Appendix A – TRAFFIC FORECAST REPORT

TRAFFIC FORECAST MEMORANDUM
Henderson County – US 41 Traffic and Access Management Study
Item No. N/A

PROJECT DESCRIPTION
Preliminary traffic forecasts have been developed to assist in the evaluation of improvement concepts for the US 41 corridor in Henderson County. US 41 is functionally classified an urban principal arterial, and the route connects the city of Henderson, KY to Evansville, IN. The general study area for the project, including KYTC's most recent average daily traffic (ADT) volumes, is shown on **Exhibit 1**.

The purpose of the US 41 Traffic and Access Management Study is to improve traffic operations and safety along US 41 north of US 60 in Henderson County. This portion of US 41 carries a heavy mix of both local and regional traffic as it connects the community of Henderson with Evansville via the twin bridges over the Ohio River. It not only serves as a connection between these interdependent cities, but also provides access to numerous businesses, industries, governmental organizations, and homes. The study is needed because traffic and congestion have increased steadily over the years, and the numerous, closely spaced driveways and intersections along the roadway are contributing to the problem. This document summarizes the methodology and preliminary findings for the US 41 traffic forecasts.

TRAFFIC VOLUMES
Average annual daily traffic (AADT) volumes for US 41, Watson Lane, Elm Street, Rettig Road, Marywood Road, and Stratman Road were obtained from the KYTC CTS traffic count database and are summarized in **Table 1**.

Table 1: KYTC Traffic Counts

Route	Station ID	Begin MP	From	End MP	To	AADT	Year
US 41	051B22	16.047	US 60	16.807	Marywood Dr.	34931	2014
	051B73	16.807	Marywood Dr.	17.407	Watson Ln.	34933	2014
	051P58	17.407	Watson Ln.	21.041	Indiana State line	38415	2012
Watson Ln. (CS 1372)	051B00	0.309	Green River Rd.	1.163	N. Elm St.	6703	2012
N. Elm St. (CS 115)	051C22	2.128	Villa Dr.	2.898	Watson Ln.	6148	2013
Rettig Rd. (CS 1302)	051A20	0	US 41	0.124	N. Elm St.	1205	2014
Marywood Dr. (CS 1235)	051B10	0	US 60	0.605	US 41	1643	2013
Stratman Rd. (CR 1052)	051B52	0	Old Henderson-Evansville Rd.	0.837	US 41	275	2014

Source: KYTC CTS database

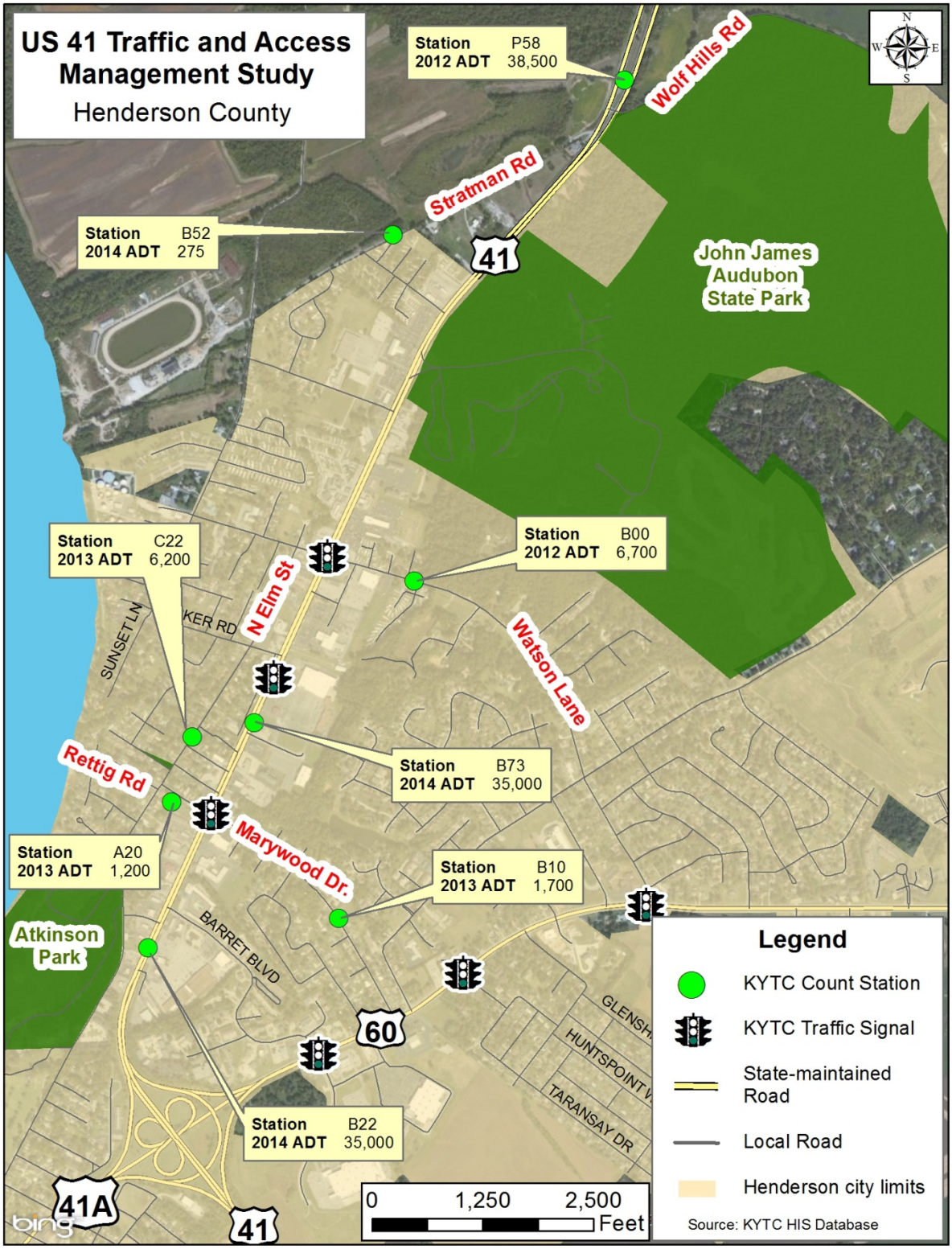


Exhibit 1: Project Area and KYTC Traffic Count Stations

POPULATION

Census population estimates and projections for Henderson and Henderson County are summarized in **Table 2** and **Exhibit 2**. Generally speaking, Henderson County's population is expected to increase slightly (0.1 percent per year) through 2030 and to decrease after 2030. Long-term projections for the City of Henderson are not available.

Table 2: Henderson, Henderson County and Statewide Population Projections

Area	Census Estimates		Annual Growth	2015	2030	Annual Growth
	2000	2010	2000 - 2010	Estimate	Projection	2015 - 2030
Kentucky	4,041,769	4,339,367	0.7%	4,509,429	4,951,178	0.6%
Henderson County	44,829	46,250	0.3%	47,017	48,122	0.1%
Henderson	27,494	28,757	0.5%	--	--	--

Source: Kentucky State Data Center

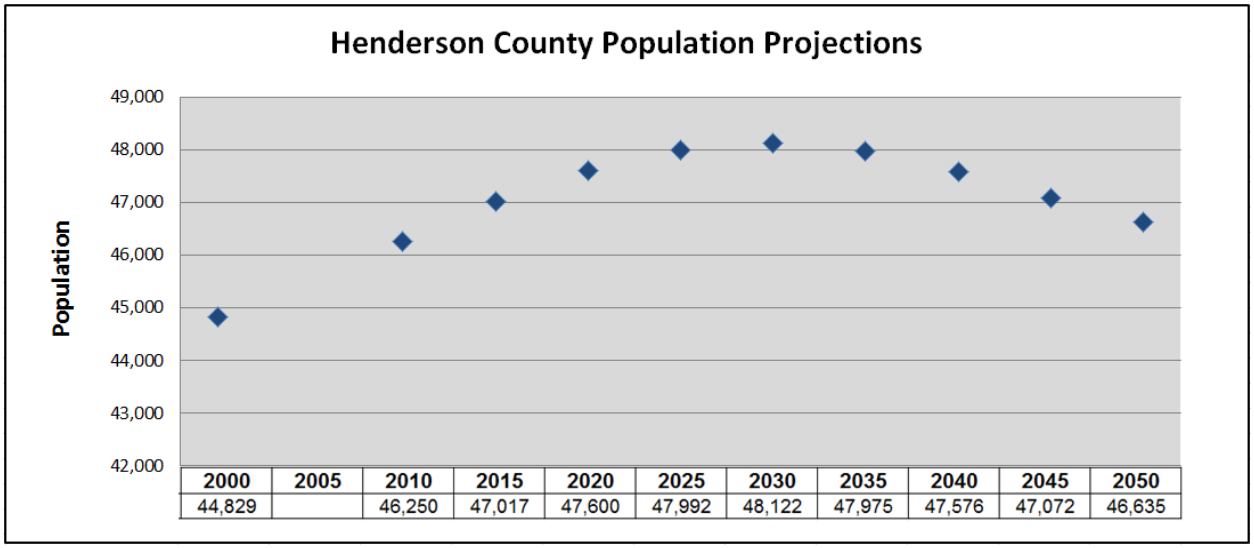
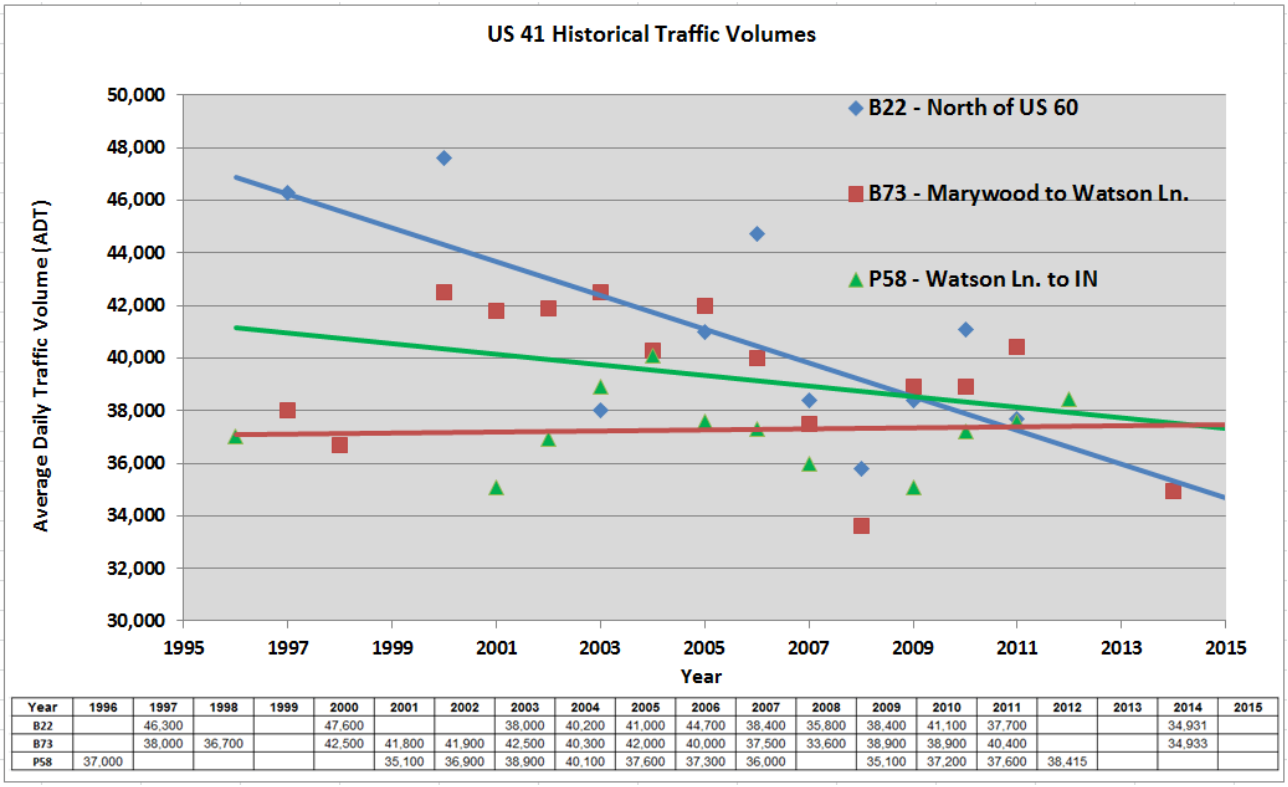


Exhibit 2: Henderson County Population Projections
Source: Kentucky State Data Center, December 2011

ESTIMATING FUTURE TRAFFIC

Estimating the future traffic volumes along US 41 included consideration of historical trends and travel demand modeling. There are three count stations located on US 41 within or near the project area. Historical daily traffic volumes for these count stations are summarized on **Exhibit 3** below.



Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
B22		46,300			47,600			38,000	40,200	41,000	44,700	38,400	35,800	38,400	41,100	37,700			34,931	
B73		38,000	36,700		42,500	41,800	41,900	42,500	40,300	42,000	40,000	37,500	33,600	38,900	38,900	40,400			34,933	
P58	37,000					35,100	36,900	38,900	40,100	37,600	37,300	36,000		35,100	37,200	37,600	38,415			

Exhibit 3: Historical Traffic Volumes on US 41
Source: KYTC CTS database

According to historic traffic counts from the KYTC, traffic along US 41 between US 60 and the Indiana state line has generally been flat or slightly declining since the mid-1990's. For comparison, the average growth rate for urban principal arterials statewide is 1.84 percent per year.

The Evansville Metropolitan Planning Organization (MPO) maintains a regional travel demand model, covering all of Henderson and Henderson County, developed using the TransCAD software. The model was updated in 2012 by the MPO with the assistance of a consultant, and has a base year of 2010. The model uses socioeconomic data, namely households and employment, to estimate current and future travel demand, and the estimated traffic is assigned to the model network based on estimated travel times. The model was used to estimate the likely growth in traffic demand along US 41. Given the recent update, no network or socioeconomic data modifications were required.

The primary need to be addressed through the use of the Evansville regional demand model related to the future of the I-69 corridor. Once fully implemented, I-69 will stretch from Mexico to Canada, comprising 32 unique Sections of Independent Utility (SIU), each with logical termini. The connection between Henderson and I-64 north of Evansville is referred to as SIU 4. SIU 3, from north of Evansville to Indianapolis, is partially open to traffic with the remaining pieces under construction or final environmental study. SIU 5 in Kentucky, from Henderson to I-24 west of Eddyville, is being advanced through upgrades to the Breathitt and Western Kentucky Parkways to bring both up to interstate standards.

Environmental studies for SIU 4 were initiated in 2001, and a preferred alternative was identified in the Draft Environmental Impact Statement (DEIS) in 2004. The preferred alternative included construction of a new interstate facility east of Henderson with a new Ohio River bridge east of the existing US 41 bridges connecting to I-164 in Evansville. I-164 would have been signed as I-69 between the new construction and the I-64 interchange to the north. However, funding for the project was not identified and a Final Environmental Impact Statement (FEIS) was never published. A feasibility study was completed in 2014 by the KYTC to explore other options to connect I-69 SIU 3 to SIU 5, but no recommendations were provided. Thus, the future of SIU 4 is currently unknown even though I-69 is under development or already serving traffic north and south.

The Evansville MPO provided model output to assist in developing the traffic forecast volumes. A summary of the output (in vehicles per day) is provided in **Table 3**. Values included in Table 3 include the latest KYTC counts, the 2010 base year assignment from the MPO model, the 2030 No-Build assigned volume (including the MPO's Existing plus Committed network but assuming no new I-69 corridor between Henderson and Evansville), and the 2030 Build with I-69 constructed in the DEIS corridor.

Table 3: 2010 and 2030 Evansville MPO Regional Travel Demand Model Output

Route	Location	Latest KYTC Count (VPD)	2010 Base Model Assignment	Daily Total Volume from No Build Model	Growth Percentage* No Build	Daily Total Volume from I-69 Model	Growth Percentage* with I-69	Difference between No Build and I-69 (VPD)
US 41	Near US 60	34,930	34,600	41,900	21%	36,300	5%	5,600
	Near Marywood	34,935	29,900	35,900	20%	32,700	9%	3,200
	Near Watson	34,935	30,500	40,000	31%	30,700	1%	9,300
	Near Stratman	38,415	28,500	36,000	26%	31,000	9%	5,000
	After Wolf Hills	38,415	30,000	40,000	33%	34,100	14%	5,900
Route	**Location**	**Latest KYTC Count (VPD)**	**2010 Base Model Assignment**	**Daily Total Volume from No Build Model**	**Growth Percentage* No Build**	**Daily Total Volume from I-69 Model**	**Growth Percentage* with I-69**	**Difference between No Build and I-69 (VPD)**
Watson Lane	East of US 60	8,000	9,500	10,800	14%	8,200	-14%	2,600
	West of US 60	4,000	5,300	6,800	28%	5,800	9%	1,000

*Note: The "growth percentage" compares the 2030 future year assignment volumes to the 2010 base year assignment.

Generally speaking, the 2010 base year assignments are lower than the latest counts provided by KYTC. Therefore, rather than comparing the future year assignments to the latest counts, the future year assignments were compared to the 2010 base year assigned volumes. The results suggest about a 25 percent increase in daily traffic from 2010 to 2030 for the No-Build scenario (about 1.1 percent per year growth) and about 5 percent growth for the I-69 Build scenario (about 0.2 percent per year). In both cases, the demand model predicts higher growth in traffic demand than has been experienced in the US 41 corridor over the past 20 years.

Based on the model output and investigation of historic traffic volume trends, a one percent annual growth was assumed along US 41 for the 2030 No-Build (Existing plus Committed network without a new I-69 bridge). This growth comes from the construction of I-69 north and south of Henderson which currently funnels traffic through the US 41 study area. With I-69 SIU 4 constructed in the

recommended DEIS corridor, the 2030 traffic volumes would essentially remain unchanged from the existing volumes. A summary of the current and future year ADT's is shown in **Table 4**.

Table 4: US 41 Traffic Forecast Summary

Route	Segment	Begin MP	End MP	Existing (2015) ADT	Design Year (2030) ADT No-Build (No I-69)	Design Year (2030) ADT with I-69
US 41	US 60 to Barret Blvd.	16.386	16.545	34,100	39,600	34,100
	Barret Blvd. to Marywood Dr.	16.545	16.807	35,900	41,700	35,900
	Marywood Dr. to Audubon Village	16.807	17.325	36,000	41,800	36,000
	Audubon Village to Watson Ln.	17.325	17.407	34,900	40,600	34,900
	Watson Ln. to Audubon S.P. Entrance	17.407	17.823	40,300	46,900	40,300
	Audubon State Park Entrance to Stratman Rd.	17.823	18.471	40,200	43,400	40,200
	North of Stratman Rd.	18.471	20.483	40,200	43,400	40,200

K FACTOR

From 2014 daily traffic counts collected along US 41, the observed average design hour factor (K Factor) for US 41 was 0.079 (7.9 percent) in the project area. Based on those 2014 counts, the design hour K factors are estimated using the following formula:

$$\text{US 41 K Factor}_{\text{Design}} = 1.069 * (\text{High Hour Count})/(\text{Total Daily Count}) = 1.069 * 0.079 = \mathbf{0.085}$$

TURNING MOVEMENTS AND PEAK HOUR FACTOR (PHF)

Intersection turning movement counts were collected at the US 41 intersections with the following roads, also shown in **Exhibit 3**:

1. Barrett Boulevard
2. Marywood Drive/Rettig Road (existing traffic signal)
3. Robin Road
4. Audubon Village (existing traffic signal)
5. Watson Lane (existing traffic signal)
6. John James Audubon State Park entrance

The average peak hour factor (PHF) was 0.86 for the A.M. peak and 0.95 for the P.M. peak.

Growth rates will be applied to the existing daily traffic counts and design hour turning movements to develop design year (2030) traffic forecasts. The existing (2015) and proposed 2030 design hour turning movements are attached.

TRUCK PERCENTAGES

Year 2014 vehicle classification data were collected at count stations B22 and B73 on US 41. From these count data, 7.7 percent of the total daily traffic consists of heavy trucks and 3.1 percent consists of medium (i.e. single-unit). For design purposes, 8 percent heavy trucks and 3 percent medium trucks is suggested. Based on the functional classification for US 41, a truck growth rate of 1.0 percent per year is assumed.

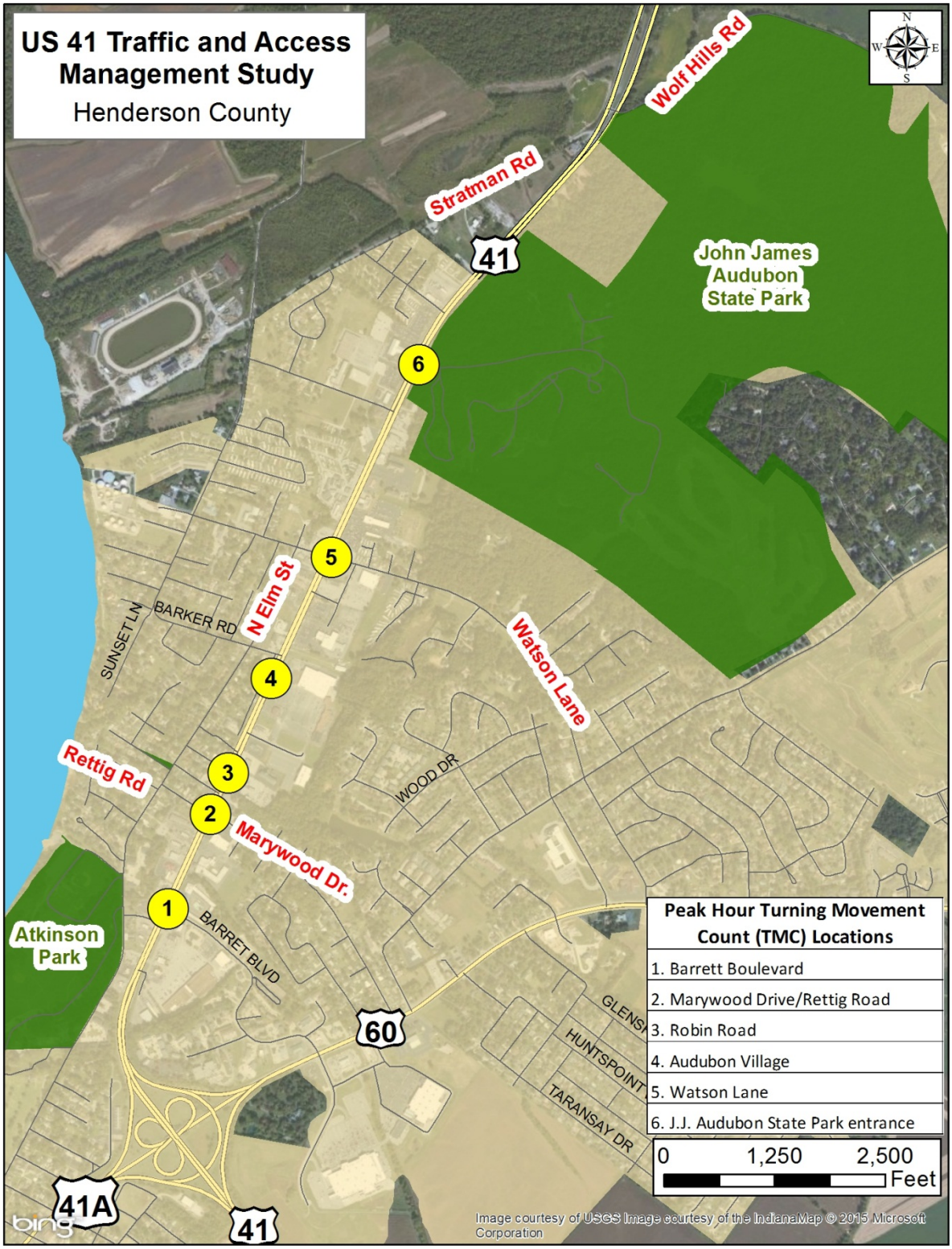
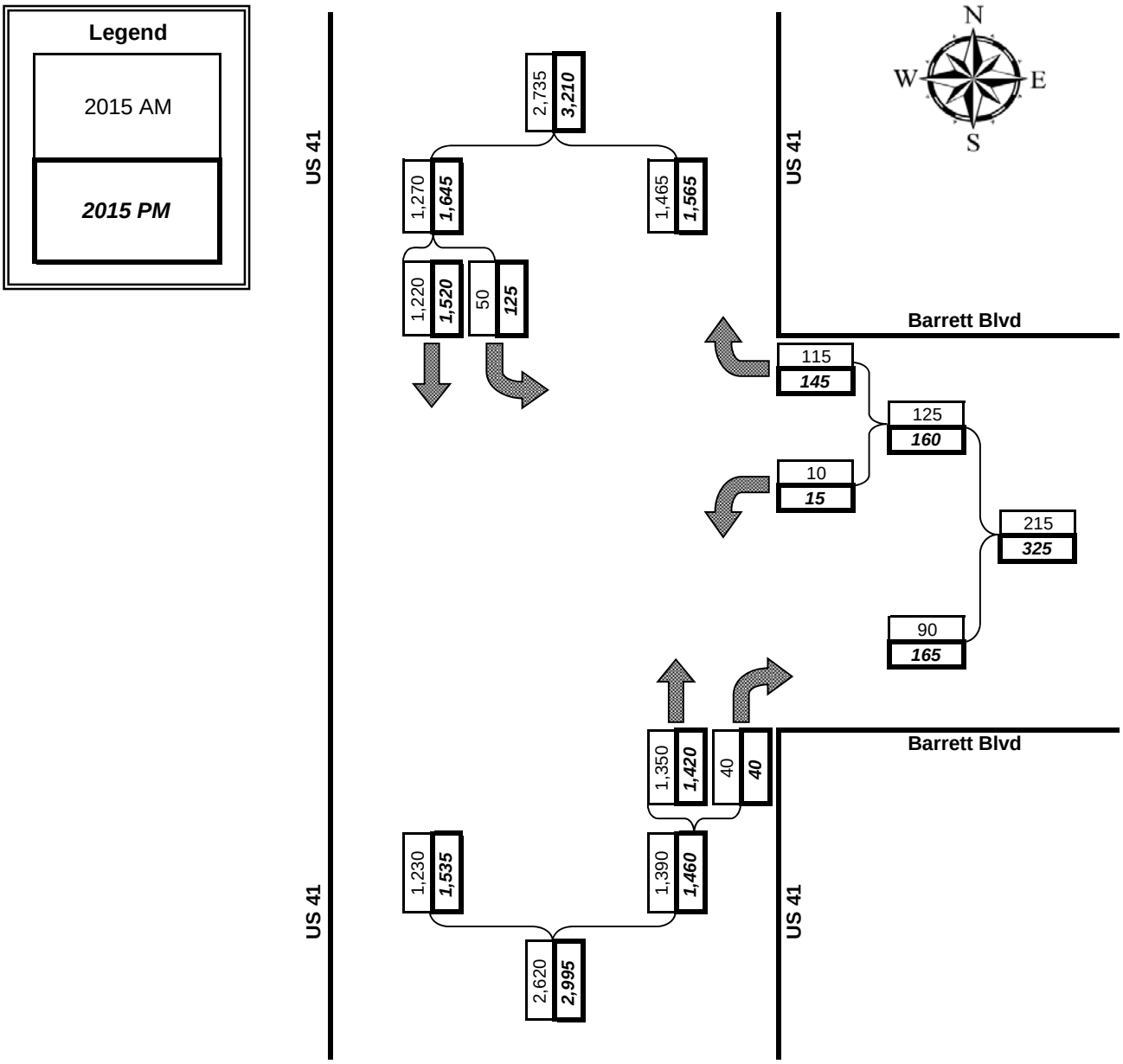


Exhibit 3: Peak Hour Turning Movement Locations

Existing (2015) and Future (2030) Turning Movements

Henderson County
US 41 Traffic & Access Study

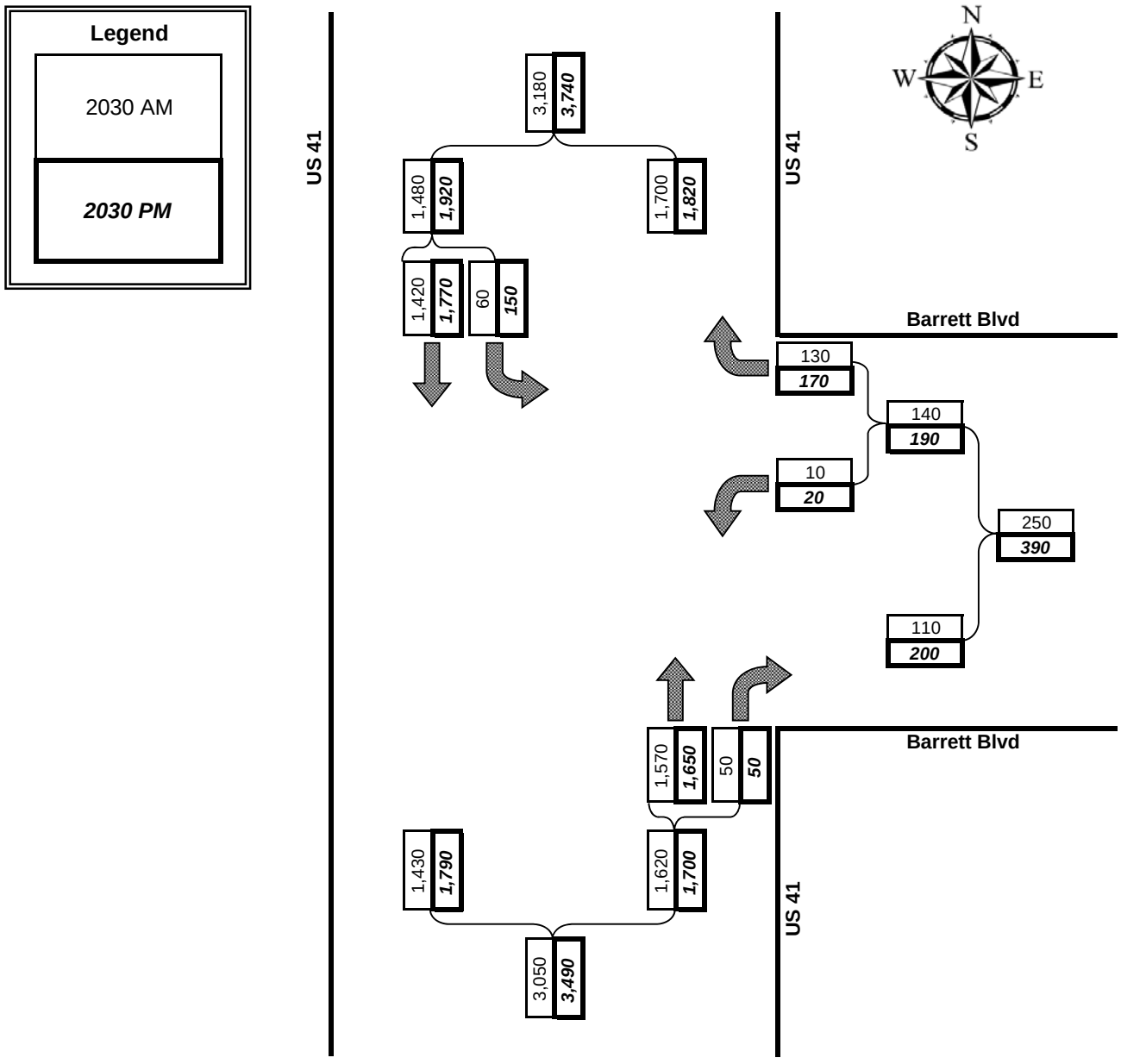
T1: US 41 at Barrett Blvd



PERIOD: Existing (2015) Peak Hour Volumes	**AM PEAK HOUR: 8:00 AM to 9:00 AM**
PREPARED BY: B. Aldridge	**AM PHF: 0.89**
DATE PREPARED: 3/24/2015	**PM PEAK HOUR: 5:00 PM to 6:00 PM**
	PM PHF: 0.95

Henderson County
US 41 Traffic & Access Study

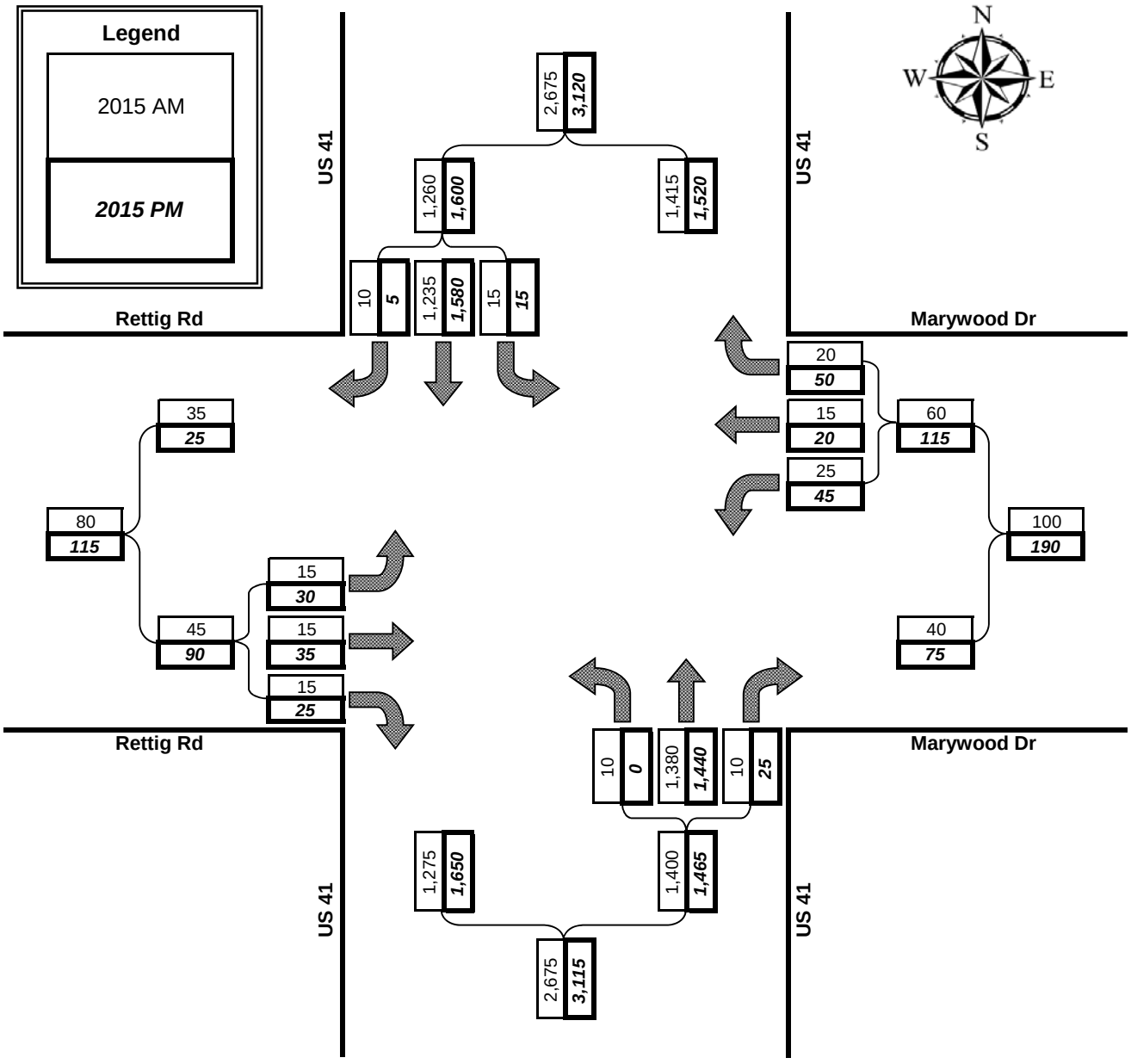
T1: US 41 at Barrett Blvd



PERIOD: 2030 Design Hour Volumes (DHV's)	
PREPARED BY: B. Aldridge	
DATE PREPARED: 7/15/2015	

Henderson County
US 41 Traffic & Access Study

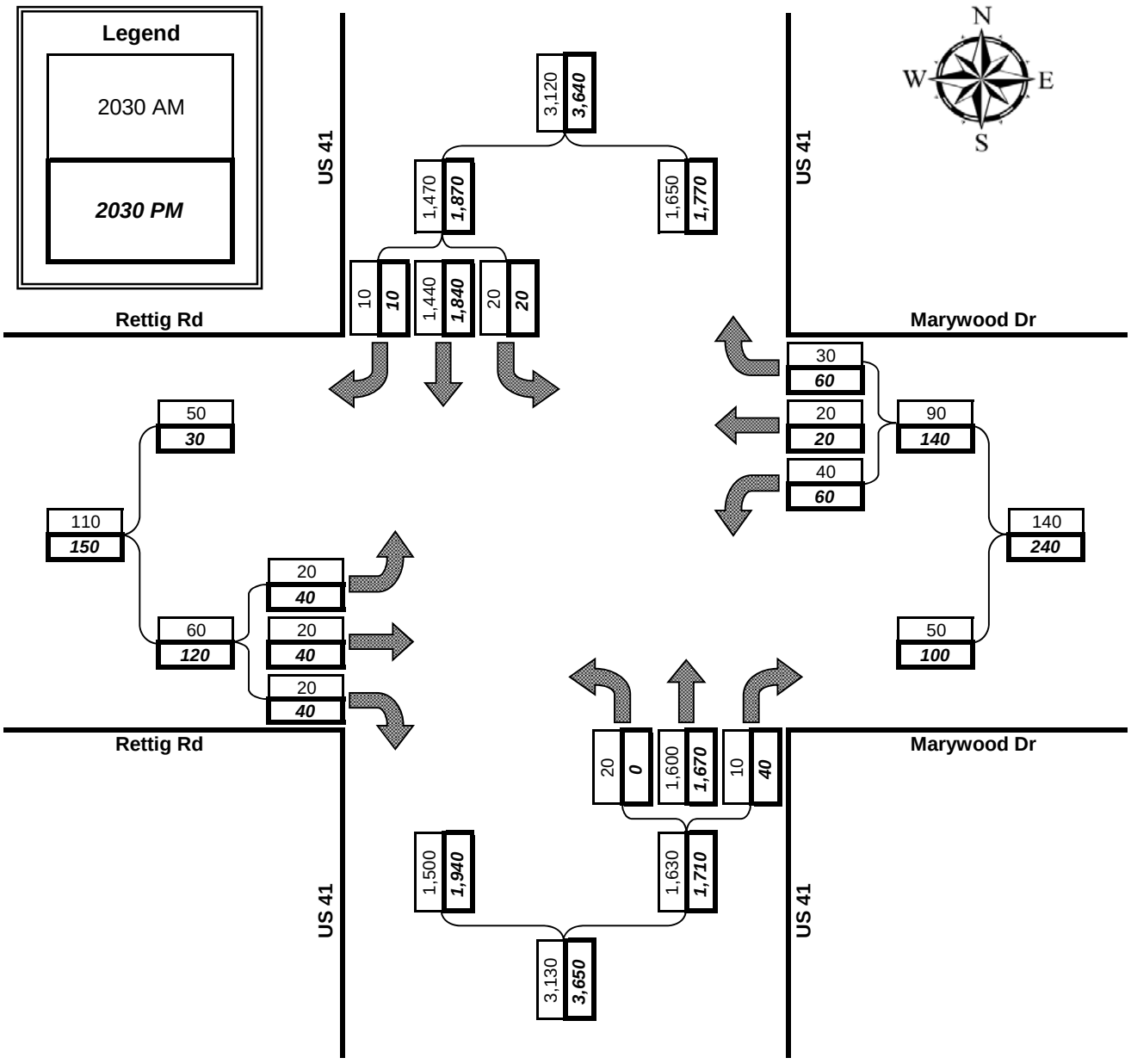
T2: US 41 at Rettig/Marywood



PERIOD: Existing (2015) Peak Hour Volumes	**AM PEAK HOUR: 8:00 AM to 9:00 AM**
PREPARED BY: B. Aldridge	**AM PHF: 0.86**
DATE PREPARED: 4/1/2015	**PM PEAK HOUR: 5:00 PM to 6:00 PM**
	PM PHF: 0.95

Henderson County
US 41 Traffic & Access Study

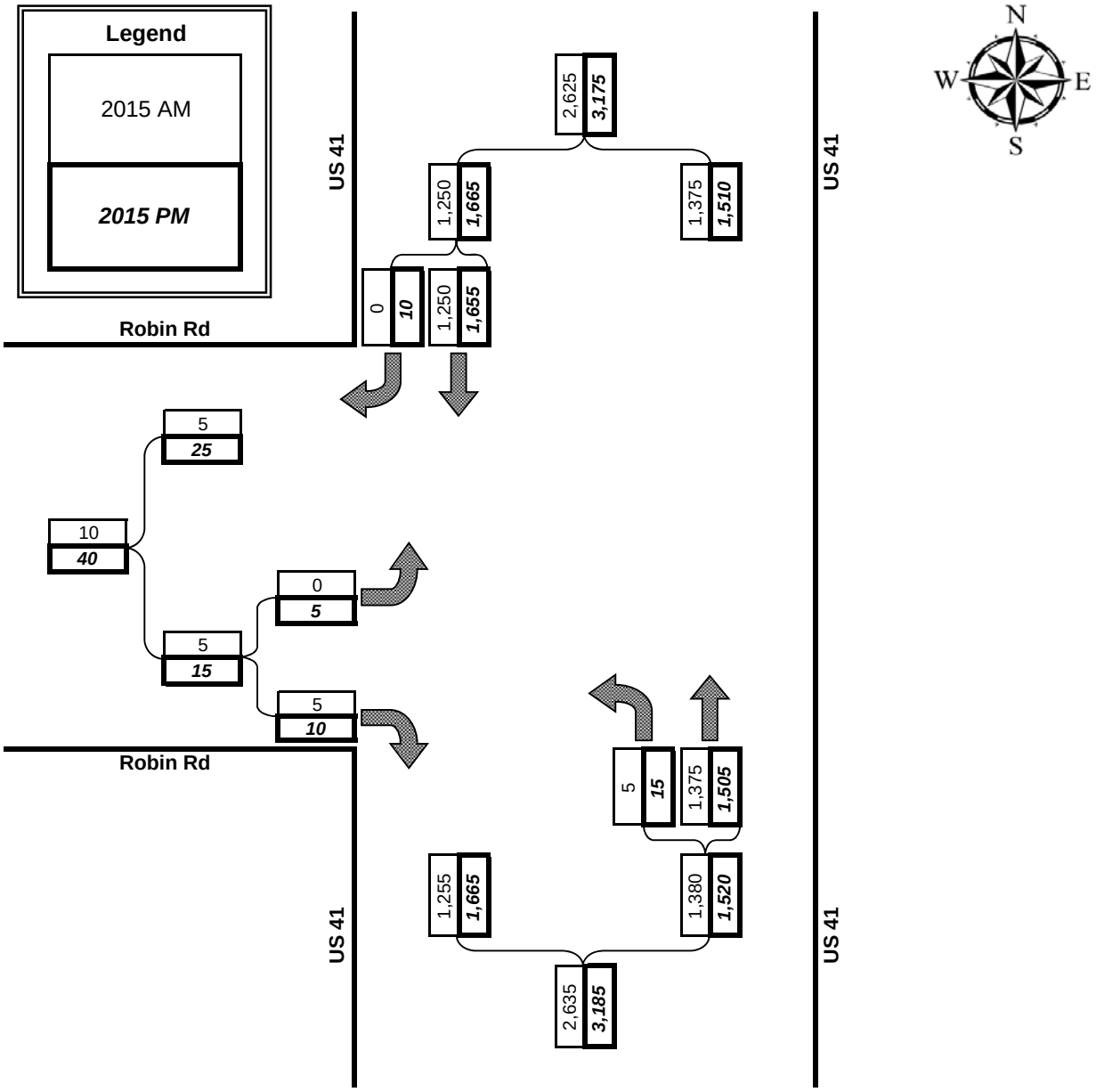
T2: US 41 at Rettig/Marywood



PERIOD: 2030 Design Hour Volumes (DHV's) **PREPARED BY: B. Aldridge** **DATE PREPARED: 7/15/2015**	

Henderson County
US 41 Traffic & Access Study

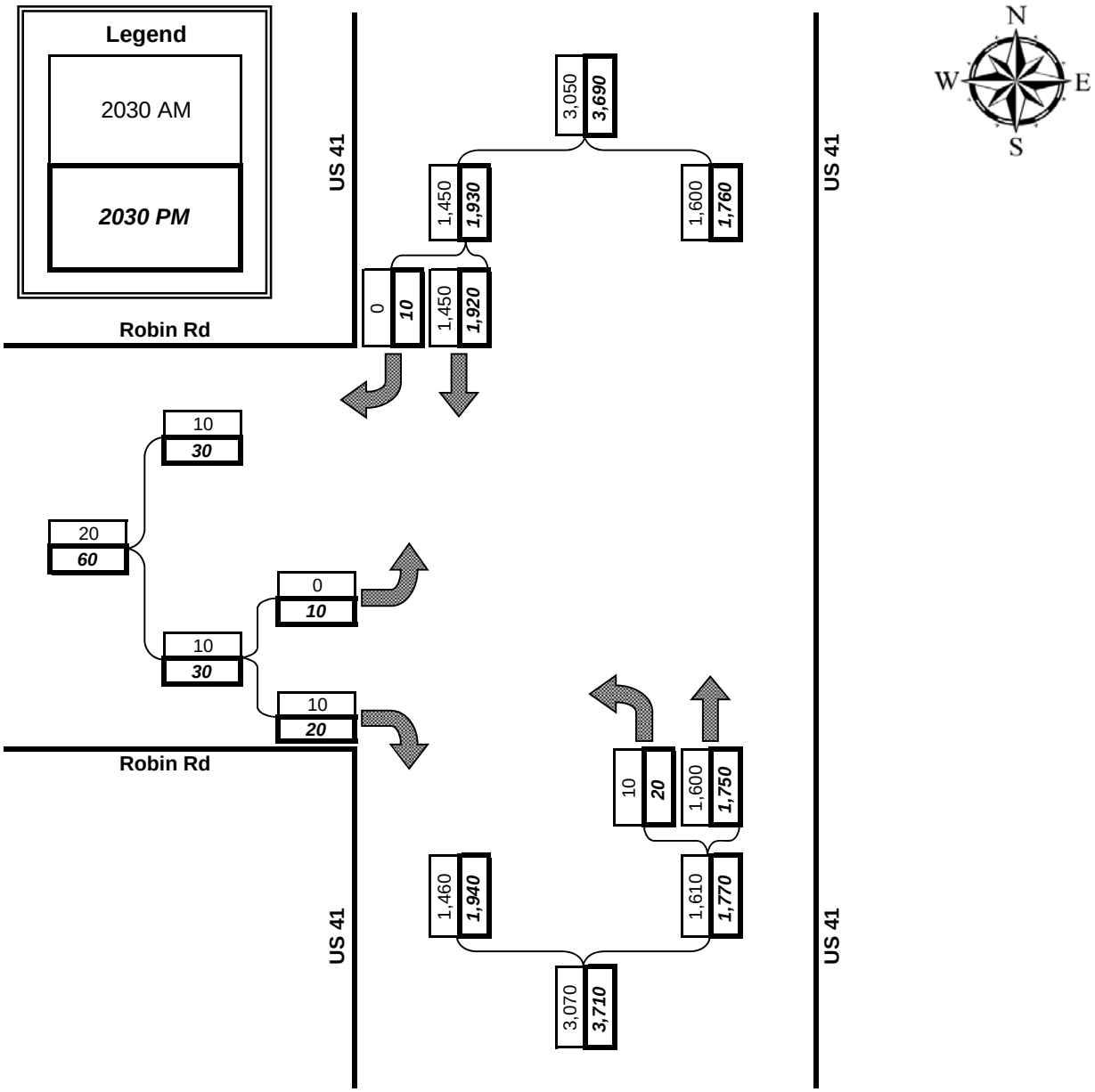
T3: US 41 at Robin Rd



PERIOD: Existing (2015) Peak Hour Volumes	**AM PEAK HOUR: 8:00 AM to 9:00 AM**
PREPARED BY: B. Aldridge	**AM PHF: 0.86**
DATE PREPARED: 4/1/2015	**PM PEAK HOUR: 5:00 PM to 6:00 PM**
	PM PHF: 0.93

Henderson County
US 41 Traffic & Access Study

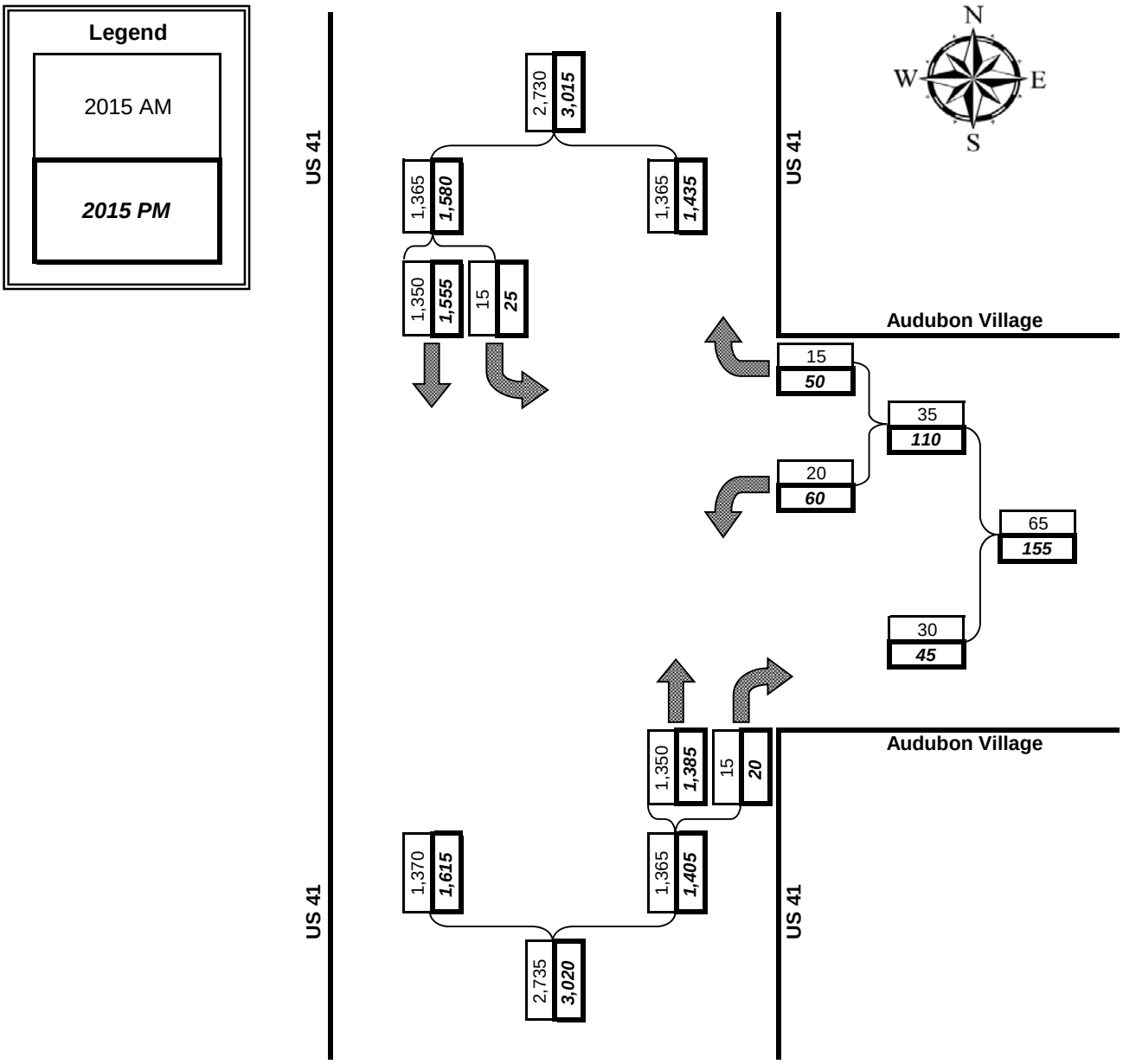
T3: US 41 at Robin Rd



PERIOD: 2030 Design Hour Volumes (DHV's)	
PREPARED BY: B. Aldridge	
DATE PREPARED: 7/15/2015	

Henderson County
US 41 Traffic & Access Study

T4: US 41 at Audubon Village



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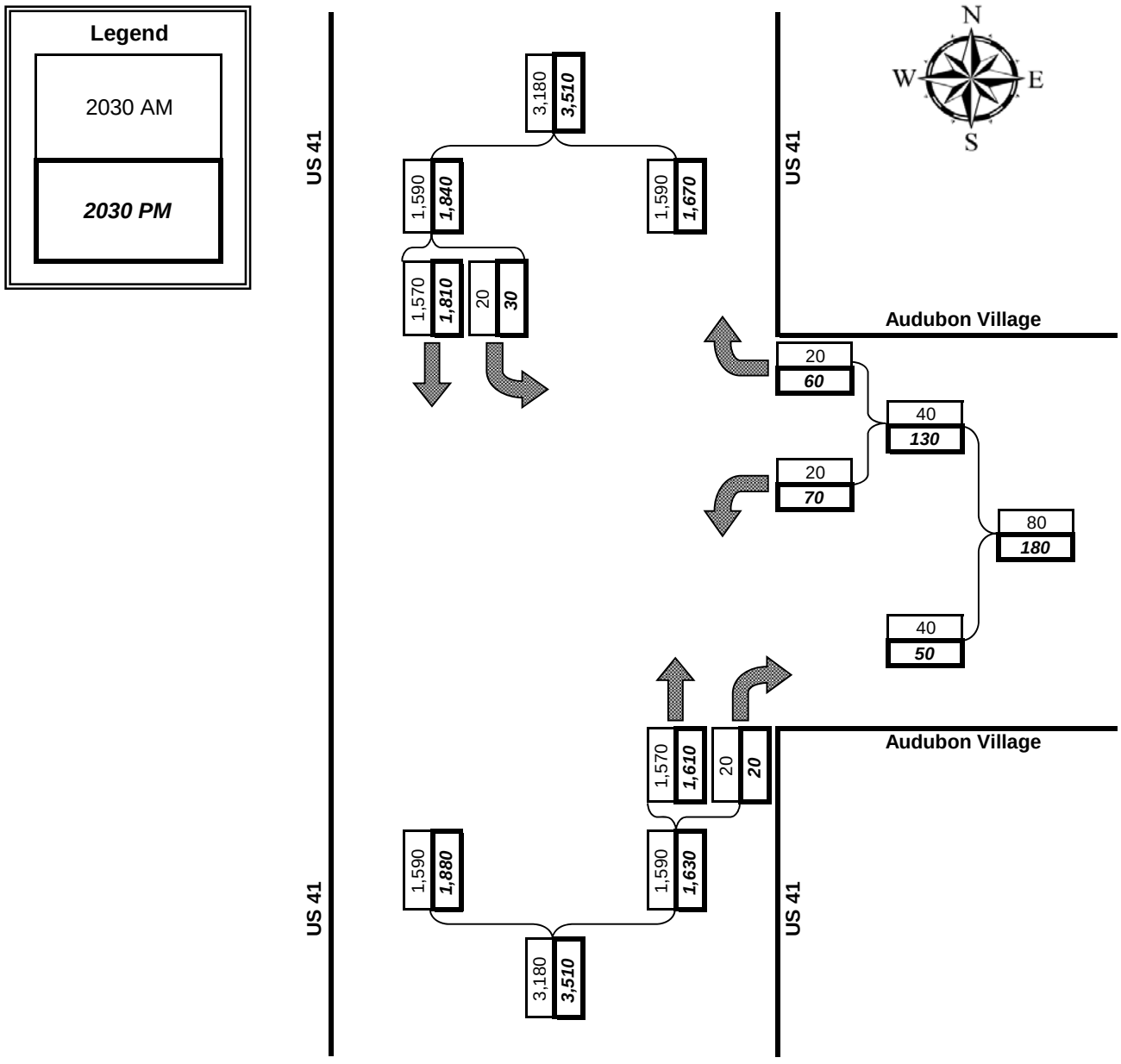
PREPARED BY: B. Aldridge	**AM PHF: 0.81**
DATE PREPARED: 4/1/2015	**PM PEAK HOUR: 4:30 PM to 5:30 PM**
	PM PHF: 0.93

Henderson County
US 41 Traffic & Access Study

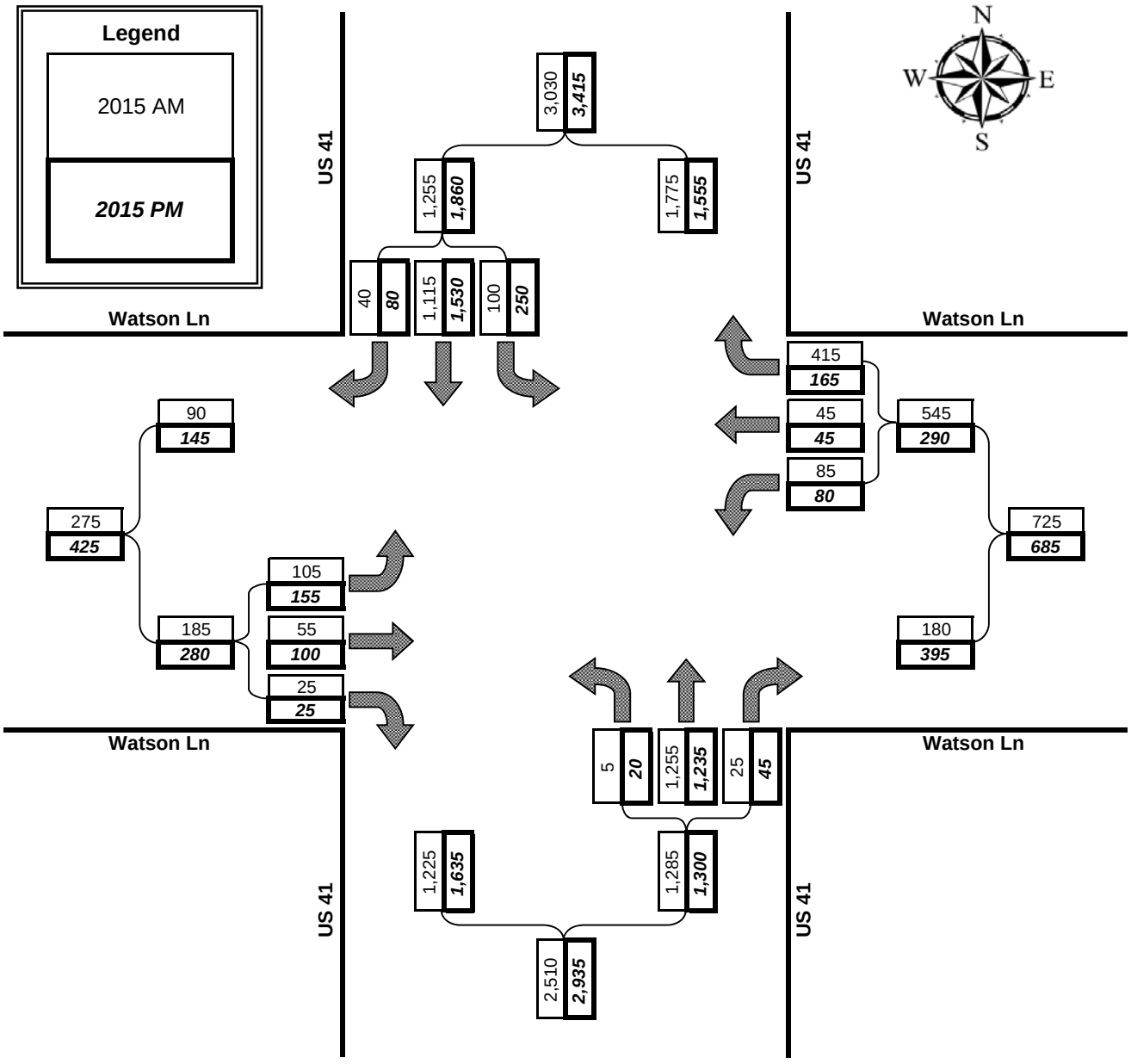
T4: US 41 at Audubon Village



PERIOD: 2030 Design Hour Volumes (DHV's)	
PREPARED BY: B. Aldridge	
DATE PREPARED: 7/15/2015	

Henderson County
US 41 Traffic & Access Study

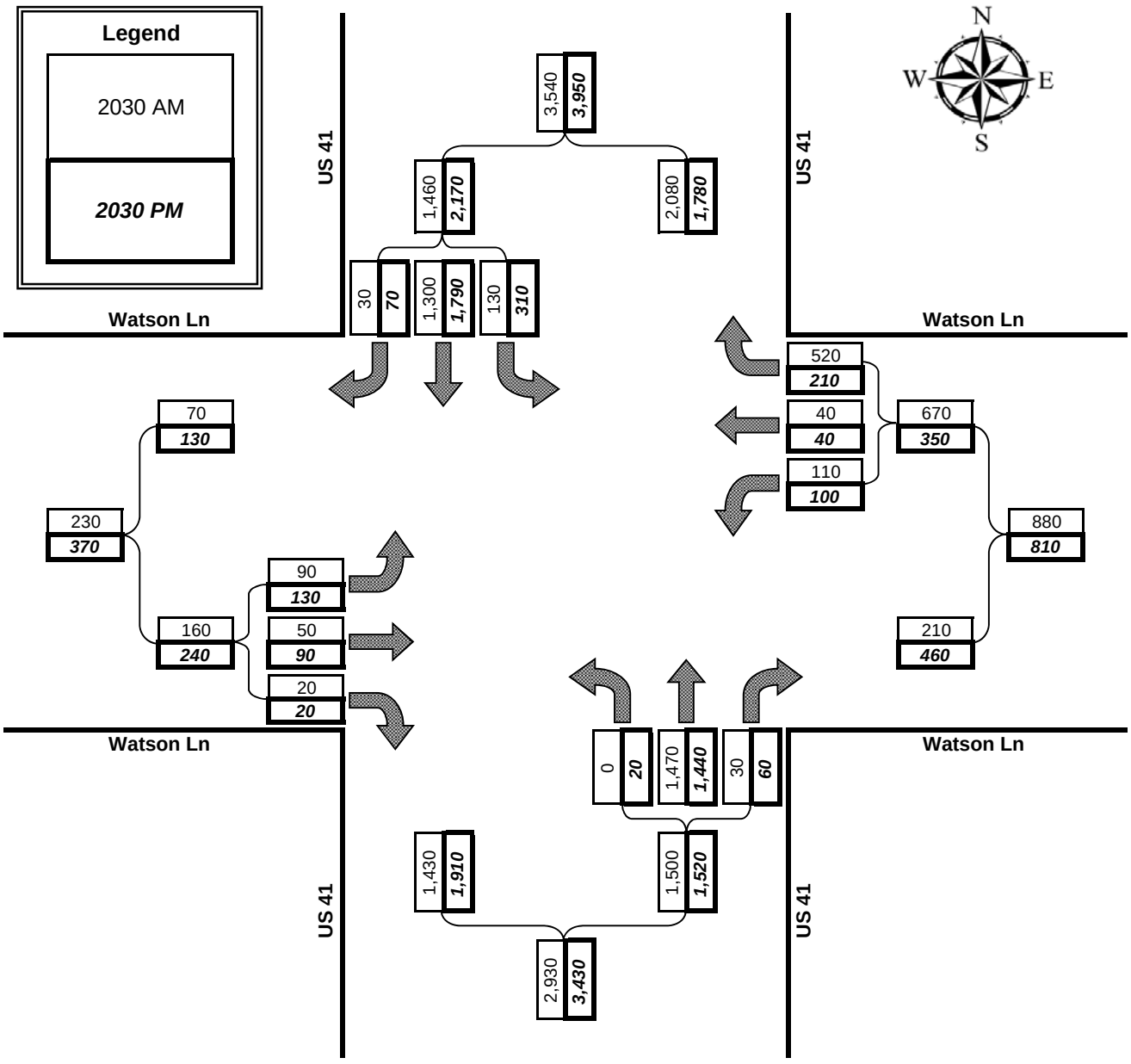
T5: US 41 at Watson Lane



PERIOD: Existing (2015) Peak Hour Volumes	**AM PEAK HOUR: 8:00 AM to 9:00 AM**
PREPARED BY: B. Aldridge	**AM PHF: 0.90**
DATE PREPARED: 7/15/2015	**PM PEAK HOUR: 5:00 PM to 6:00 PM**
	PM PHF: 0.96

Henderson County
US 41 Traffic & Access Study

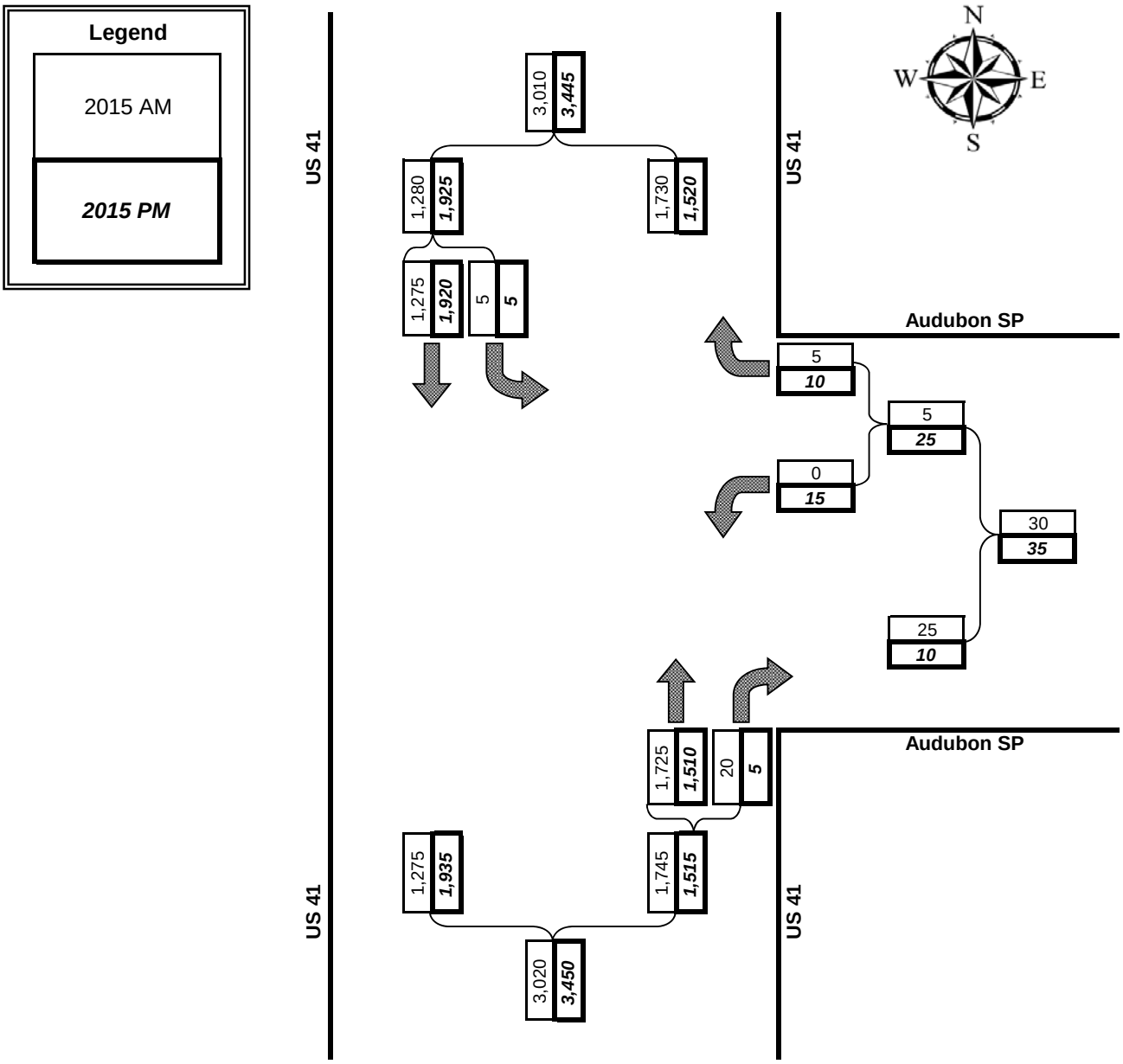
T5: US 41 at Watson Lane



PERIOD: 2030 Design Hour Volumes (DHV's) **PREPARED BY: B. Aldridge** **DATE PREPARED: 7/15/2015**	

Henderson County
US 41 Traffic & Access Study

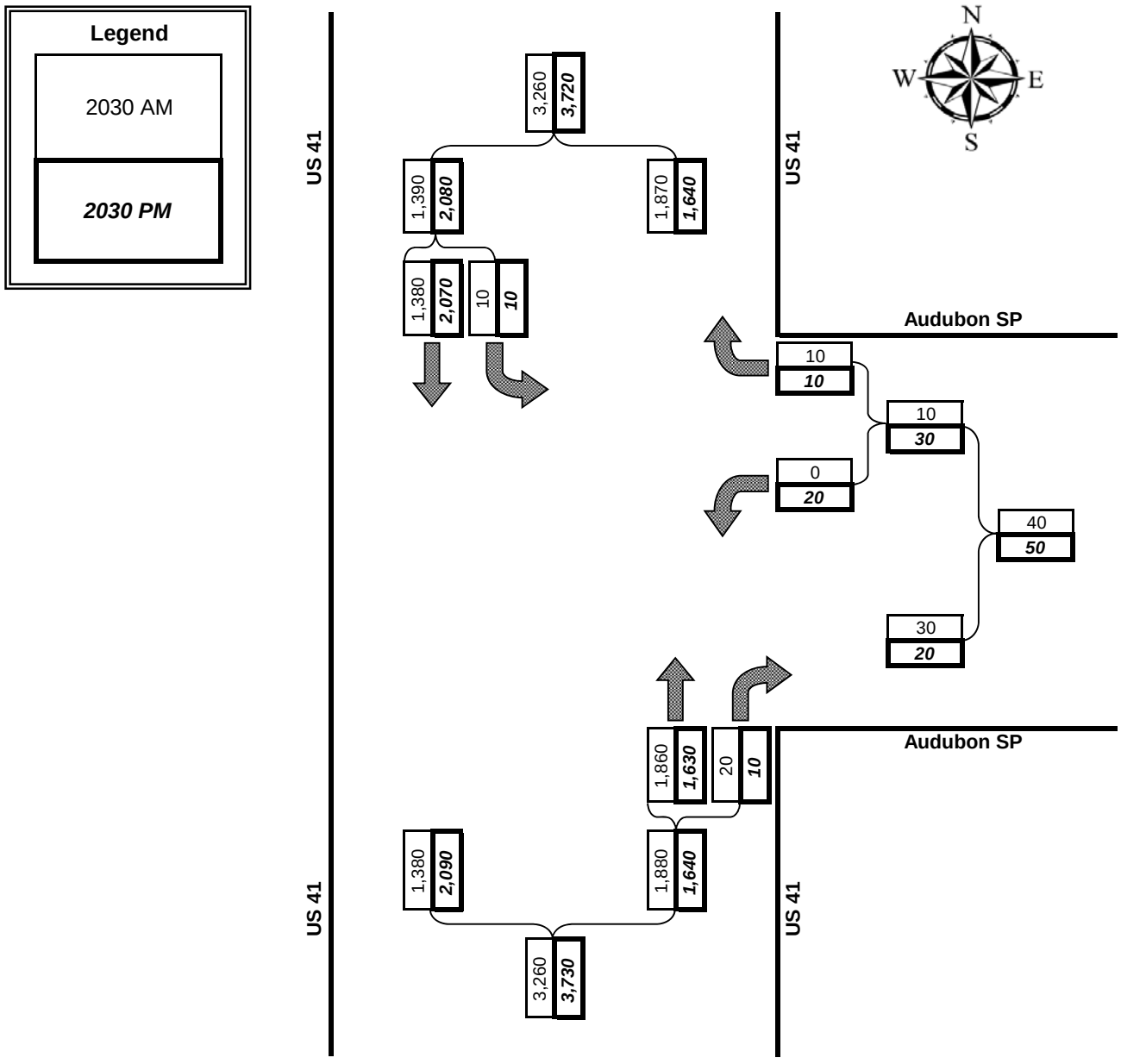
T6: US 41 at Audubon S.P.



PERIOD: Existing (2015) Peak Hour Volumes	**AM PEAK HOUR: 8:00 AM to 9:00 AM**
PREPARED BY: B. Aldridge	**AM PHF: 0.86**
DATE PREPARED: 4/1/2015	**PM PEAK HOUR: 5:00 PM to 6:00 PM**
	PM PHF: 0.95

Henderson County
US 41 Traffic & Access Study

T6: US 41 at Audubon S.P.



PERIOD: 2030 Design Hour Volumes (DHV's)	
PREPARED BY: B. Aldridge	
DATE PREPARED: 7/15/2015	