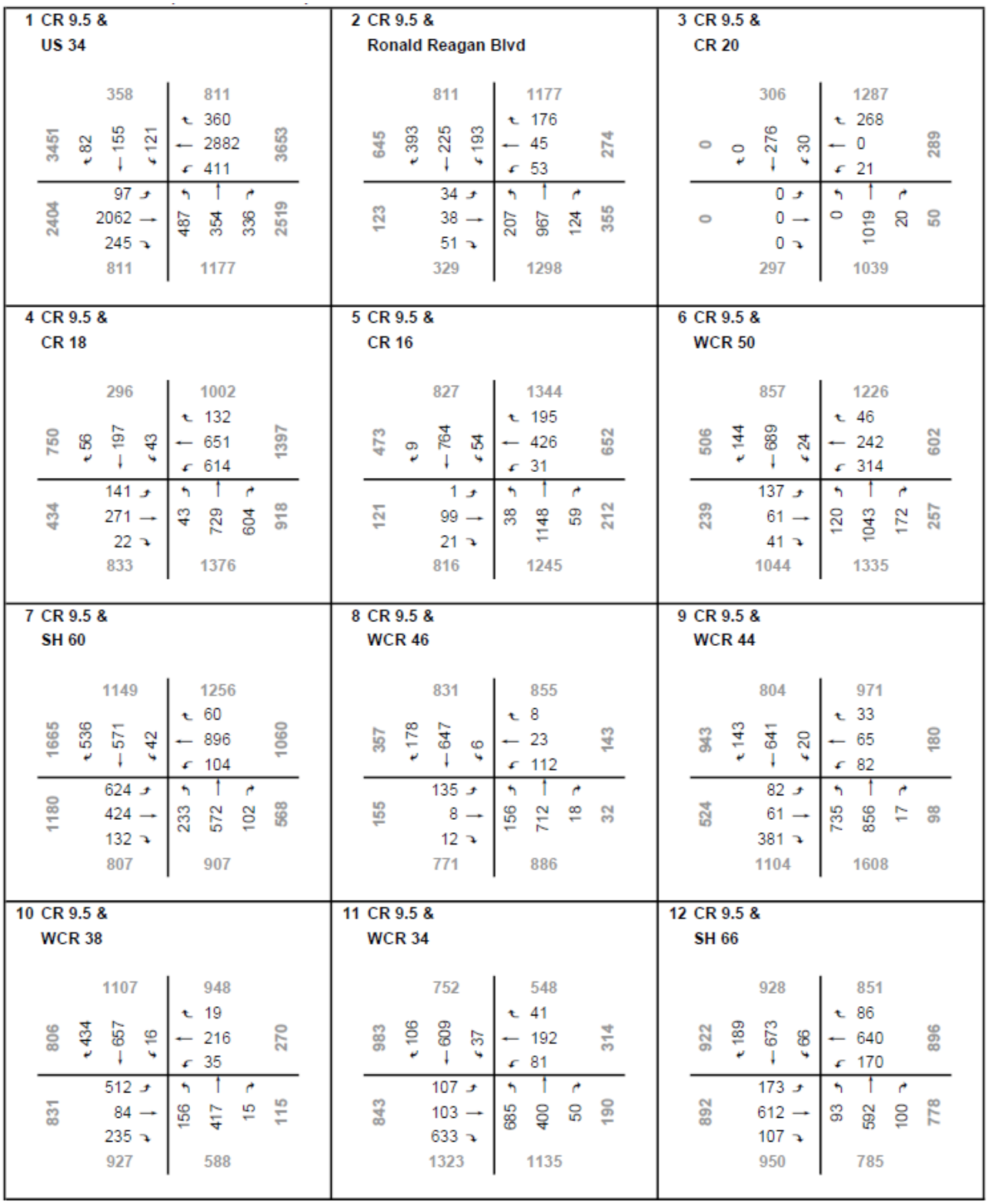
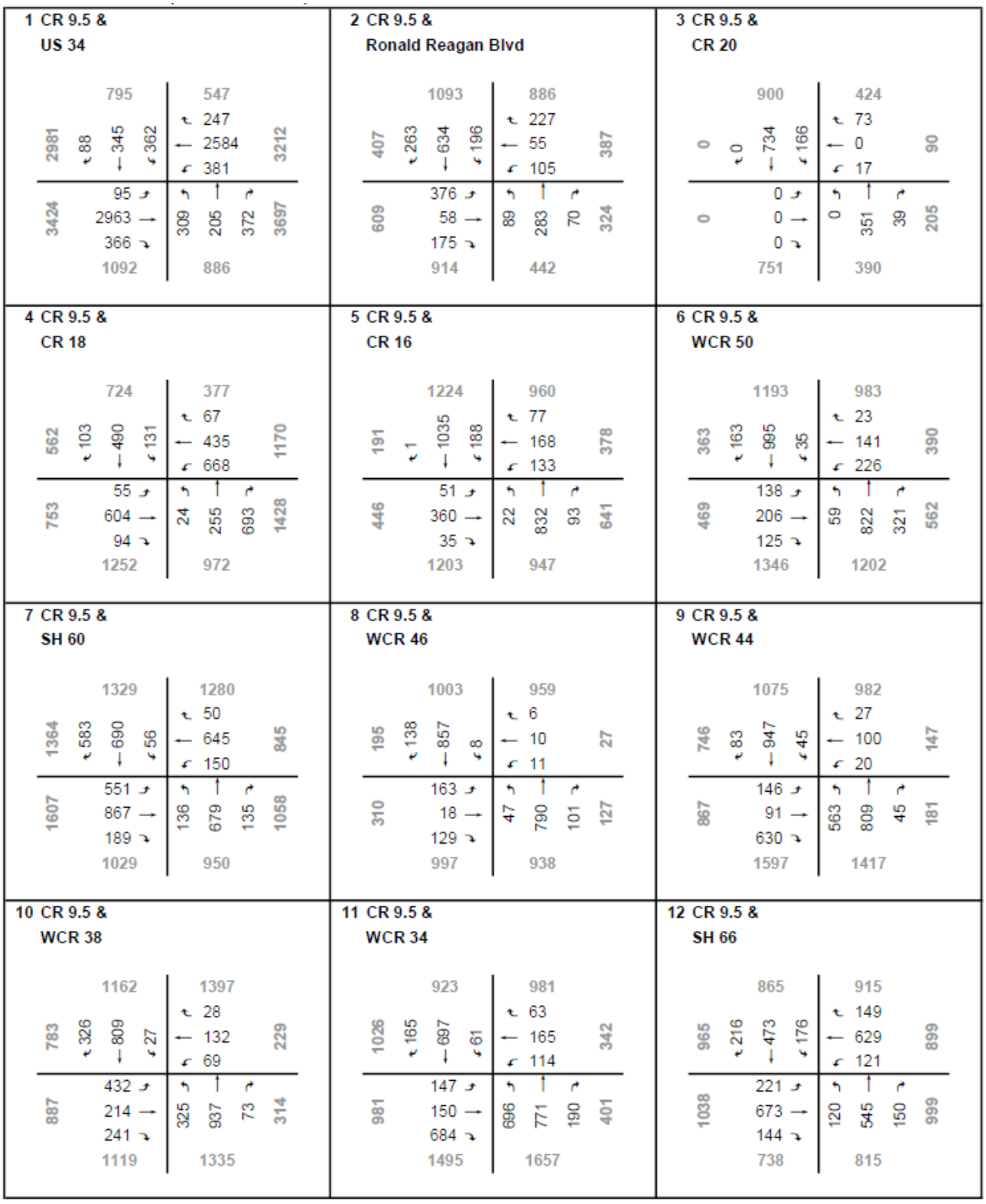


Figure C.2 2040 PM Peak Hour turning Movements



Appendix D. Socioeconomic Data Comparison Tables

Tables that follow compare socioeconomic data between the NIPA Study and the I-25 Segment 5 & 6 Study.

	TAZ ID		Year 2040 Households		Year 2040 Employment	
	Seg 5 & 6 (Parent)	NIPA	Seg 5 & 6	NIPA	Seg 5 & 6	NIPA
Thompson River Ranch Development	529	529	397	663	200	126
	532	532	91	338	16	197
	534	534	250	16	10	11
	538	538	93	228	-	98
	535	1076	1,600	258	1	101
		1077		156		636
		1078		95		98
	562	1066	440	4	105	167
		1067		165		9
Total			**2,871**	**1,923**	**332**	**1,443**

	TAZ ID		Year 2040 Households		Year 2040 Employment	
	Seg 5 & 6 (Parent)	NIPA	Seg 5 & 6	NIPA	Seg 5 & 6	NIPA
Great Plains Development	566	566	529	2,000	-	8
	564	1069	611	34	557	100
	564	1070	611	500	557	14
	884	1071	12	450	200	201
Total			**1,763**	**2,984**	**1,314**	**323**

	TAZ ID		Year 2040 Households		Year 2040 Employment	
	Seg 5 & 6 (Parent)	NIPA	Seg 5 & 6	NIPA	Seg 5 & 6	NIPA
Wilson Ranch Development	920	920	200	800	83	722
	921	921	200	800	11	-
	923	923	200	800	94	785
	924	924	400	1,600	58	-
Total			**1,000**	**4,000**	**246**	**1,507**

	TAZ ID		Year 2040 Households		Year 2040 Employment	
	Seg 5 & 6 (Parent)	NIPA	Seg 5 & 6	NIPA	Seg 5 & 6	NIPA
Town of Mead Transportation Plan	939	939	44	494	43	380
	942	942	54	350	63	325
	945	945	79	886	42	380
	948	948	104	673	209	1,078
	947	1037	65	226	1,586	-
		1038		-		4,594
		1041		169		184
		1042		1,776		198
	946	1043	198	600	109	138
		1044		230		138
		1045		56		138
		1046		1,216		1,478
	941	1047	67	52	24	286
		1048		367		700
		1049		157		1,018
		1050		66		764
	940	1051	973	36	377	-
		1052		794		96
		1053		620		275
		1054		1,255		653
Total			**1,584**	**10,023**	**2,453**	**12,823**

Appendix E. Traffic Volume Comparison Tables

1	Screenline Total Comparis	Seg5&6	NIPA	Diff.	% Diff.
	Between US 34 and LCR 18	153,203	153,471	268	0%
	Between LCR 18 and LCR 16	139,265	152,912	13,647	10%
	Between LCR 16 and WCR 50	135,897	149,649	13,753	10%
	Between WCR 50 and SH 60	140,401	156,929	16,528	12%
	Between SH 60 and WCR 44	133,753	160,161	26,407	20%
	Between WCR 44 and WCR 38	134,715	179,034	44,319	33%
	Between WCR 38 and WCR 34	139,297	182,148	42,851	31%
	Between WCR 34 and SH-66	149,403	181,667	32,264	22%
	South of SH-66	163,344	198,451	35,108	21%

		Seg5&6				NIPA				Difference				% Difference			
2	Detailed Comparison	I-25	FR	CR 9.5/CR3	CL RD	I-25	FR	CR 9.5/CR	CL RD	I-25	FR	CR 9.5/CR3	CL RD	I-25	FR	CR 9.5/CR3	CL RD
	Between US 34 and LCR 18	117,906	11,055	12,443	11,799	113,049	8,840	18,482	13,099	(4,857)	(2,214)	6,039	1,301	-4%	-20%	49%	11%
	Between LCR 18 and LCR 16	117,288	5,603	4,485	11,889	115,439	1,878	25,957	9,637	(1,849)	(3,725)	21,473	(2,252)	-2%	-66%	479%	-19%
	Between LCR 16 and WCR 50	118,619	3,287	7,563	6,427	117,290	1,964	25,742	4,654	(1,330)	(1,323)	18,179	(1,774)	-1%	-40%	240%	-28%
	Between WCR 50 and SH 60	118,619	6,922	7,129	7,731	117,290	-	30,676	8,963	(1,330)	(6,922)	23,547	1,233	-1%	-100%	330%	16%
	Between SH 60 and WCR 44	121,747	5,632	-	6,375	129,063	-	24,974	6,124	7,316	(5,632)	24,974	(251)	6%	-100%	n/a	-4%
	Between WCR 44 and WCR 38	124,631	5,150	-	4,934	134,724	2,757	33,739	7,814	10,092	(2,393)	33,739	2,881	8%	-46%	n/a	58%
	Between WCR 38 and WCR 34	124,631	11,864	-	2,802	134,724	15,881	26,290	5,253	10,092	4,017	26,290	2,452	8%	34%	n/a	88%
	Between WCR 34 and SH-66	140,967	5,841	-	2,595	147,669	2,587	29,018	2,393	6,702	(3,253)	29,018	(203)	5%	-56%	n/a	-8%
	South of SH-66	157,528	-	-	5,816	169,835	-	19,913	8,703	12,307	-	19,913	2,888	8%	0%	n/a	50%

3	Crossing Arterials	Seg5&6	NIPA	Diff.	% Diff.
	US 34	58,418	66,833	8,415	14%
	LCR 18	26,423	14,397	(12,026)	-46%
	LCR 16	13,644	14,420	776	6%
	WCR 50	11,617	14,813	3,196	28%
	SH 60	34,681	35,909	1,228	4%
	WCR 44	12,545	19,893	7,348	59%
	WCR 38	10,262	22,865	12,603	123%
	WCR 34	5,194	36,322	31,128	599%
	SH-66	13,193	28,441	15,247	116%

4 I-25 Volumes Comparison GP vs. Express Lanes

	Seg5&6 I-25			NIPA I-25			Difference I-25			% Difference I-25		
	GP	Exp. Lane	Total	GP	Exp. Lane	Total	GP	Exp. Lane	Total	GP	Exp. Lane	Total
Between US 34 and LCR 18	89,379	28,528	**117,906**	79,522	33,527	**113,049**	(9,857)	4,999	(4,857)	-11%	18%	-4%
Between LCR 18 and LCR 16	85,128	32,160	**117,288**	87,205	28,234	**115,439**	2,078	(3,926)	(1,849)	2%	-12%	-2%
Between LCR 16 and WCR 50	88,472	30,148	**118,619**	89,056	28,234	**117,290**	584	(1,914)	(1,330)	1%	-6%	-1%
Between WCR 50 and SH 60	88,807	29,813	**118,619**	89,056	28,234	**117,290**	249	(1,579)	(1,330)	0%	-5%	-1%
Between SH 60 and WCR 44	91,934	29,813	**121,747**	91,786	37,277	**129,063**	(148)	7,464	7,316	0%	25%	6%
Between WCR 44 and WCR 38	89,480	35,152	**124,631**	94,958	39,766	**134,724**	5,478	4,614	10,092	6%	13%	8%
Between WCR 38 and WCR 34	89,480	35,152	**124,631**	94,958	39,766	**134,724**	5,478	4,614	10,092	6%	13%	8%
Between WCR 34 and SH-66	105,815	35,152	**140,967**	102,010	45,660	**147,669**	(3,806)	10,508	6,702	-4%	30%	5%
South of SH-66	157,528	-	**157,528**	117,537	52,298	**169,835**	(39,991)	52,298	12,307	-25%	0%	8%

5 I-25 Volumes Comparison GP vs. Express Lanes

	Seg5&6 I-25 Southbound		Northbound	NIPA I-25 Southbound		Northbound	Difference I-25 Southbound		Northbound	% Difference I-25 Southbound		Northbound	
	GP	Exp. Lane	Exp. Lane	GP	GP	Exp. Lane	Exp. Lane	GP	GP	Exp. Lan	Exp. Lane	GP	GP	Exp. Lane	Exp. Lane	GP
Between US 34 and LCR 18	46,116	15,524	13,004	43,263	41,059	17,458	16,069	38,463	(5,056)	1,934	3,065	(4,800)	-11%	12%	24%	-11%
Between LCR 18 and LCR 16	46,418	15,524	16,637	38,710	44,229	14,635	13,600	42,976	(2,189)	(889)	(3,037)	4,267	-5%	-6%	-18%	11%
Between LCR 16 and WCR 50	42,901	15,524	14,624	45,571	44,479	14,635	13,600	44,576	1,578	(889)	(1,024)	(994)	4%	-6%	-7%	-2%
Between WCR 50 and SH 60	43,236	15,189	14,624	45,571	44,479	14,635	13,600	44,576	1,243	(554)	(1,024)	(994)	3%	-4%	-7%	-2%
Between SH 60 and WCR 44	46,191	15,189	14,624	45,743	46,174	18,564	18,714	45,611	(17)	3,375	4,090	(131)	0%	22%	28%	0%
Between WCR 44 and WCR 38	45,801	17,706	17,445	43,679	48,451	19,403	20,362	46,507	2,650	1,697	2,917	2,828	6%	10%	17%	6%
Between WCR 38 and WCR 34	45,801	17,706	17,445	43,679	48,451	19,403	20,362	46,507	2,650	1,697	2,917	2,828	6%	10%	17%	6%
Between WCR 34 and SH-66	54,362	17,706	17,445	51,453	51,611	22,966	22,694	50,399	(2,751)	5,259	5,249	(1,055)	-5%	30%	30%	-2%
South of SH-66	79,934	-	-	77,594	59,096	26,586	25,712	58,441	(20,838)	26,586	25,712	(19,153)	-26%	0%	0%	-25%