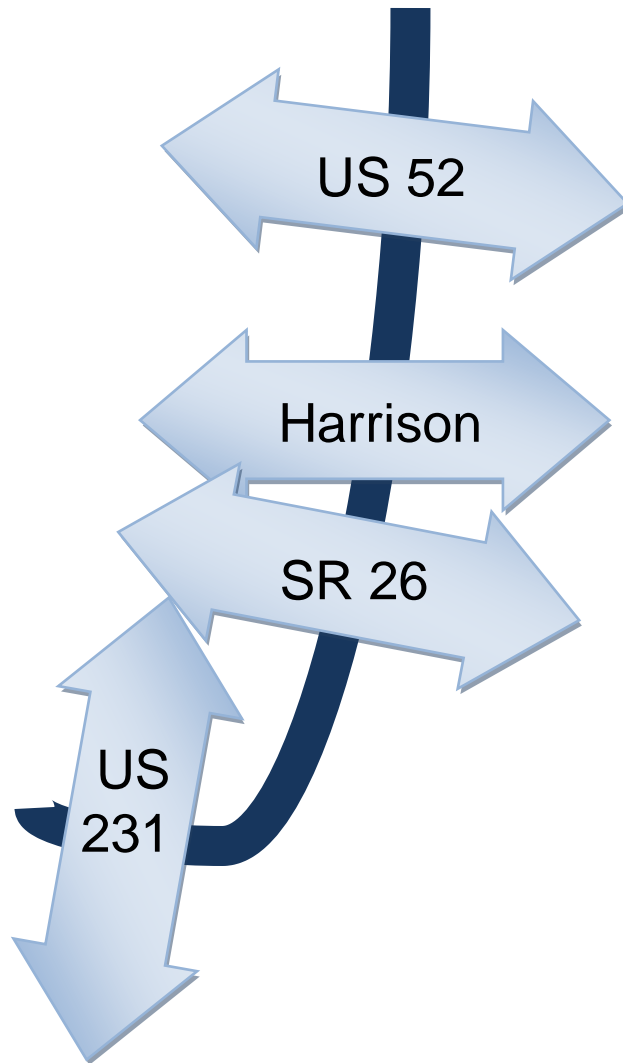


Vehicle Occupancy Survey

September 2010



Area Plan Commission of Tippecanoe County

Vehicle Occupancy Survey US 52 – Harrison – SR 26 – US 231

September 2010

Introduction

On April 20, 2010, staff from the Area Plan Commission of Tippecanoe County conducted a vehicle occupancy survey at the four Wabash River bridges in Greater Lafayette/West Lafayette. The purpose of the survey is to monitoring travel behavior at the SR 26 Bridges, the Harrison Bridge, the US 52 Bridges, and the US 231 Bridges.

This report includes 1) details of the occupancy survey process and its limitations, 2) a summary of the findings of the survey, 3) a historical comparison to previous surveys and 4) the tabulated vehicle occupancy data.

Process

The survey was conducted during the morning peak work related travel period (6:45 a.m. to 8:30 a.m.). Two staff members were assigned to each bridge and recorded the number and type of vehicles crossing and their occupancy. Data was recorded on a simple paper form. In addition to noting the type of vehicle (auto/van/small truck, motorcycle, bus/large truck) pedestrians and bicyclists were also counted.

Data Limitations and Procedural Changes

Ramp Data for Harrison Bridge: Observers at the Harrison Bridge were unable to count vehicles entering and exiting the westbound ramps or eastbound on-ramp. There were no safe locations on or near the Harrison Bridge for observers to view both vehicles and occupancy.

Weather: Overcast conditions made it difficult to observe occupancy during the first fifteen minutes of the survey.

Window Tinting: Newer minivans and SUVs often featured rear side windows that are tinted. This made it extremely difficult to count occupants in the rear seats.

Day-light Savings Time: All of the previous surveys were conducted in late September or October. With the sun rising later due to day-light savings time, there are now only a few days in April with enough light to observe occupancy in vehicles and conduct the survey.

2010 Findings

During the survey period, staff counted 11,172 cars, vans and pick-ups crossing the Wabash River. Those vehicles carried 12,291 persons, which is an average of 1.10 persons per vehicle. For every ten cars that crossed over the Wabash River, only one vehicle had two or more occupants (Table 1).

US 52 Bridges – 3,244 vehicles carried 3,662 occupants over the US 52 Bridges, an average occupancy rate of 1.13 persons per vehicle (Table 2).

Harrison Bridge – The lowest traffic volume was observed on the Harrison Bridge, with 1,794 vehicles carrying 1,973 occupants, an average rate of 1.10 persons per vehicle (Table 2).

SR 26 Bridges – 2,857 vehicles carried 3,096 occupants over the SR 26 Bridges, an average occupancy rate of 1.08 persons per vehicle (Table 2).

US 231 Bridge – The heaviest traffic was observed on US 231. Staff counted 3,277 vehicles with 3,560 occupants, an average occupancy rate of 1.09 persons per vehicle (Table 2).

The lowest occupancy rates were observed from 6:45 to 7:30. The fewest persons per vehicle were: northbound on the US 231 Bridge (1.02 persons per vehicle), westbound on the US 52 bridge and eastbound on the SR 26 bridge (1.03 persons per vehicle). As the morning progressed, the number of occupants per vehicle increased. The highest occupancy rates were on the southbound US 231 bridge (1.19 persons per vehicle), and on the westbound US 52 bridge (1.18 persons per vehicle). The highest occupancy vehicles (3 or more persons) used US 231 in both directions and westbound Harrison. Tables 10 and 11 shows detailed occupancy information.

The occupancy survey also provided some additional insight about morning travel behavior. Nearly two thirds of all the cars, vans and pick-ups traveled to West Lafayette (Table 3). The bridge with the highest percentage of vehicles traveling into West Lafayette was US 231 (76%), followed by the Harrison Bridge (68%), the SR 26 bridges (63%), and the US 52 bridges (50%).

The 15-minute period with the most vehicles occurred from 7:45 to 8:00. Motorists traveling northbound on US 231 experienced the heaviest traffic, 485 vehicles, during that peak period.

Historic Comparison

This is the sixth survey to be conducted in the 30 years. A 1980 survey focused only on the Harrison and SR 26 Bridges, and the 1990 and 1999 surveys incorporated the US 52 Bridges but still precluded a survey for the yet-to-be-built US 231 bridge. 2001 and 2003 surveys, which included the newly opened US 231 Bridge, provide the best comparative data for the April 2010 survey.

The average number of persons per vehicle has steadily declined since 1980 and the 2010 survey shows that trend continuing. In 1980, on the two bridges surveyed, staff observed an average of 1.24 persons per vehicle. In the slightly more comparative survey in 1990, the average dropped significantly to 1.14. In 1999 the average declined slightly to 1.13 persons per vehicle and the 2001 occupancy rate remained the same. The two most recent studies show a further downward trend to 1.11 persons per vehicle in 2003 and an even lower rate of 1.10 persons per vehicle in 2010.

Historically, the number of vehicles traveling on local and state streets increases by an annual rate of 1 to 2% a year. The 2003 and 2010 surveys indicate a different trend. 19 fewer vehicles were counted in 2003 compared to 2001, and two hundred fewer in 2010 than 2003.

Very little has changed over the past three decades regarding the morning peak 15 minutes. In all six surveys, the peak was observed from 7:45 to 8:00 am.

Conclusion

The 30 year trend is clear; occupancy has declined in each of the six surveys. The decline was most dramatic in the decade on the 1980s, with much less decline in the following 20 years. However, both the US 52 and US 231 bridges experienced a slight increase in occupancy from 2003 to 2010.

Table 1

Overall Vehicle Occupancy (2010)		
Vehicle Counts	Occupancy Count	Persons Per Vehicle
11,172	12,291	1.10

Table 2

Bidirectional Occupancy and Counts (2010)			
Location	Vehicle Count	Occupancy	Persons Per Vehicle
US 52	3,244	3,662	1.13
Harrison	1,794	1,973	1.10
SR 26	2,857	3,096	1.08
US 231	3,277	3,560	1.09

Table 3

Overall Directional Occupancy and Counts (2010)			
Location	Vehicle Count	Occupancy	Persons Per Vehicle
East & South	4,041	4,470	1.11
West & North	7,131	7,821	1.10

Table 4

Directional Occupancy and Counts (2010)			
Location	Vehicle Count	Occupancy	Persons Per Vehicle
EB US 52	1,637	1,855	1.13
WB US 52	1,607	1,807	1.12
EB Harrison	578	635	1.10
WB Harrison	1,216	1,338	1.10
EB SR 26	1,055	1,115	1.06
WB SR 26	1,802	1,981	1.10
NB US 231	2,506	2,695	1.08
SB US 231	771	865	1.12

Table 5

Historical Comparison – Number of Vehicles						
Location	1980	1990	1999	2001	2003	2010
<i>Harrison Bridge</i>						
Eastbound	1,083	1,560	969	904	798	578
Westbound	<u>1,679</u>	<u>2,106</u>	<u>1,982</u>	<u>1,712</u>	<u>1,407</u>	<u>1,216</u>
Total	2,762	3,666	2,951	2,616	2,205	1,794
<i>SR 26 Bridge(s)</i>						
Eastbound	708	730	696	1,007	1,176	1,055
Westbound	<u>1,715</u>	<u>1,809</u>	<u>1,663</u>	<u>1,843</u>	<u>1,883</u>	<u>1,802</u>
Total	2,423	2,539	2,359	2,850	3,059	2,857
<i>US 52 Bridge</i>						
Eastbound		1,256	1,562	1,763	1,630	1,637
Westbound		<u>1,443</u>	<u>1,677</u>	<u>1,759</u>	<u>1,637</u>	<u>1,607</u>
Total		2,699	3,239	3,519	3,267	3,244
<i>US 231 Bridge</i>						
Northbound				1,801	2,115	2,506
Southbound				<u>586</u>	<u>707</u>	<u>771</u>
Total				2,387	2,822	3,277
Total	5,185	8,904	8,549	11,372	11,353	11,172

Table 6

Historical Comparison – Occupancy Rate						
Location	1980	1990	1999	2001	2003	2010
<i>Harrison Bridge</i>						
Eastbound	1.22	1.13	1.15	1.13	1.18	1.10
Westbound	<u>1.24</u>	<u>1.12</u>	<u>1.11</u>	<u>1.10</u>	<u>1.10</u>	<u>1.10</u>
Overall	1.23	1.12	1.13	1.11	1.13	1.10
<i>SR 26 Bridge(s)</i>						
Eastbound	1.27	1.17	1.19	1.18	1.13	1.06
Westbound	<u>1.25</u>	<u>1.18</u>	<u>1.10</u>	<u>1.09</u>	<u>1.13</u>	<u>1.10</u>
Overall	1.26	1.18	1.13	1.12	1.13	1.08
<i>US 52 Bridge</i>						
Eastbound		1.15	1.14	1.19	1.11	1.13
Westbound		<u>1.13</u>	<u>1.13</u>	<u>1.13</u>	<u>1.08</u>	<u>1.12</u>
Overall		1.14	1.14	1.16	1.10	1.13
<i>US 231 Bridge</i>						
Northbound				1.07	1.07	1.08
Southbound				<u>1.33</u>	<u>1.12</u>	<u>1.12</u>
Average				1.13	1.08	1.09
Overall	1.24	1.14	1.13	1.13	1.11	1.10

Table 7

Modes Used by Route Direction											
Direction	Auto, Van, Truck	%	Bike	%	Motor- cycle	%	Bus, Truck	%	Peds	%	Total
Eastbound											
US 52	1,637	97.4			1	0.1	42	2.5			1,680
Harrison	578	96.0	3	0.5	1	0.2	15	2.5	5	0.8	602
SR 26	1,055	97.5	3	0.3	3	0.3	17	1.6	4	0.4	1,082
US 231	2,506	96.3	2	0.1	13	0.5	80	3.1			2,601
Westbound											
US 52	1,607	93.7			10	0.6	97	5.7	1	0.1	1,715
Harrison	1,216	97.0	2	0.2	4	0.3	30	2.4	1	0.1	1,253
SR 26	1,802	95.8	5	0.2	11	0.6	61	3.2	2	0.1	1,881
US 231	771	92.0			5	0.6	62	7.4			838
TOTAL	11,172	95.9	15	0.1	48	0.4	404	3.5	13	0.1	11,652

Table 8

Historical Mode Use											
Direction	Auto, Van, Truck	%	Bike	%	Motor- cycle	%	Bus, Truck	%	Peds	%	Total
2010*1	11,172	95.9	15	0.13	48	0.41	404	3.47	13	0.11	11,652
2003*1	11,353	95.6	16	0.13	8	0.07	482	4.06	20	0.17	11,879
2001*1	11,372	95.4	17	0.14	13	0.11	499	4.19	22	0.18	11,923
1999*2	8,549	95.8	11	0.12	13	0.15	340	3.81	7	0.08	8,920
1990*3	9,845	95.6	38	0.37	32	0.31	342	3.32	44	0.43	10,301
1980*2	5,185	91.7	116	2.05	95	1.68	191	3.38	65	1.15	5,652

*1: Study occurred from 6:45 to 8:30

*2: Study occurred from 7:00 to 8:30

*3: Study occurred from 7:45 to 8:30

Table 9

Modes Used by Route and Time												
Time	Location	Auto, Van, Truck	%	Bike	%	Motor- Cycle	%	Bus, Truck	%	Peds	%	Total
6:45	US 52	324	96.7			1	0.3	10	3.0			335
to	Harrison	152	90.5	1	0.6	1	0.6	14	8.3			168
7:00	SR 26	268	96.8			2	0.4	7	2.5	1	0.4	277
	US 231	356	92.2			1	0.5	28	7.3			386
7:00	US 52	365	95.8					16	4.2			381
to	Harrison	183	94.3			1	0.5	9	4.6	1	0.5	194
7:15	SR 26	361	94.8			4	1.0	15	3.9	1	0.3	381
	US 231	438	93.8			1	0.2	28	6.0			467
7:15	US 52	497	95.8			2	0.4	20	3.9			519
to	Harrison	227	98.7	1	0.4			1	0.4	1	0.4	230
7:30	SR 26	340	95.2	1	0.3	4	1.1	12	3.4			357
	US 231	517	96.8			6	1.1	11	2.1			534
7:30	US 52	508	96.6			3	0.6	14	2.7	1	0.2	529
to	Harrison	300	98.0			1	0.3	4	1.3	1	0.3	306
7:45	SR 26	482	96.6	2	0.4	1	0.2	13	2.6	1	0.2	499
	US 231	560	96.9			7	1.2	11	1.9			578
7:45	US 52	569	95.3			4	0.7	24	4.0			597
to	Harrison	403	97.3	3	0.7	1	0.2	7	1.7			414
8:00	SR 26	529	97.1	3	0.6	2	0.4	11	2.0			545
	US 231	642	97.0	1		1	0.2	18	2.7			662
8:00	US 52	454	95.4			1	0.2	21	4.4			476
to	Harrison	258	96.3			1	0.4	7	2.6	2	0.7	268
8:15	SR 26	482	98.6			1	0.2	6	1.2			489
	US 231	409	93.6	1	0.2	1	0.2	26	5.9			437
8:15	US 52	527	93.9					34	6.1			561
to	Harrison	271	98.5					3	1.1	1	0.4	275
8:30	SR 26	395	95.2	2	0.5	1	0.2	14	3.4	3	0.7	415
	US 231	355	94.7					20	5.3			375
Total		11,172	95.9	15	0.1	48	0.4	404	3.5	13	0.1	11,652

Table 10

Occupancy and Counts by Time and Bridge							
Location		One-Way Vehicle Occupancy Count			Two-Way Vehicle Occupancy Count		
		Vehicle Count	Occupancy Count	Persons Per Vehicle	Vehicle Count	Occupancy Count	Persons Per Vehicle
6:45	EB US 52	132	144	1.09	324	341	1.05
to	WB US 52	192	197	1.03			
7:00	EB Harrison	62	67	1.08	152	163	1.07
	WB Harrison	90	96	1.07			
	EB SR 26	98	102	1.04	268	299	1.12
	WB SR 26	170	197	1.16			
	NB US 231	261	267	1.02	356	372	1.04
	SB US 231	95	105	1.11			
7:00	EB US 52	198	208	1.05	365	392	1.07
to	WB US 52	167	184	1.10			
7:15	EB Harrison	54	57	1.06	183	199	1.09
	WB Harrison	129	142	1.10			
	EB SR 26	120	123	1.03	361	375	1.04
	WB SR 26	241	252	1.05			
	NB US 231	316	342	1.08	438	472	1.08
	SB US 231	122	130	1.07			
7:15	EB US 52	259	294	1.14	497	553	1.11
to	WB US 52	238	259	1.09			
7:30	EB Harrison	66	71	1.08	227	252	1.11
	WB Harrison	161	181	1.12			
	EB SR 26	131	135	1.03	340	363	1.07
	WB SR 26	209	228	1.09			
	NB US 231	374	402	1.07	517	517	1.08
	SB US 231	143	158	1.10			
7:30	EB US 52	299	341	1.16	508	584	1.15
to	WB US 52	209	324	1.18			
7:45	EB Harrison	103	158	1.10	300	330	1.10
	WB Harrison	197	285	1.10			
	EB SR 26	194	229	1.07	482	524	1.09
	WB SR 26	288	348	1.11			
	NB US 231	440	551	1.07	560	608	1.09
	SB US 231	120	139	1.11			

Table 10 continued

Occupancy and Counts by Time and Bridge										
Location		One-Way Vehicle Occupancy Count			Two-Way Vehicle Occupancy Count					
		Vehicle Count	Occupancy Count	Persons Per Vehicle	Vehicle Count	Occupancy Count	Persons Per Vehicle			
7:45	EB US 52	294	341	1.16	569	665	1.17			
to	WB US 52	275	324	1.18						
8:00	EB Harrison	143	158	1.10						
	WB Harrison	260	285	1.10						
	EB SR 26	215	229	1.07				529	577	1.09
	WB SR 26	314	348	1.11						
	NB US 231	517	551	1.07				642	690	1.07
	SB US 231	125	139	1.11						
8:00	EB US 52	246	286	1.16	454	523	1.15			
to	WB US 52	208	237	1.14						
8:15	EB Harrison	64	75	1.17	258	279	1.08			
	WB Harrison	194	204	1.05						
	EB SR 26	158	172	1.09	482	536	1.11			
	WB SR 26	324	364	1.12						
	NB US 231	315	346	1.10	409	455	1.11			
	SB US 231	94	109	1.16						
8:15	EB US 52	209	236	1.13	527	604	1.15			
to	WB US 52	318	368	1.16						
8:30	EB Harrison	86	96	1.12	271	307	1.13			
	WB Harrison	185	211	1.14						
	EB SR 26	139	147	1.06	395	422	1.07			
	WB SR 26	256	275	1.07						
	NB US 231	283	317	1.12	355	403	1.14			
	SB US 231	72	86	1.19						

Table 11

Auto, Van, Pick-up, Bus, Bicycle, Motorcycle and Pedestrian Data											
	Location	Occupant					Total	Bus, Truck	Bike	Motor-Cycle	Ped.
		1	2	3	4	5 +					
6:45 to 7:00	EB US 52	120	12				132	3			
	WB US 52	187	5				192	7		1	
	EB Harrison	57	5				62	1	1		
	WB Harrison	84	6				90	13		1	
	EB SR 26	94	4				98	1			1
	WB SR 26	144	25	1			170	6		1	
	NB US 231	255	6				261	22		1	
	SB US 231	85	10				95	6		1	
7:00 to 7:15	EB US 52	188	10				198	4			
	WB US 52	150	17				167	12			
	EB Harrison	51	3				54	2		1	1
	WB Harrison	116	13				129	7			
	EB SR 26	117	3				120	5		1	1
	WB SR 26	230	11				241	10		3	
	NB US 231	290	26				316	11		1	
	SB US 231	114	8				122	17			
7:15 to 7:30	EB US 52	224	35				259	5			
	WB US 52	218	19	1			238	15		2	
	EB Harrison	61	5				66	1	1		
	WB Harrison	143	16	2			161				1
	EB SR 26	128	2	1			131	1	1	1	
	WB SR 26	190	19				209	11		3	
	NB US 231	349	23	1	1		374	5		4	
	SB US 231	131	9	3			143	6		2	
7:30 to 7:45	EB US 52	256	39	4			299	5			
	WB US 52	180	29				209	9		3	1
	EB Harrison	95	8				103	2			1
	WB Harrison	179	16	1		1	197	2		1	
	EB SR 26	181	13				194	4	1		1
	WB SR 26	259	29				288	9	1	1	
	NB US 231	415	23		1	1	440	4		5	
	SB US 231	106	11	2	1		120	7		2	

Table 11 Continued

Auto, Van, Pick-up, Bus, Bicycle, Motorcycle and Pedestrian Data											
	Location	Occupant					Total	Bus, Truck	Bike	Motor- Cycle	Ped.
		1	2	3	4	5 +					
7:45	EB US 52	248	45	1			294	8			
to	WB US 52	226	49				275	16		4	
8:00	EB Harrison	129	13	1			143	5	1		
	WB Harrison	238	19	3			260	2	2	1	
	EB SR 26	210	14				215	1	1		
	WB SR 26	280	34				314	10	2	2	
	NB US 231	485	31		1		517	9	1	1	
	SB US 231	113	10	2			125	9			
8:00	EB US 52	208	36	2			246	7		1	
to	WB US 52	179	29				208	14			
8:15	EB Harrison	57	5	1		1	64	3			2
	WB Harrison	185	8	1			194	4		1	
	EB SR 26	146	10	2			158	3		1	
	WB SR 26	284	40				324	3			
	NB US 231	287	26	1	1		315	16	1	1	
	SB US 231	82	10	1	1		94	10			
8:15	EB US 52	183	25	1			209	10			
to	WB US 52	271	45	1	1		318	24			
8:30	EB Harrison	77	8	1			86	1			1
	WB Harrison	163	19	2	1		185	2			
	EB SR 26	132	6	1			139	2			1
	WB SR 26	237	19				256	12	2	1	2
	NB US 231	252	28	3			283	13			
	SB US 231	60	10	2			72	7			
	TOTAL	10,120	999	42	8	3	11,172	404	15	48	13