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A2H

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EXECUTIVE SUMMARY

The proposed Baptist Memorial Healthcare Hospital and changes in land use will affect the levels of traffic demand on the local transportation system as well as the Arkansas Highway 49 system. The purpose and function of a trip generation analysis is to develop a meaningful relationship between the proposed land use and potential site generated traffic volumes. The results from the trip analysis for the proposed changes in land use can be used to determine the subsequent changes required in the transportation network for the Arkansas State Highway system and local transportation system.

Without an actual traffic count or a trip generation data collection, the trip generation rate from the Institute of Transportation Engineers (ITE) *Trip Generation* manual, a nationally accepted source for trip generation rates as they relate to specific land uses, was utilized for the traffic study for the proposed Baptist Memorial Healthcare Hospital in Jonesboro. The rate of trips is related to the socioeconomic information of a community as well as the land use; local trip generation rates can vary from those published in the ITE manual. Due to the limited sample size of the ITE publication, the statistical result in this report should be used as potential traffic volume. The user is encouraged to provide the size and site-specific information when practical to re-evaluate the potential volume.

Together with the Annual Average Daily Traffic Estimates (AADT) from the Arkansas State Highway and Transportation Department for Craighead County, a signal warrant study was conducted.

The summary of the trip generation and projected traffic volume is tabulated below.

Table 1: Trip Generation with the Baptist Memorial Healthcare Hospital & Clinic

Average Daily 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Hospital (Weekday)	17.57	11.93	1.0	10,981
Clinic (Weekday)	31.45	None	1.0	4,717
Estimated Peak Volume				15,698

**Table 2: Trip Generation Peak Hour Volume for
Baptist Memorial Healthcare Hospital & Clinic**

Peak Hour 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Hospital (Sunday)	2.13	Unknown	1.0	1,331
Clinic (Sunday)	24.10	Unknown	1.0	3,615
Peak Hour Traffic Volume				4,946

Table 3: Craighead County Annual Average Daily Traffic Estimate and Projection

Year	Peak Volume
2010 projected at Highway 49 near Highway 351	41,441*
2009 projected at Highway 49 near Highway 351	25,323
2008 projected at Highway 49 near Highway 351	24,910
2007 at Highway 49 near Highway 351	24,500
2006 at Highway 49 near Highway 351	24,100
2005 at Highway 49 near Highway 351	19,900
2004 at Highway 49 near Highway 351	21,400
2003 at Highway 49 near Highway 351	20,000

*When Hospital and Clinic are operational

Based on the trip generation and Craighead County annual traffic estimates, the traffic signal is warranted at the location of ingress/egress of the proposed hospital and clinic.

This is based on the site visit and field observation during the engineering study. The results from the engineering study indicated that conditions of the proposed Highway 49 intersection meet the requirements of the MUTCD 2003 edition recommendation of the traffic control signal's three conditions.

I. INTRODUCTION

A. THE JONESBORO, CRAIGHEAD COUNTY TRANSPORTATION STUDY

The United States Congress recognized that effective transportation planning requires an organization with a regional focus and the ability to operate independently of city, county or state lines. As a result, the Federal-Aid Highway Act was enacted in 1962. This legislation mandated that all urbanized areas over 50,000 in population were required to establish a continuing, cooperative, comprehensive (3C) planning process in order to receive federal highway planning and improvement funding (23 USC 134; 49 USC 1603a). In 1969, metropolitan planning organizations (MPO) were created to conduct the 3C planning process within these urbanized areas.

The City of Jonesboro is the home of Arkansas State University, the second largest institution of higher learning in Arkansas. Because of its shopping centers, restaurants, and other attractions, Jonesboro has become the major trade center for 500,000 people in northeast Arkansas and southeast Missouri with an area of 7,000 square miles.

B. TRIP GENERATION

Trip generation rates are the ratio of the number of daily trips or trip ends generated by or attracted to a site by some independent variable that is a physical, measurable and predictable unit describing the study site for the proposed land use. These independent variables include such items as the number of employees, gross floor area, dwelling units, acreage, etc. Trip generation rates are used by the County Mayor, planners, traffic engineers, zoning boards, land use boards and other interested groups in forecasting the amount of traffic that will be generated by the proposed land use change.

The 7th edition of *Trip Generation* published by the Institute of Transportation Engineers (ITE) is the only reference manual that reasonably forecasts the trip generation rates without an actual traffic count. The information published in the ITE manual is based on trip generation studies conducted by public agencies and private groups and reported back to the Institute. Even with the latest revised and published ITE handbook and manual, it still does not provide trip generation rates for all types of land use that is applicable to the study area. Therefore, it is important that the City of Jonesboro develop their own rates to verify the existing published rates or develop rates for those land uses that have not been previously recorded.

II. METHODOLOGY

A. LAND USE

The City of Jonesboro proposed the analysis for a specific land use of Baptist Memorial Healthcare Hospital and clinic to be located in the City of Jonesboro. Utilizing development trends, assuming the consistent growth of the City of Jonesboro with the surrounding metropolitan area, and using the published information in the ITE *Trip Generation*, A2H developed a potential traffic generation count during the weekday, Saturday and Sunday. Together with the yearly traffic count from Craighead County at the proximity of the proposed hospital and clinic site, a signal warrant study was conducted.

The land uses studied are as follows:

- Baptist Memorial Healthcare Hospital (625,000 Square Foot Building)
- Clinic (150,000 Square Foot Building)

To provide trip generation rates that typify the study area, the land uses above are randomly selected and not site location specific for the proposed site.

B. TRIP GENERATION

No actual traffic data was collected at the Study Area. Trip generation rates published by ITE are used for the various traffic volumes. For example, it was determined that 'A' number of trips were generated by a Clinic that had 'B' number of square footage of building area. 'C'% entering the Clinic in the morning peak hour and 'D'% in the evening peak hour leaving the Clinic.

1. Hospital (Land Use Code 610)

According to the ITE published report, a hospital is any institution where medical or surgical care and overnight accommodations are provided to patients. The ITE study of the hospital trip generation does not include medical clinics or nursing homes.

No vehicle occupancy data was available from ITE data specifically for hospitals. According to ITE, the peak hour of the generator typically coincided with the peak hour of the adjacent street traffic.

ITE has compiled only 14 studies with an average gross floor area of 292,000 square feet. At an average rate of 17.57, the estimated peak volume is 10,981. (Refer to Figure 1.)

Table 4: Trip Generation with Baptist Memorial Healthcare Hospital

Average Daily 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Hospital (Weekday)	17.57	11.93	1.0	10,981
Hospital (Saturday)	11.73	8.26	1.0	7,331
Hospital (Sunday)	10.34	7.60	1.0	6,462
Estimated Peak Volume				10,981

(Refer to Figures 2, 3 and 4.)

2. Clinic (Land Use Code 630)

According to the ITE publication, a clinic is any facility that provides limited diagnostic and outpatient care but is unable to provide prolonged in-house medical and surgical care.

ITE has compiled 2 studies with an average of 112,000 square feet of gross floor area. At an average rate of 31.45, the estimated peak volume is 4,717. (Refer to Figure 5.)

Table 5: Trip Generation with Baptist Memorial Healthcare Hospital & Clinic

Average Daily 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Clinic (Weekday)	31.45	None	1.0	4,717
Clinic (Saturday)	13.54	None	1.0	2,031
Clinic (Sunday)	24.10	None	1.0	3,615
Estimated Peak Volume				4,717

C. PEAK VOLUME OF TRIP GENERATION WITH HOSPITAL

1. Hospital

ITE has compiled 9 studies with an average of 295,000 square feet of gross floor area on a **weekday**. At an average rate of 1.61, the estimated peak volume is 1,006. (Refer to Figure 6.)

ITE has compiled 3 studies with an average of 152,000 square feet of gross floor area on a **Saturday**. At an average rate of 2.26, the estimated peak volume is 1,412. (Refer to Figure 7.)

ITE has compiled 5 studies with an average of 156,000 square feet of gross floor area on a **Sunday**. At an average rate of 2.13, the estimated peak volume is 1,331. (Refer to Figure 8)

Table 6: Summary of Peak Hour Volume for Hospital

Peak Hour 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Hospital A.M.(Weekday)	1.47	1.63	1.0	958
Hospital P.M. (Weekday)	1.61	1.83	1.0	1,006
Hospital (Saturday)	2.26	2.53	1.0	1,412
Hospital (Sunday)	2.13	1.85	1.0	1,331
Peak Hour Traffic Volume				1,412

2. Clinic

ITE has compiled 1 study with an average of 64,000 square feet of gross floor area on a **weekday**. At an average rate of 5.18, the estimated peak volume is 777. (Refer to Figure 9.)

ITE has compiled 1 study with an average of 161,000 square feet of gross floor area on a **Saturday**. At an average rate of 13.54, the estimated peak volume is 2,031. (Refer to Figure 9.)

ITE has compiled 1 study with an average of 161,000 square feet of gross floor area on a **Sunday**. At an average rate of 24.10, the estimated peak volume is 3,615. (Refer to Figure 9.)

Table 7: Summary of Peak Hour Volume for Clinic

Peak Hour 2-way volume	Average Rate	Standard Deviation	Adjustment Factor	Peak Volume
Clinic (Weekday)	5.18	Unknown	1.0	777
Clinic (Saturday)	13.54	Unknown	1.0	2,031
Clinic (Sunday)	24.10	Unknown	1.0	3,615
Peak Hour Traffic Volume				3,615

III. TRAFFIC CONTROL SIGNAL

The MUTCD 2003 edition recommends installation of a traffic control signal only after the following conditions are met:

1. One or more of the factors contained in the warrants is met,
2. an engineering study shown that the traffic control signal will improve the overall operation and/or safety of the intersection, and
3. the traffic control signal will not seriously disrupt progressive traffic flow.

The eight (8) warrants for justifying traffic control signals are:

- ❖ Warrant 1, Eight-Hour Vehicular Volume
- ❖ Warrant 2, Four-Hour Vehicular Volume
- ❖ Warrant 3, Peak Hour
- ❖ Warrant 4, Pedestrian Volume
- ❖ Warrant 5, School Crossing
- ❖ Warrant 6, Coordinated Signal System
- ❖ Warrant 7, Crash Experience
- ❖ Warrant 8, Roadway Network

Based on the trip generation and Craighead County annual traffic estimates, the traffic signal is warranted at the location of ingress/egress of the proposed hospital and clinic. This is based on the proposed land development of the proposed hospital and clinic that met Warrant 1, Warrant 3 and Warrant 6. Hence, this will meet Item 1 above for the traffic control signal to be installed at Highway 49.

The A2H traffic study indicated that a properly installed and timed traffic control signal will enhance and improve the overall operation and safety of the newly constructed intersection. Also, with the advanced technology, the signalized intersection will enable emergency ambulance to have access to control the traffic 'green' light during the emergency ingress and egress.

The existing Highway 49 has a traffic control signal west of the proposed access to the proposed hospital and clinic. With the proposed traffic control signal and properly synchronize timing, the new traffic control signal will not seriously disrupt the progressive traffic flow but enhance the traffic flow for access to the proposed hospital, clinic, and existing Highway 49.

It is our recommendation that traffic control signal be installed at Highway 49 prior to the operation of the proposed hospital.

FIGURE NO. 1

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 14
Average 1000 Sq. Feet GFA: 292
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
17.57	11.40 - 67.52	11.93

Data Plot and Equation

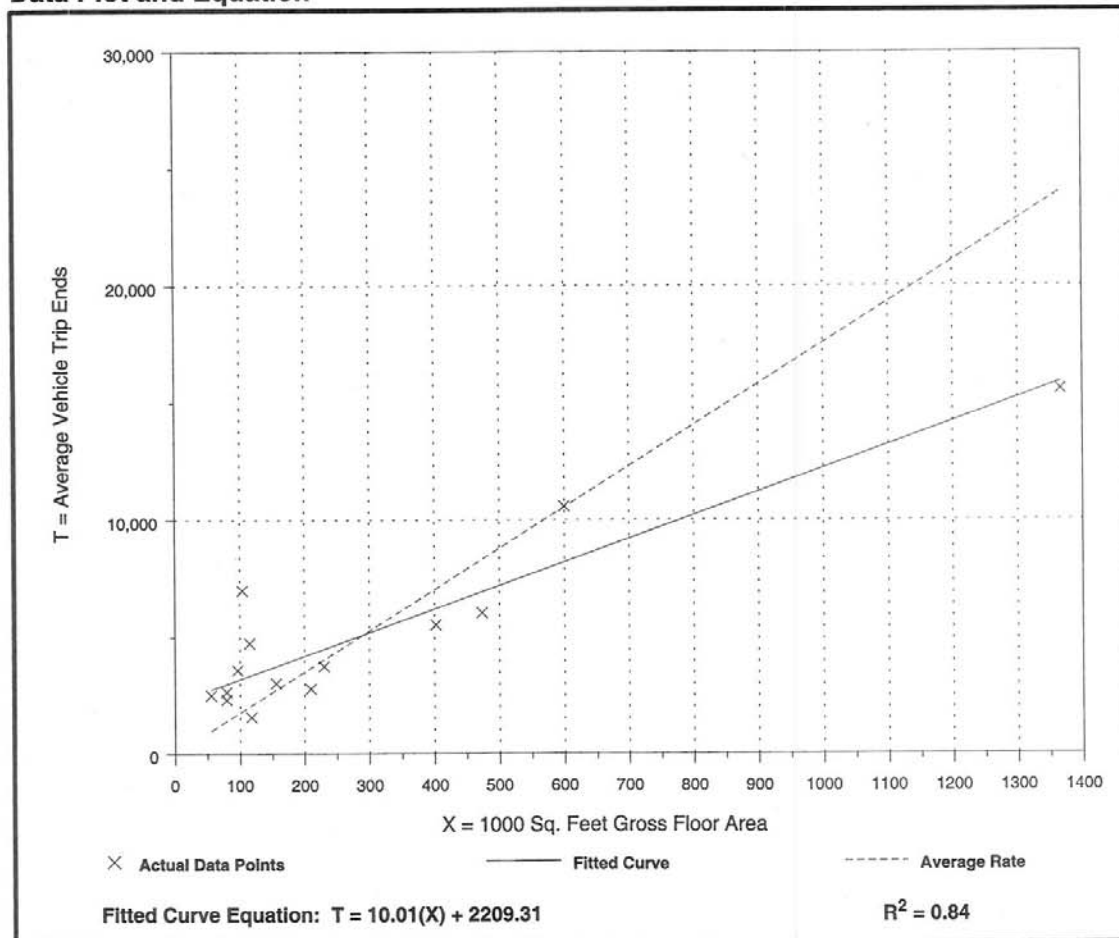


FIGURE NO. 2

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour of Generator

Number of Studies: 5
Average 1000 Sq. Feet GFA: 341
Directional Distribution: 63% entering, 37% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.47	0.94 - 5.70	1.63

Data Plot and Equation

Caution - Use Carefully - Small Sample Size

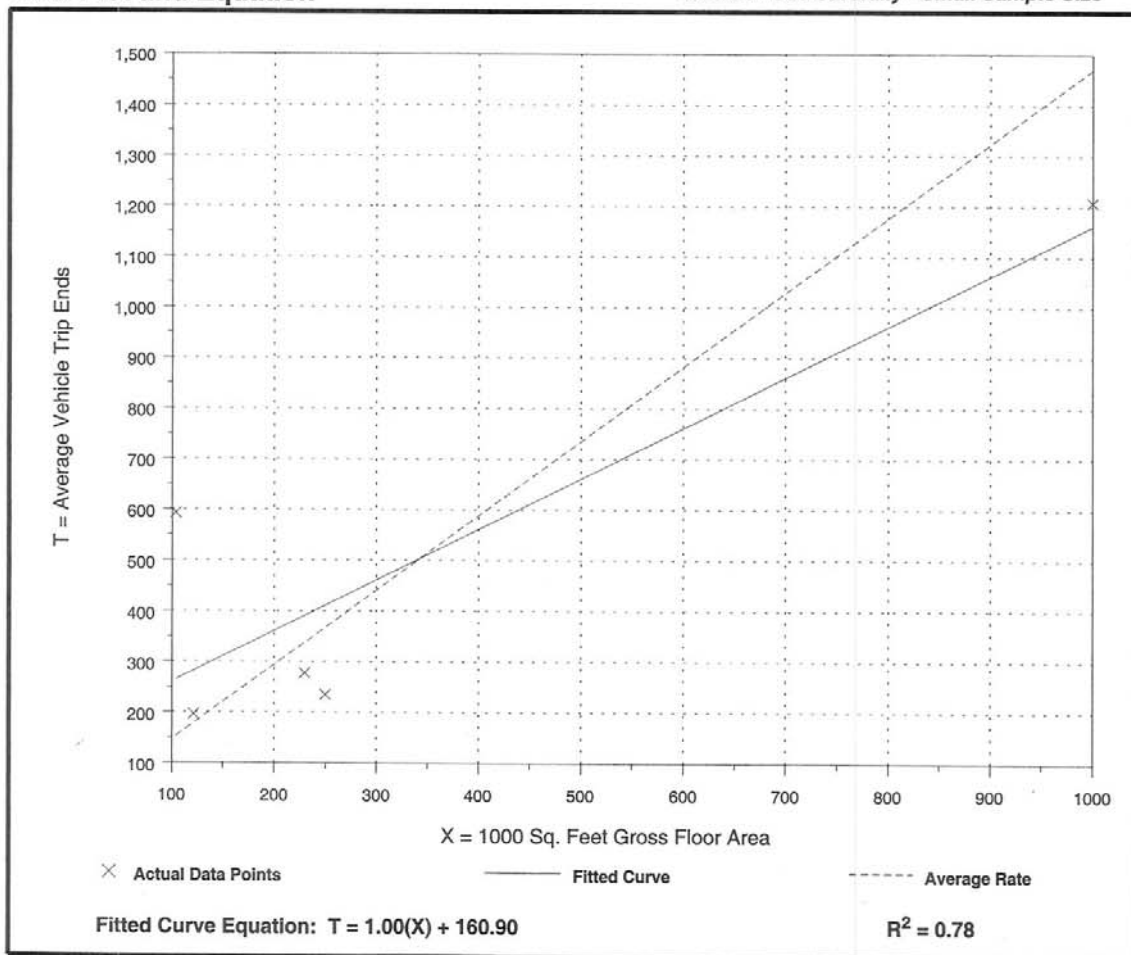


FIGURE NO. 3

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Saturday

Number of Studies: 13
Average 1000 Sq. Feet GFA: 305
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
11.73	6.25 - 41.80	8.26

Data Plot and Equation

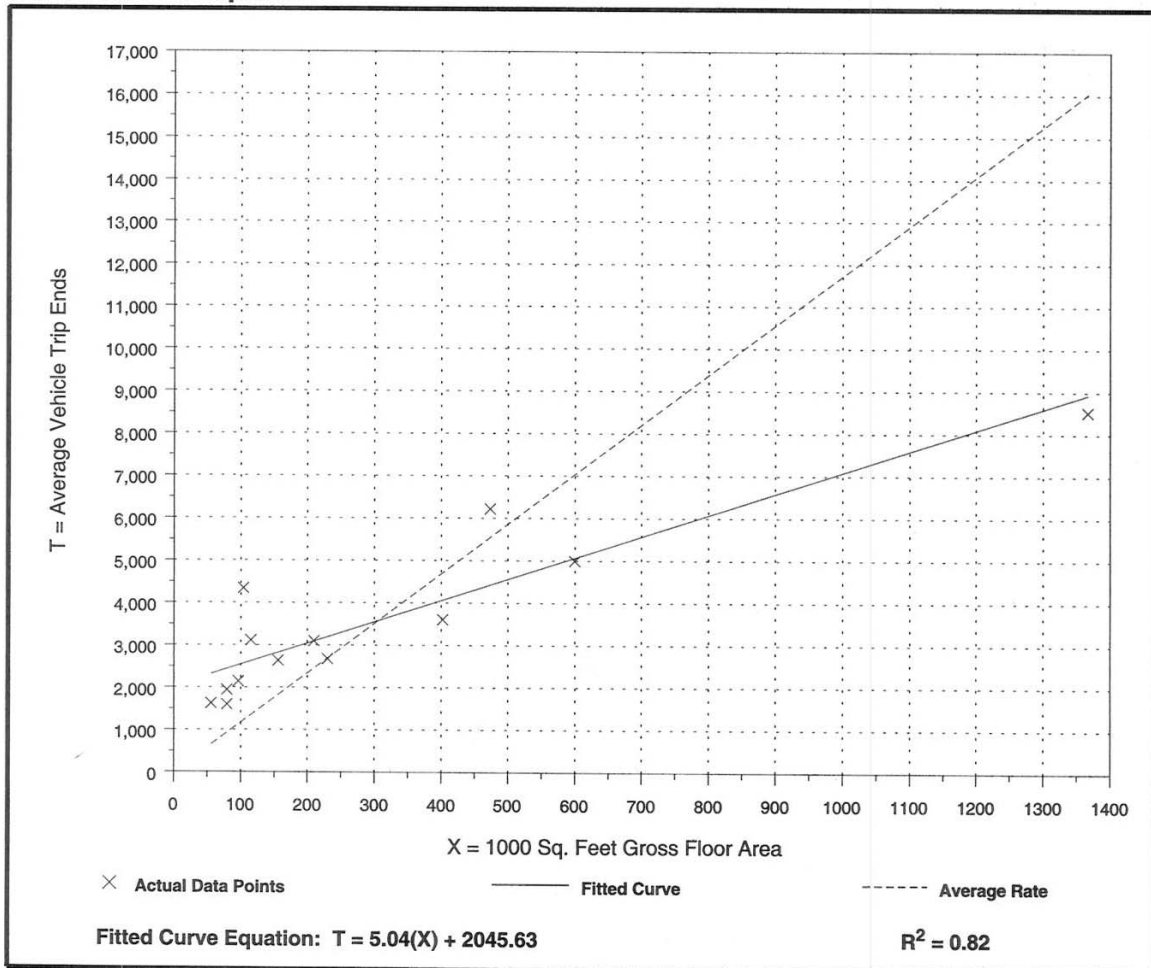


FIGURE NO. 4

Hospital (610)

**Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Sunday**

Number of Studies: 13
Average 1000 Sq. Feet GFA: 305
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
10.34	5.63 - 39.13	7.60

Data Plot and Equation

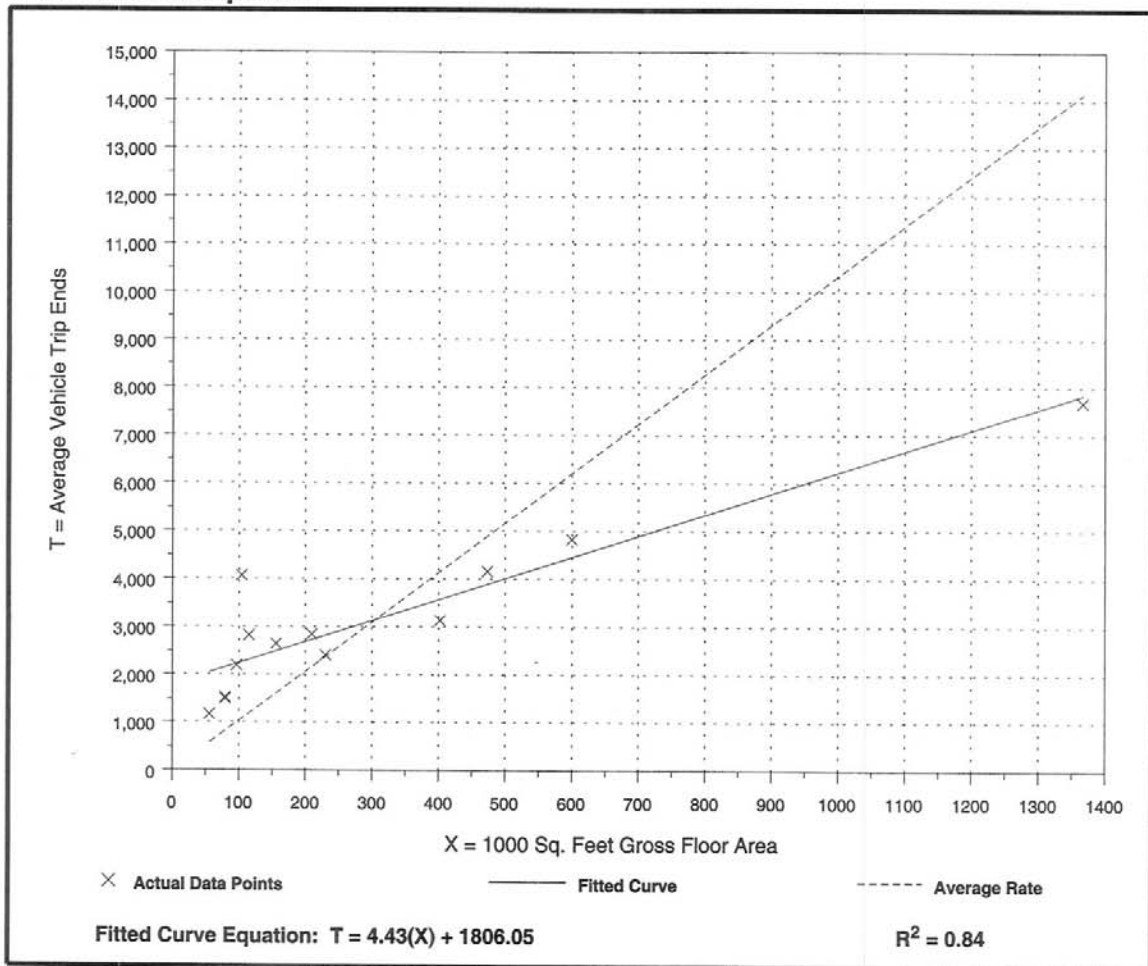


FIGURE NO. 5

**Clinic
(630)**

**Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday**

Number of Studies: 2
Average 1000 Sq. Feet GFA: 112
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
31.45	23.79 - 50.74	*

Data Plot and Equation

Caution - Use Carefully - Small Sample Size

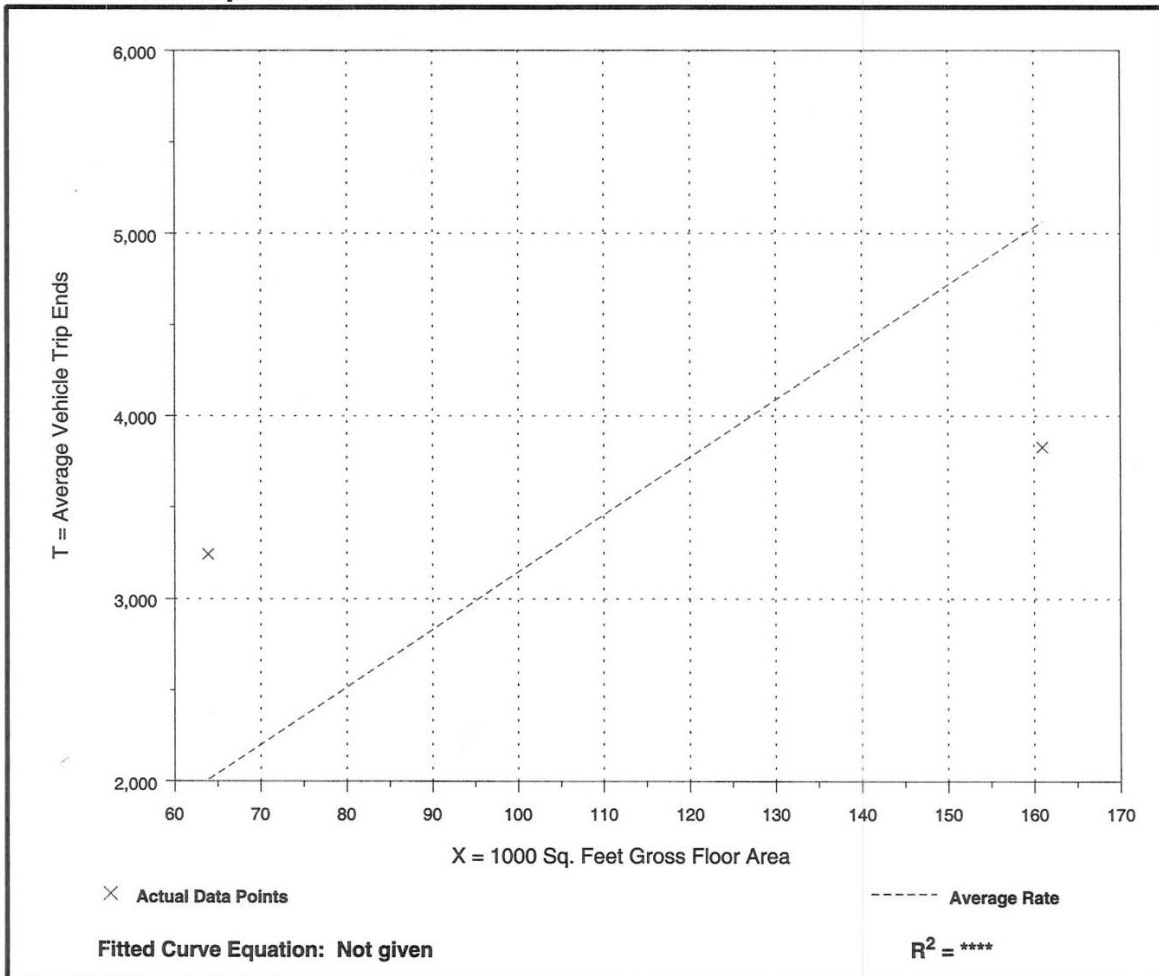


FIGURE NO. 6

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
P.M. Peak Hour of Generator

Number of Studies: 9
Average 1000 Sq. Feet GFA: 295
Directional Distribution: 38% entering, 62% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.61	0.87 - 7.63	1.83

Data Plot and Equation

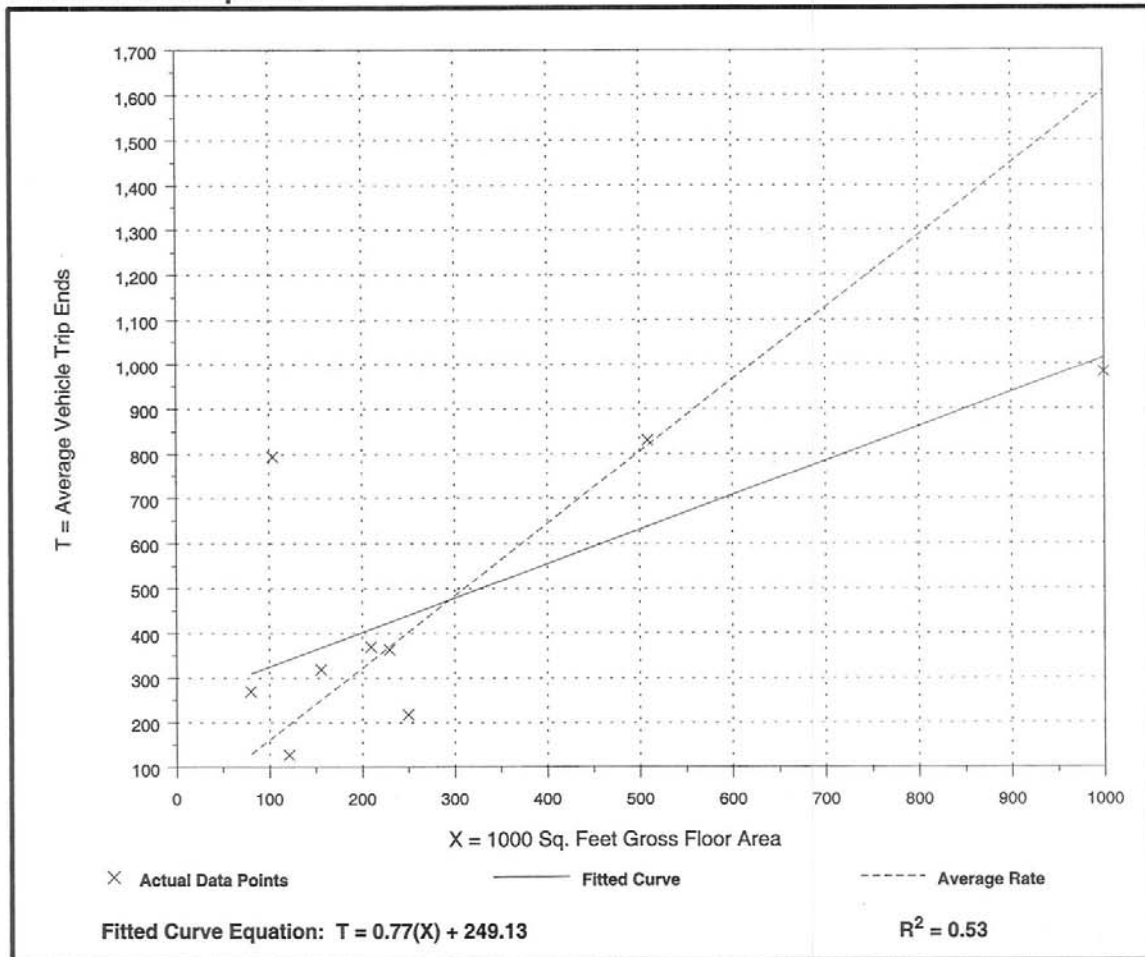


FIGURE NO. 7

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Saturday,
Peak Hour of Generator

Number of Studies: 3
Average 1000 Sq. Feet GFA: 152
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
2.26	0.92 - 5.98	2.53

Data Plot and Equation

Caution - Use Carefully - Small Sample Size

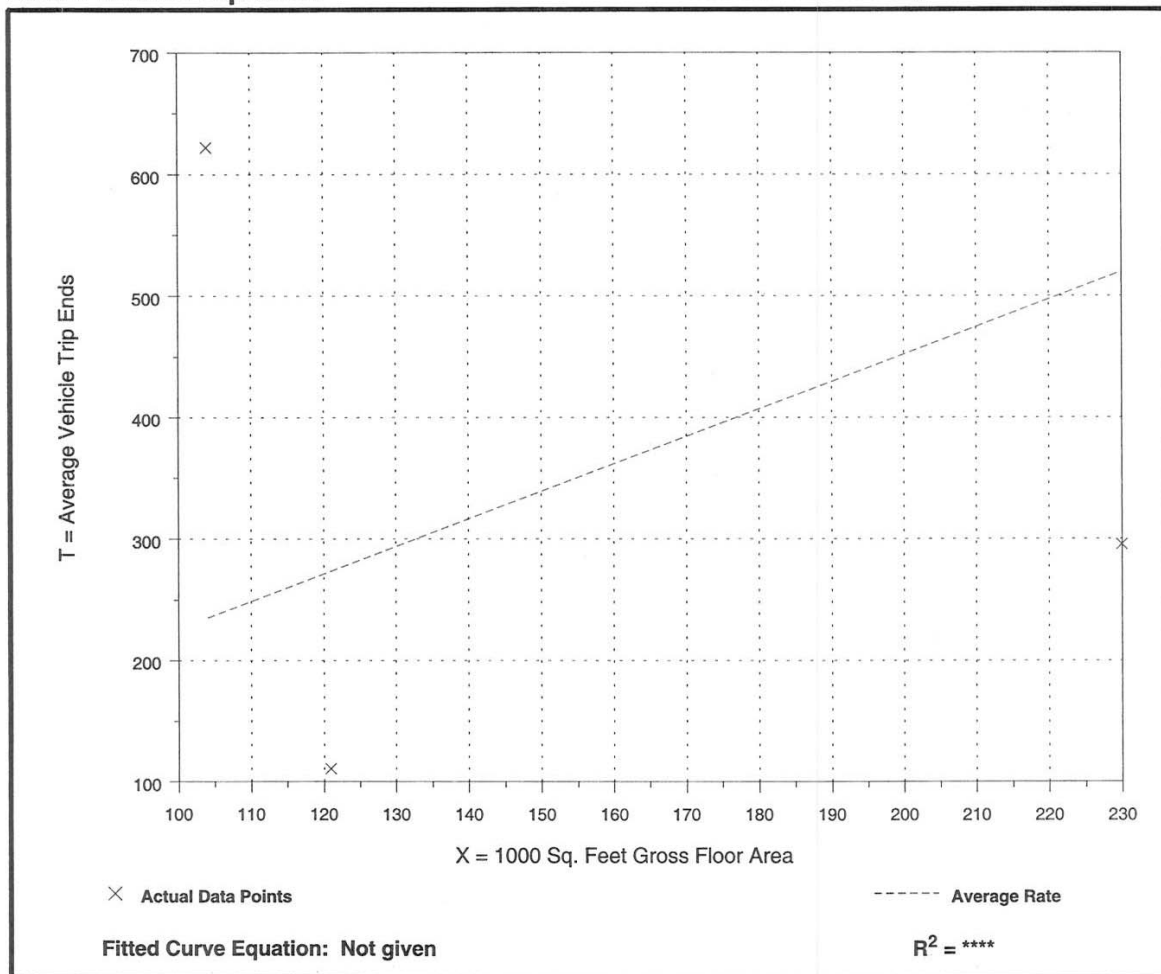


FIGURE NO. 8

Hospital (610)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Sunday,
Peak Hour of Generator

Number of Studies: 5
Average 1000 Sq. Feet GFA: 156
Directional Distribution: 45% entering, 55% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
2.13	1.20 - 4.85	1.85

Data Plot and Equation

Caution - Use Carefully - Small Sample Size

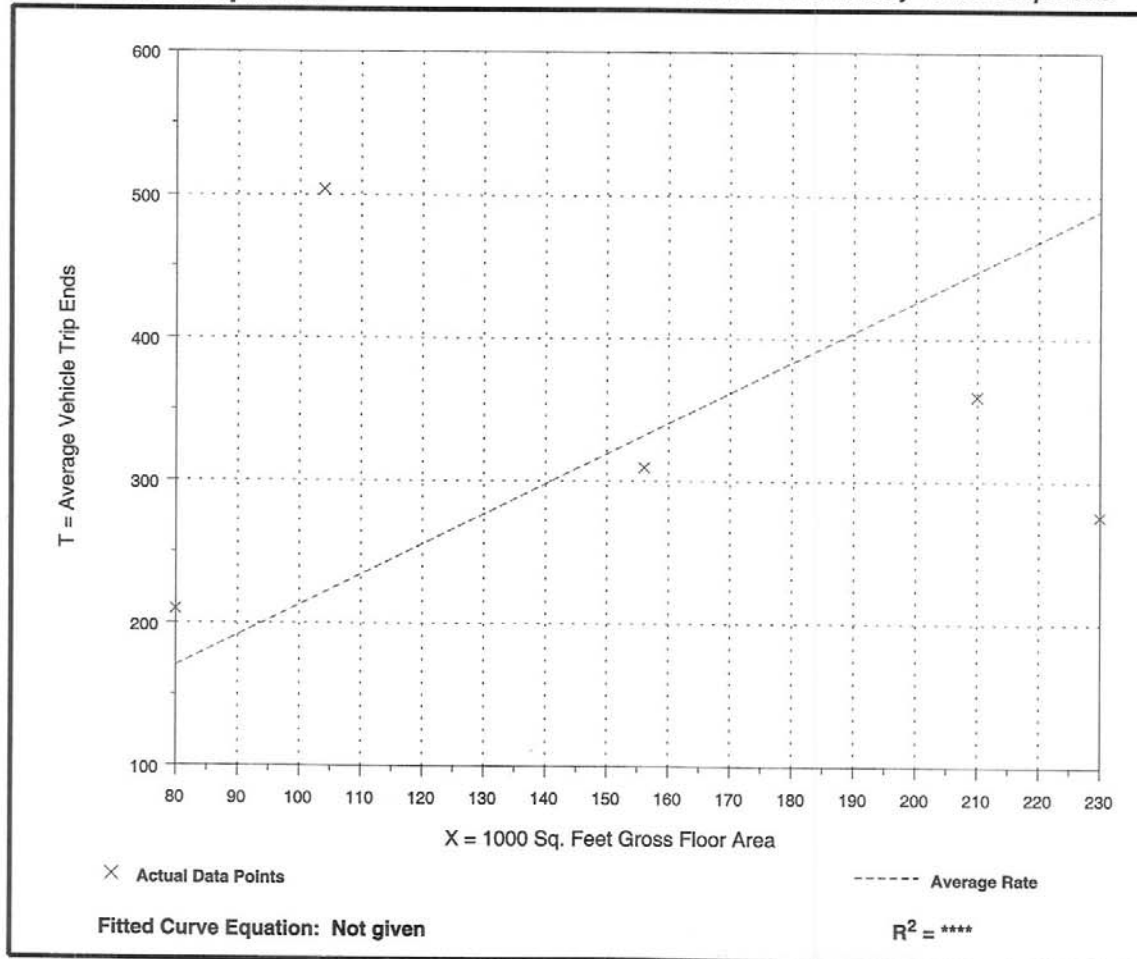


FIGURE NO. 9

**Land Use: 630
Clinic**

Independent Variables With One Observation

The following trip generation data are for independent variables with only one observation. This information is shown in this table only; there are no related plots for these data.

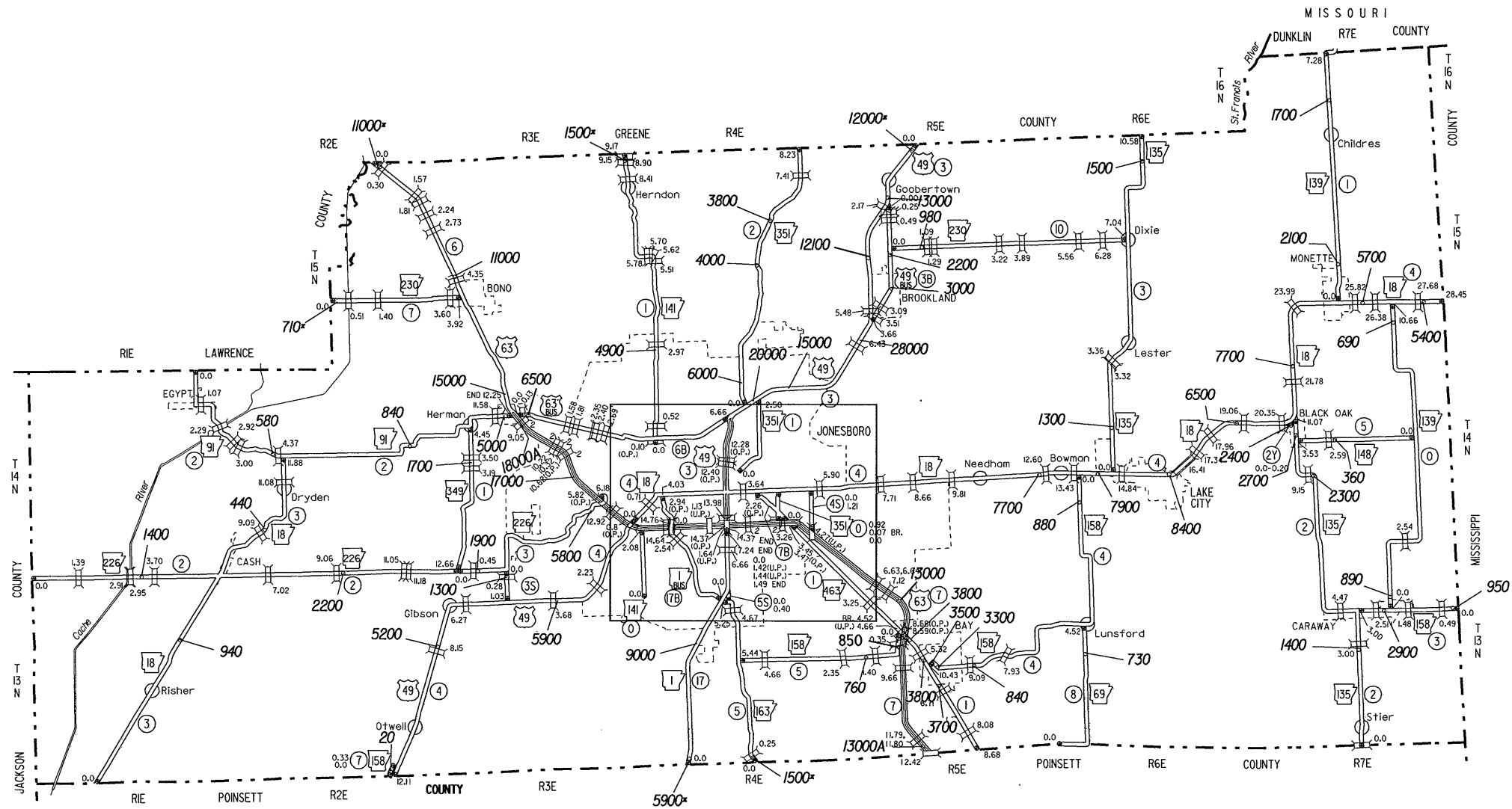
Users are cautioned to use data with care because of the small sample size.

<u>Independent Variable</u>	<u>Trip Generation Rate</u>	<u>Size of Independent Variable</u>	<u>Number of Studies</u>	<u>Directional Distribution</u>
Employees				
Weekday a.m. Peak Hour of Generator	0.90	20	1	50% entering, 50% exiting
Saturday	3.35	650	1	50% entering, 50% exiting
Sunday	5.97	650	1	50% entering, 50% exiting
Full-Time Doctors				
Weekday a.m. Peak Hour of Generator	3.60	5	1	50% entering, 50% exiting
1,000 Square Feet Gross Floor Area				
Weekday p.m. Peak Hour of Adjacent Street Traffic	5.18	64	1	Not Available
Saturday	13.54	161	1	50% entering, 50% exiting
Sunday	24.10	161	1	50% entering, 50% exiting

APPENDIX A

CRAIGHEAD COUNTY TRAFFIC COUNTS

(9 pages following)



LEGEND

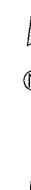
A = AUTOMATIC (PERMANENT) TRAFFIC RECORDER LOCATION

N/A = NOT AVAILABLE THIS YEAR

* = COUNT MADE IN ADJOINING COUNTY

DISTRICT 10

COUNTY MAP PRODUCED BY
COMPUTER ASSISTED CARTOGRAPHY

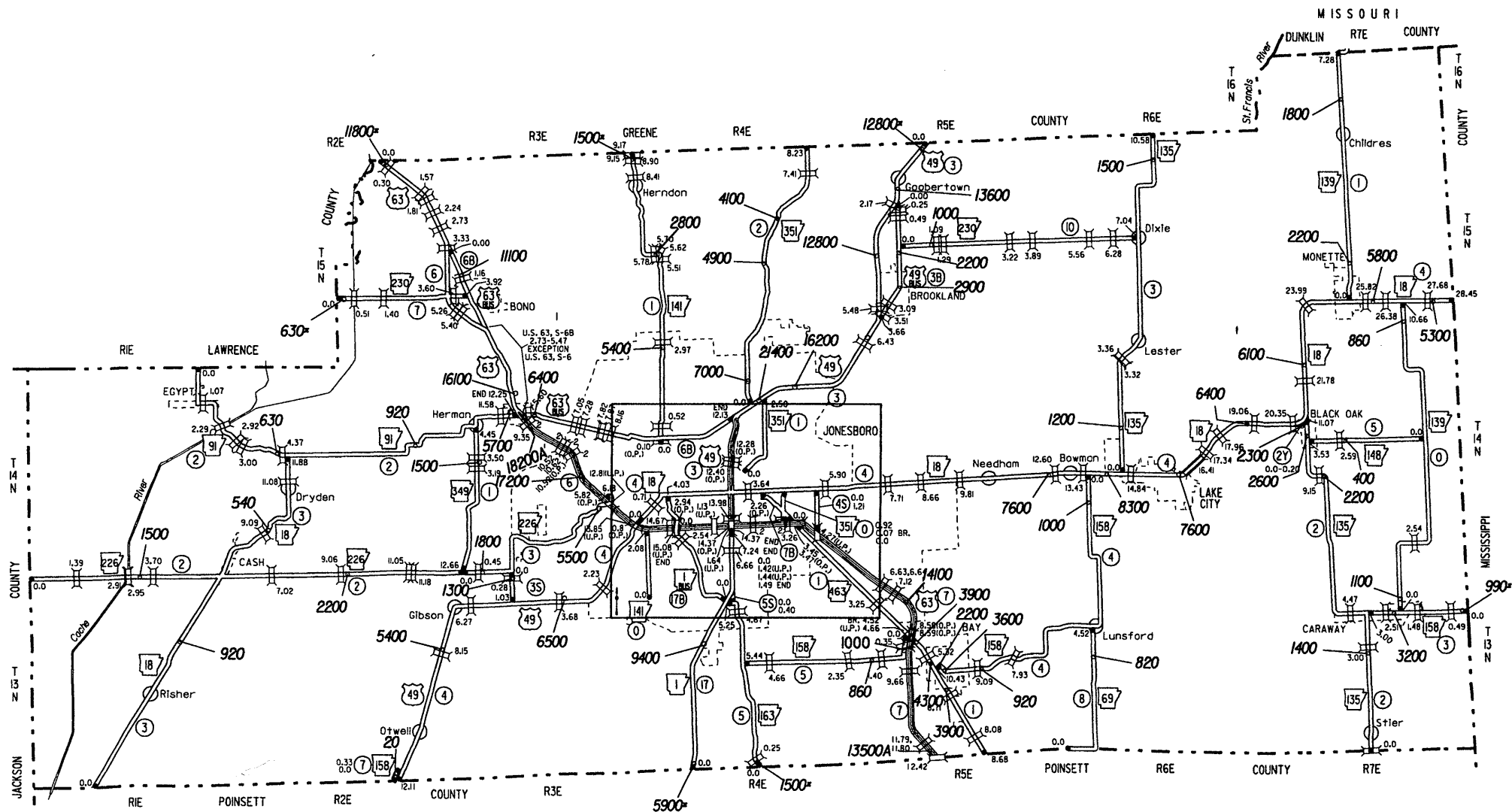


2003 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES

STATE HIGHWAY
ROUTE AND SECTION MAP
CRAIGHEAD COUNTY
ARKANSAS

SHOWING
BRIDGE LOG NUMBERS

PREPARED BY AHTD/P&R/TS 4-1-2004



2004 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES

STATE HIGHWAY
ROUTE AND SECTION MAP
CRAIGHEAD COUNTY
ARKANSAS

SHOWING
BRIDGE LOG NUMBERS

LEGEND

A = AUTOMATIC (PERMANENT) TRAFFIC RECORDER LOCATION

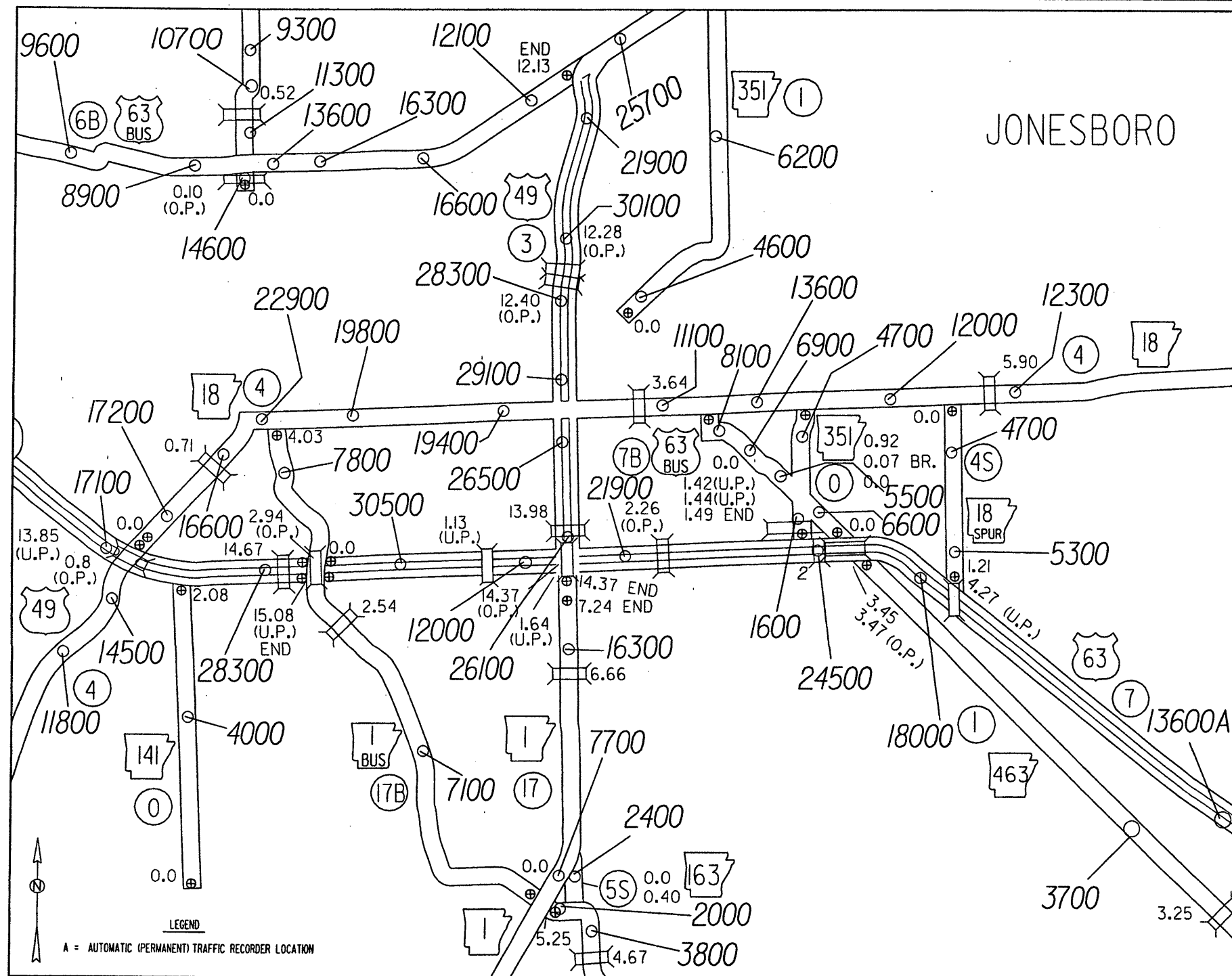
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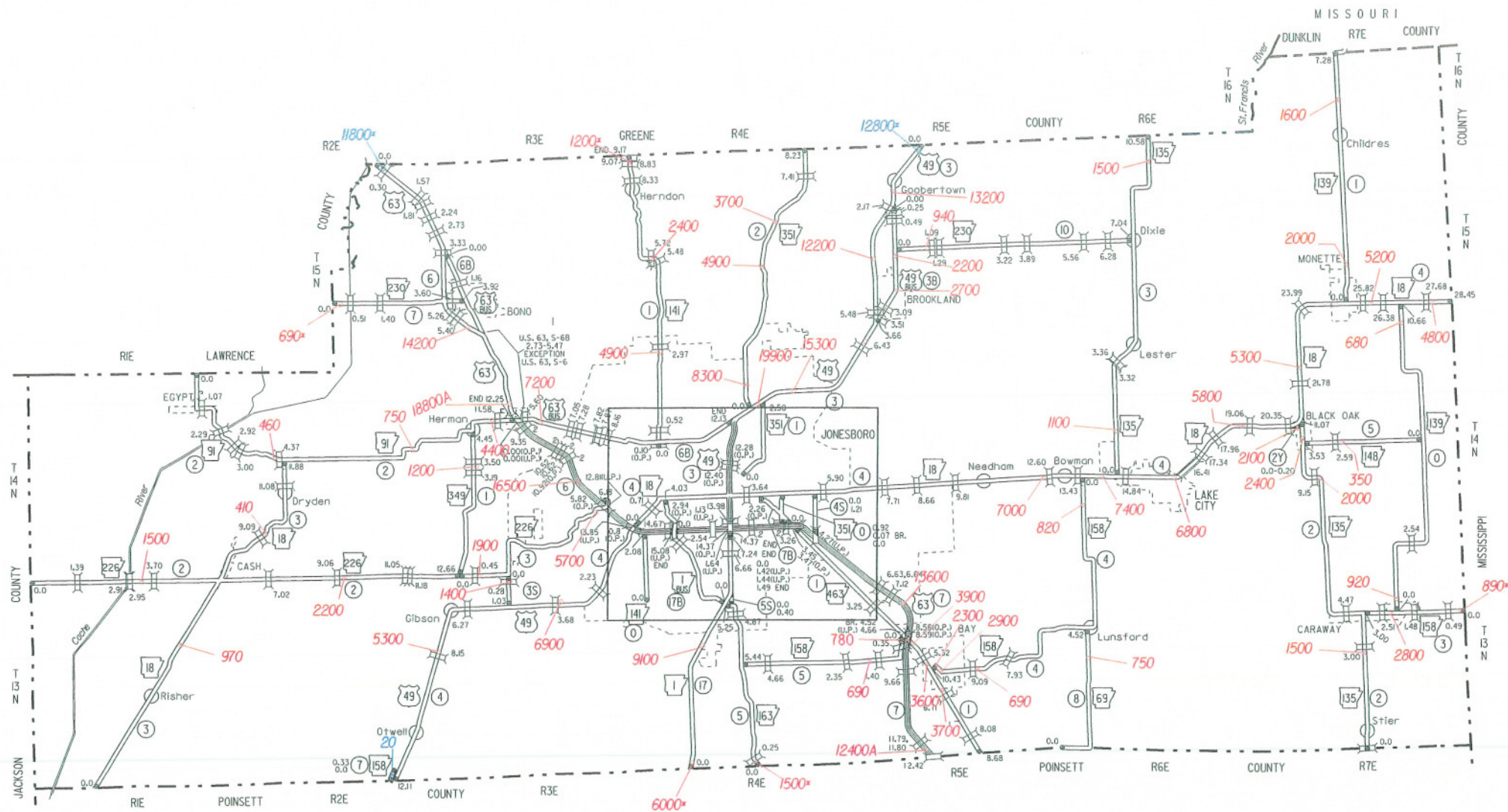
N/A = NOT AVAILABLE THIS YEAR

DISTRICT 10

COUNTY MAP PRODUCED BY
COMPUTER ASSISTED CARTOGRAPHY

PREPARED BY AHTD/P&R/TS 4-1-2005





LEGEND

A = AUTOMATIC (PERMANENT) TRAFFIC RECORDER LOCATION

* = COUNT MADE IN ADJOINING COUNTY

DISTRICT 10

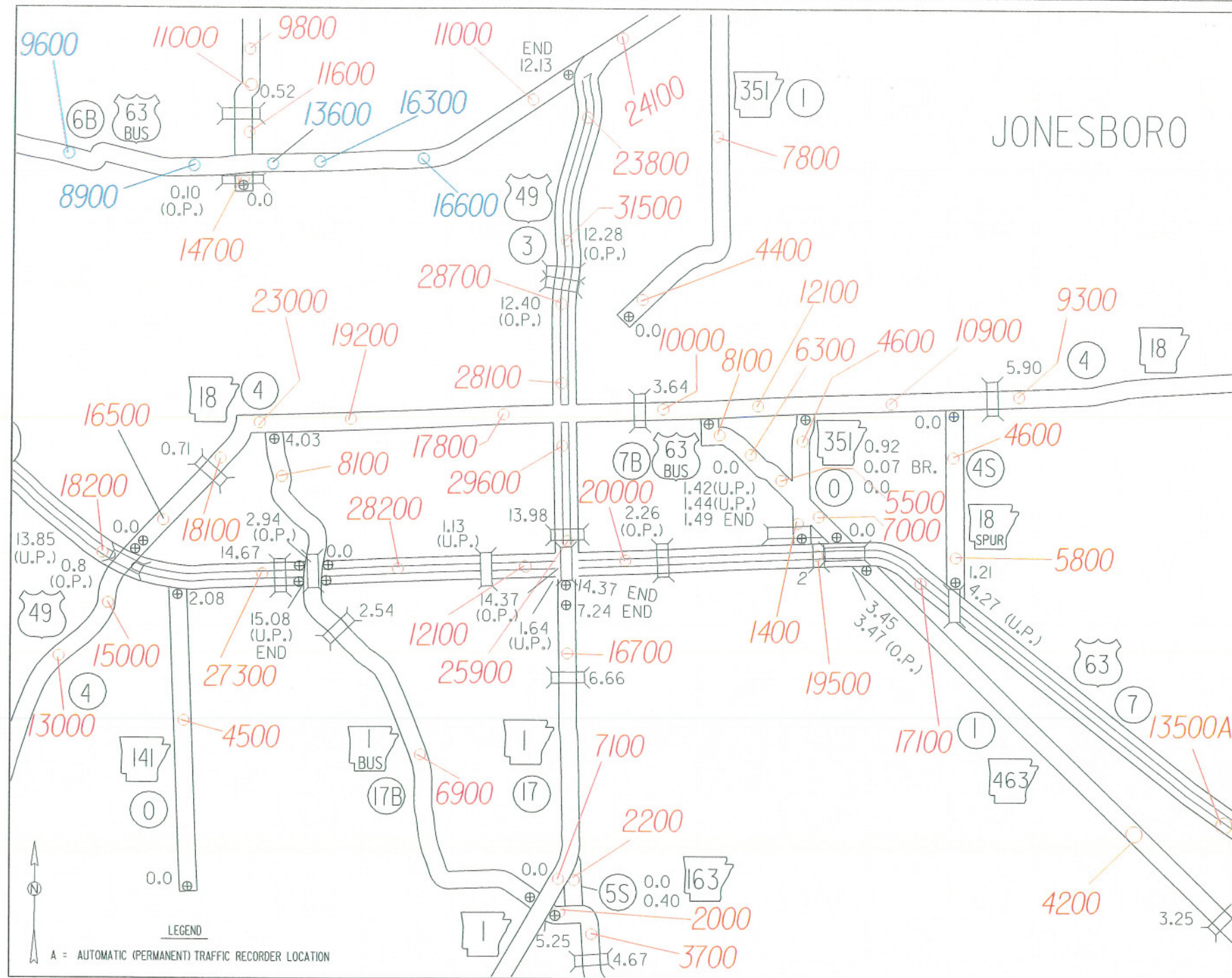
COUNTY MAP PRODUCED BY
COMPUTER ASSISTED CARTOGRAPHY

PREPARED BY AHTD/P&R/TS 4-1-2006

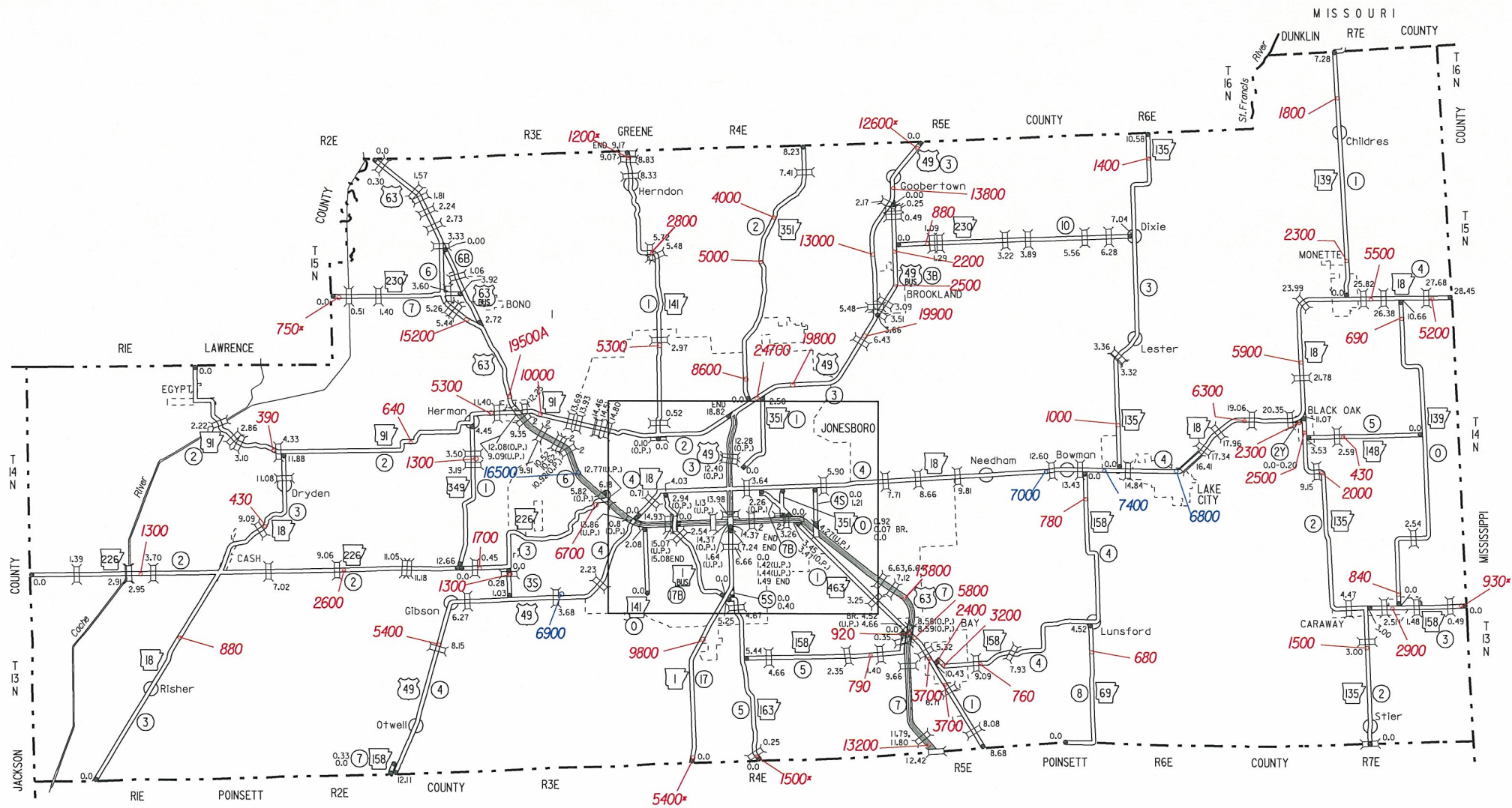
2005 ANNUAL AVERAGE
2004 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES

STATE HIGHWAY
ROUTE AND SECTION MAP
CRAIGHEAD COUNTY
ARKANSAS

SHOWING
BRIDGE LOG NUMBERS



2005 ANNUAL AVERAGE
2004 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES



2006 ANNUAL AVERAGE
2005 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES

STATE HIGHWAY
ROUTE AND SECTION MAP
CRAIGHEAD COUNTY
ARKANSAS

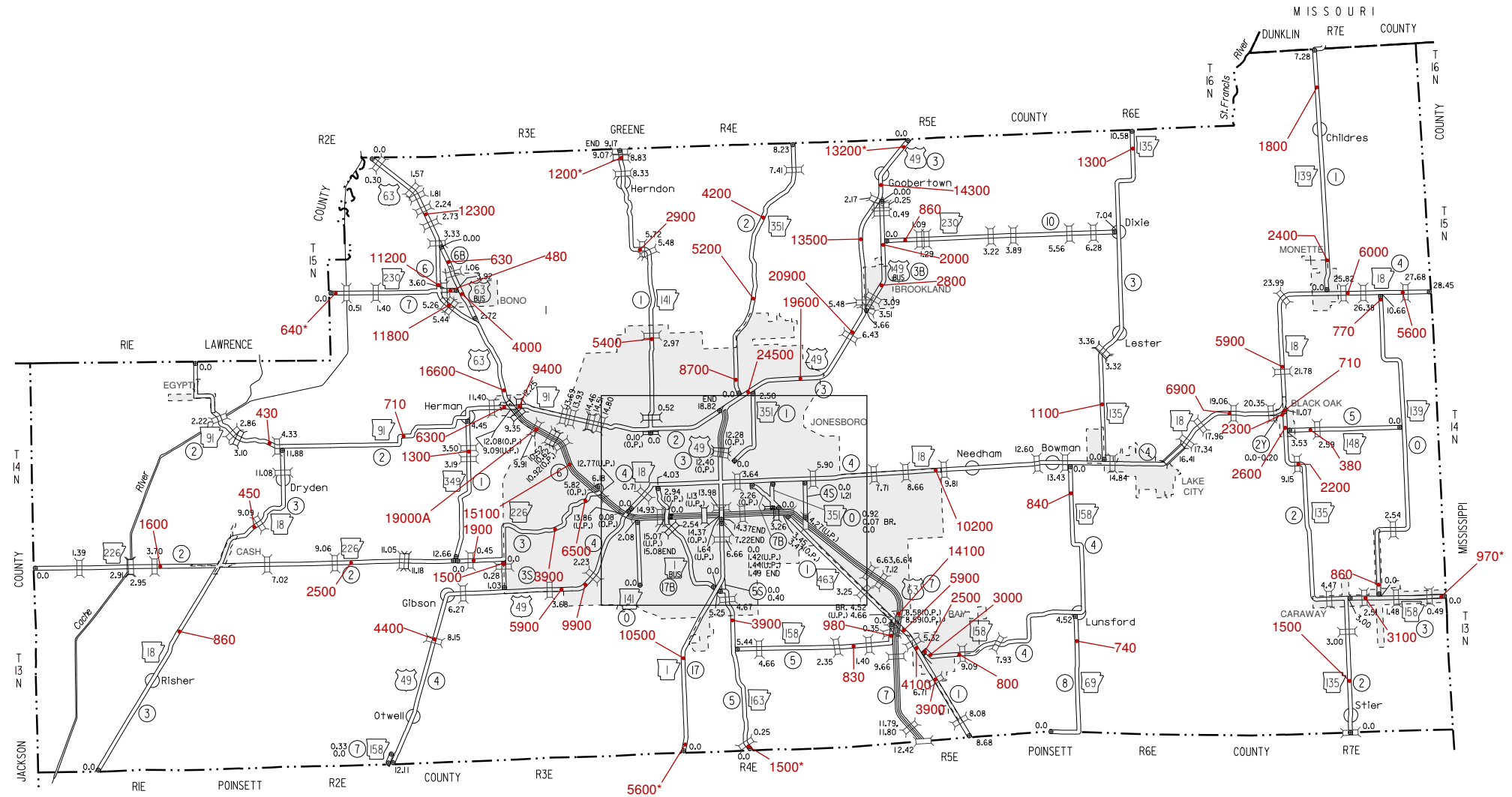
1 0 1
MILES
SHOWING
BRIDGE LOG NUMBERS

LEGEND

A = AUTOMATIC (PERMANENT) TRAFFIC RECORDER LOCATION
* = COUNT MADE IN ADJOINING COUNTY

DISTRICT 10
COUNTY MAP PRODUCED BY
COMPUTER ASSISTED CARTOGRAPHY

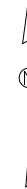
PREPARED BY AHTD/P&R/TS 4-1-2007



PREPARED BY AHTD/P&R/TS 4-1-2008

LEGEND
A = AUTOMATIC (PERMANENT) TRAFFIC RECORDER LOCATION
* = COUNT MADE IN ADJOINING COUNTY

DISTRICT 10
COUNTY MAP PRODUCED BY
COMPUTER ASSISTED CARTOGRAPHY



2007 ANNUAL AVERAGE
DAILY TRAFFIC ESTIMATES
STATE HIGHWAY
ROUTE AND SECTION MAP
CRAIGHEAD COUNTY
ARKANSAS
SHOWING
BRIDGE LOG NUMBERS

