HEJAL & MICHAEL

A PREDICTIVE MODEL FOR TRAVEL TIMES ON TWO-LANE STATE HIGHWAYS

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BY

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JOINT HIGHWAY RESEARCH PROJECT

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Progress Report

A PREDICTION MODEL FOR TRAVEL TIMES
ON RURAL TWO-LANE STATE HIGHWAYS

TO: J. F. McLaughlin, Director
Joint Highway Research Project

September 15, 1970

File No.: 3-4-4

FROM: H. L. Michael, Associate Director
Joint Highway Research Project

Project No.: C-36-73D

The attached Progress Report titled "A Prediction Model for Travel Times on Rural Two-Lane State Highways" is submitted on the research project "Priority Programming for Highway Construction". The Report has been authored by S. S. Nejal and H. L. Michael of our staff.

The phase of the research reported here is concerned with the prediction of travel times on state highways. Average running speed, as can be obtained from travel time, is an important factor in evaluating benefits to motorists obtained from improving a highway by reconstruction or resurfacing and should be evaluated in priority programming procedures.

The model developed was found to be a very good means of predicting travel time. As travel time, or running speed, is used as an important measure of the quality of service provided by a highway and in many transportation and traffic engineering studies, the results of this phase of the project are presented separately in order to promote early application of the findings.

The report, less Appendix B, is also planned for submission as a Technical Paper to Traffic Engineering magazine. Action, therefore, is also requested on approval of such publication.

Respectfully submitted,

Harold L. Michael
Associate Director

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Progress Report

A PREDICTION MODEL FOR TRAVEL TIMES
ON RURAL TWO-LANE STATE HIGHWAYS

by

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ABSTRACT

Predicting travel time on highways is essential in evaluating the level of service, the adequacy of the highway system, road user costs, and the magnitude of improvement needed. Determining the effects of factors such as traffic, geometric conditions and pavement structural conditions on travel time on two lane rural highways was the task of this investigation.

A stratified sample of 120 highway sections on Indiana rural state highways was selected and travel time was measured by the average car method. Several runs in both directions were made to obtain representative average running times. Parameters such as traffic volumes, width of pavement, etc. were measured; while other variables describing roadway characteristics, such as terrain, length of no passing zones, etc were obtained from the records of the sufficiency inventory of rural state highways. Ten such variables were used in data analysis.

The average running speed was the dependent variable in the stepwise linear regression analysis used to interpret travel time as a function of physical and traffic roadway conditions. A model containing only six independent variables (traffic volume, traffic interruptions per mile, width of pavement, stopping sight distance restrictions, alignment factor and restricted passing sight distance) predicted running speeds with a high degree of accuracy, $R^2 = .903$ and standard error of estimate of 1.876 mph. The model was then tested, examined for variation and compared with speed and volume relationships suggested by the Highway Capacity Manual.

A PREDICTION MODEL FOR TRAVEL TIMES ON RURAL TWO-LANE STATE HIGHWAYS

Introduction

Traveltime is an essential parameter in evaluating the level of service provided by a highway facility, the adequacy of a highway system, road-user costs, and the magnitude of improvements needed. Quantifying the effects of traffic and roadway physical conditions on travel time, therefore, would not only permit better estimates of travel time but also would provide a better evaluation of the level of service, better estimates of road user costs and an important tool useful in determining the cost effectiveness of various improvement projects.

Developing a model to estimate travel time on two lane rural highways was the task of the research investigation reported here. The effects of factors such as traffic, geometric features and pavement structural condition were evaluated. Traffic conditions included vehicular volumes, truck volumes and traffic interruptions. Geometric features consisted of pavement width, shoulder width, horizontal and vertical alignment and adequacy of sight distance. Pavement structural condition was measured by the quality of the riding surface. For a sample of highway sections, travel time was measured in the field while the possible affecting factors were obtained from current highway inventory records of the Indiana State Highway Commission.

For the travel time measurements, two basic methods were considered:

1. License Plate Method
2. Average Car Method

Examination of these methods revealed, however, that the license plate method had two inherent disadvantages:

1. The time and manpower required to conduct studies on low volume roads would be high.
2. A large variance in sampled travel time was found for one pilot test section, due to large variations in the speed of different drivers.

As the objectives of this study were measurement of the adequacy of a highway section and its level of service, the variability of speeds by different operators in driving over it was of little concern.

The average car method did not possess these disadvantages and it was the method selected.

The test sections were selected from the Inventory Records of the Indiana State Highway Commission. Each test section was a logical, homogeneous road section beginning and ending at well defined points, such as county lines, highway junctions, city limits, changes in roadway and pavement features, bridges, etc. Furthermore, many characteristics of such sections were reported in Indiana's inventory records.

Selection of the Study Sample

A stratified sample of 120 test sections was selected from the State of Indiana with subsamples of 20 sections in each of the six highway districts. A wide range of values for each of the parameters to be analyzed was desired. High, medium and low traffic volume highways were chosen and sections with pavement widths ranging from 18 to 28 feet were selected; these are two examples of the stratification exercised to insure coverage over a range of useful values. A sample size of 120 was utilized to insure an adequate number of observations.

A highway section to be selected for the sample had to meet the following requirements:

1. Located on a rural two-lane state highway,
2. Free of construction and maintenance operations when the travel time runs were conducted,
3. Outside of incorporated areas,
4. Free of restricting speed limits due to adjacent development.

A list of the test sections selected is given in Appendix B.

Procedure

Travel time was measured by the average car technique. The test vehicle was driven at an average speed of 62 mph whenever traffic and roadway conditions permitted such speed to be safely run. This speed was the free flow average speed on two lane highways in Indiana for the year 1968 (1). Poor alignment and traffic interruptions are examples of roadway and traffic conditions which resulted in many average running speeds below 62 mph. Although several sections were of a high type design and traffic volumes were low, thus permitting a safe comfortable running speed above 62 mph, the speed of the test vehicle was not allowed to exceed that value. The maximum speed limit on two lane highways in Indiana is 65 mph and probably will not be raised for many years. Hence, a 62 mph maximum average running speed is the approximate maximum which could be legally obtained under the highest level of service.

The procedure for collecting the data was as follows:

1. A safe, comfortable speed was driven, depending on traffic and roadway conditions. This speed, as noted previously, was not allowed to exceed 62 mph.

2. Slow moving vehicles were passed when conditions permitted.
The passing maneuver was the unforced type with typical acceleration and deceleration characteristics. On highways with high traffic volumes, a balance between vehicles passing and those passed by the test vehicle was achieved.
3. The travel time for each section, measured with a stop watch, was an average of several runs made in both directions. The number of runs depended on the traffic volume. On high volume roads, five to eight runs were taken to obtain the average travel time.
4. On sections which did not begin or end with an intersection controlled by a stop sign or a traffic signal, the speed of the test vehicle at the beginning or end of the section was the safe, comfortable speed allowed by the highway section and conditions.
5. On highways with very little traffic, the recorded times of individual runs were very close and in many cases identical. This reflects the care that was exercised in making the several test runs and the almost total absence of different conditions which affected travel time.

Analysis of Field Data

The following are the variables used in the data analysis:

1. Average Running Speed. This is the dependent variable in the regression analysis. It was computed by dividing the length of the test section by the recorded travel time. Identified as SPEED.

2. Traffic Volume. This is the volume of traffic, expressed as vehicles per hour, that was manually counted during the test period at one representative location on the section. Identified as VEH/HR.
3. Truck Volume. This is the truck volume, expressed as trucks per hour, that was similarly counted during the test period. Identified as TRK/HR.
4. Traffic Interruptions per Mile. A traffic interruption was defined as either a stop sign, a traffic signal, or any other traffic event for which at least one-half of the traffic was required to stop or severely slow down. Such an interruption could be located at the beginning, end or anywhere on the test section. The total number of these traffic interruptions was divided by the length of the section to yield this variable. Identified as TRC/LN.
5. Width of Pavement. The actual width of the usable pavement was measured and used as an independent variable in the analysis. Identified as WIDTH.
6. Shoulders Width. The average width of the usable part of both shoulders was another variable used in the analysis. Identified as SHLDR.

7. Terrain. Three different types of terrain are commonly used to identify the topography in Indiana - flat, rolling and hilly. They were coded as 1, 2 and 3 respectively. This variable was abbreviated as TERR.
8. Stopping Sight Distance Restrictions. The total number of locations where sight distance was below the minimum standard for the highway class is reported for each section in the Indiana Inventory records. If no restrictions were present, a value of zero is recorded. The abbreviation for this variable was S.S.D.
9. Alignment Factor. For each horizontal curve where the degree of curvature exceeds the design standard, the excessive number of degrees (difference between actual and maximum allowable) are totaled for substandard curves on the section. This was reported in the inventory and was identified by ALIGNE.
10. Restricted Passing Sight Distance. The length of restricted passing sight distance, measured by logging in tenths of miles the amount of the section with a yellow barrier line is also reported in the inventory. This was another independent variable used in the regression and designated as NOPASS.
11. Pavement Structural Adequacy. Pavement condition for the section was measured by the type of maintenance or construction requirements. None, minor, moderate and extensive maintenance are coded as 1 to 4, respectively, in the inventory while resurfacing and reconstruction are coded as 5 and 6. This integer variable was used as reported in the highway inventory and abbreviated as SURFCE.

Variables 5 through 11 were obtained from the records of the sufficiency inventory for rural state highways. The values were checked while conducting the travel time study for any errors.

A stepwise linear regression analysis was performed by program BMD-2R (2). The ten independent variables, with all included, produced a linear estimating model with an R^2 , coefficient of determination, of 0.907. The first six variables to be included in the regression program in the model produced an (R^2) of 0.903. As a result, the regression model for predicting travel time was limited to the six most significant variables.

The equation, commonly called the regression analysis model is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_6 X_6 + \epsilon$$

where Y is the dependent variable, the average running speed (SPEED); X_i 's are the independent variables; β_i 's are the regression coefficients estimated by the least square method by program BMD-2R; ϵ is a random error term. The values for the model obtained in this study are given in Table 1. The values obtained using all ten independent variables are presented in Appendix A.

Regression Analysis Interpretations

When all ten of the independent variables were included in the model, four of them were not significant at the 95% level:

- a) Truck volume per hour, TRK/HR. This indicates that trucks did not influence travel time significantly other than their effect in the total traffic volume. On highways where any appreciable number of trucks was observed, the percentage of trucks in the traffic stream was relatively constant. It

TABLE 1. SUMMARY OF REGRESSION MODEL

R^2 coefficient of determination = .903

Standard error of estimate = 1.876 mph

Variable	Identification	Co-efficient β_i	Standard error	F to Remove	Range of Variable and Units
Constant	--	38.43	--	--	
X_1	VEH/HR	-.0113	.00115	95.36 *	6-1000, veh/hr
X_2	TRC/LN	-7.0143	.56599	153.59 *	0-2.5, interruptions/mile
X_3	WIDTH	1.0452	.10193	105.14 *	18-30, ft
X_4	S.S.D.	-.3076	.04714	42.58 *	0-17, number of obstructions/ sect
X_5	ALIGN	-.1049	.01342	61.05 *	0-48, excess degrees of curves/sect
X_6	NO PASS	-.1073	.01709	39.41 *	0-22, tenths of miles/sect

* Significant at all levels.

ranged between 10 to 16 percent; these were also the sections of high traffic volumes. This high correlation between truck volumes and total traffic volume on high volume roads could explain the non-significance phenomena.

- b) Terrain, TERR. This emphasizes the known fact that passenger vehicles are not adversely affected by the terrain; furthermore no appreciable truck volumes were observed on two-lane highways on non-flat terrain.
- c) Shoulder Width, SHLDR. This indicates that traveling speeds of passenger vehicles are not influenced by the width and condition of the shoulders. It should be noted, however, that the majority of sections with wide pavements are also the sections with wide usable shoulders.
- d) Pavement Structural Adequacy, SURFCE. This suggests that the condition of the pavement does not affect the drivers choice of traveling speed. It must be noted, however, that this study did not include any road sections which had severe pavement conditions warranting complete resurfacing or reconstruction.

The results of the regression analysis are conceptually correct.

An increase in width of pavement results in increased travel speed while an increase in traffic volume traffic interruptions, no pass restrictions, etc. reduces travel speed.

For the same highway section, higher traffic volumes result in larger variations in values among individual runs when compared with lower volumes of traffic on the same section. This is a situation where

the variance of the error term is a function of one of the independent variables. This could have been resolved by weighted regression where more weight is given to values at lower traffic volumes where variations are lower. While sampling in the field for this study, more runs were made on sections with high traffic volumes. This has a similar effect to weighting. Mathematically the value $\frac{S_i^2}{n_i}$ was maintained relatively

constant, n_i being the number of runs on section i and S_i^2 the estimate of the variance on section i .

Conclusion

The following conclusions resulted from the study:

1. The regression model developed is a simple, efficient way of computing travel time on two lane rural highways; the input parameters are clearly defined and many are listed in the inventory records of state highway sections.
2. The model is linear and has the additivity property. On extended highway links, consisting of more than one section, a weighted average of the variables would produce the same results as a weighted average of the running speeds on the individual sections.
3. The scope of this study is complementary to that of the Highway Capacity Manual (3). The regression model concept is a sensitive estimator of average running speed on rural two lane highways and can be used to evaluate the level of service of highway sections. It is easy to apply the model to existing highways where inventory data is present, and one is also able to estimate the effect on level of service of factors not evaluated by the highway capacity manual.

4. The estimated average running speed of a highway section with ideal geometric conditions ($WIDTH = 24$, $TRC/LN = 0$, $S.S.D. = 0$, $ALIGN = 0$, $NO PASS = 0$) and free of the influence of traffic ($VEH/HR = 0$) is 63.5 mph. This value conforms to the speed restriction of a 65 mph maximum limit and current driver practice though higher speed could be practically achieved on such sections.
5. The same ideal section with a traffic volume of 400 vph is estimated by the model to operate at a speed of 59 mph. This is very close to the Highway Capacity Manual 60 mph limiting operating speed for level of service A on ideal two lane highways (400 vph is also the maximum volume for level of service A).
6. The increase of 500 vph between levels of service A and B should reduce the average running speed by 10 mph according to the Highway Capacity Manual. The regression model developed in this study, however, produces a 5.6 mph reduction. In general, the rate of change of speed v/s traffic volume is less using the regression model than what the capacity manual suggests. This suggests that the effect of volume on running speed may not be as great as estimated by the capacity manual.
7. For two-lane rural highways, six feet reduction in the width of the pavement (24 ft to 18 ft) results in an average 28% reduction in the capacity or service volume according to the Highway Capacity Manual. The same reduction in width would result in 6.27 mph decrease in running speeds according to the regression model. Using the model a traffic volume of 557 vph produces an equivalent speed reduction; 557 vph is also 27.8% of the capacity of such roads under ideal conditions.

8. An increase or decrease of unobstructed shoulder width is roughly equivalent to equal variations in pavement width, relative to the effect on capacities and service volumes according to the Capacity Manual. Examining the coefficients of the expanded model given in Table A1 reveals that the effect of unobstructed shoulder width approximately equals the effect of pavement width on average running speeds.

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APPENDIX A

TABLE A-1. SUMMARY OF REGRESSION MODEL INCLUDING ALL 10 VARIABLES

R^2 , Coefficient of determination = 0.907

Standard error of estimate = 1.8645 mph.

Variable	Identification	Co-efficient β_i (a)	F to Remove	Comments
Constant	--	39.64	--	
X_1	VEH/HR	- .0100	47.704 *	Variables in the regression adopted by this study.
X_2	TRC/LN	-7.0257	155.652 *	
X_3	WIDTH	1.0067	80.964 *	
X_4	S.S.D.	- .2766	28.132 *	
X_5	ALIGN	- .1047	60.925 *	
X_6	NO PASS	- .1012	31.871 *	
X_7	TRK/HR	- .0098	1.155 **	Additional variables that did not improve the estimating power of the model.
X_8	TERR	- .3759	1.083 **	
X_9	SHLDR	0.0947	1.814 **	
X_{10}	SURFACE	- .1856	0.787 **	

(a) As four more variables are included, the coefficients of the six original independent variables and constant in the regression are different than those in Table 1.

* Significant at 95% level.

** Not significant at 95% level.

APPENDIX B

Highway Test Sections Location, Description, and Average Running Speed

Crawfordsville District

1. SR 18	Speed*: 58.4 mph
County: Benton	Length: 11.14 mi.
Section Begins: JCT US 52	Section Ends: White Co. Line
2. SR 25	Speed: 52.8 mph
County: Tippecanoe	Length: 2.41 mi.
Section Begins: JCT SR 225	Section Ends: 2.41 Mi. South
3. SR 28	Speed : 59.8 mph
County: Fountain	Length: 4.59 mi.
Section Begins: JCT SR 341	Section Ends: Attica City Limit
4. SR 28	Speed: 61.5 mph
County: Clinton	Length: 8.14 mi.
Section Begins: JCT US 421	Section Ends: Tipton Co. Line
5. SR 32	Speed: 62.0 mph
County: Boone	Length: 4.11 mi.
Section Begins: Montgomery Co. Line	Section Ends: JCT SR 75
6. US 36	Speed: 58.2 mph
County: Putnam	Length: 3.72 mi.
Section Begins: JCT SR 43	Section Ends: Bainbridge City Limit
7. US 36	Speed: 57.2 mph
County: Putnam	Length: 6.44 mi.
Section Begins: Bainbridge City Limit	Section Ends: Hendricks Co. Line
8. SR 38	Speed: 52.7 mph
County: Tippecanoe	Length: 4.06 mi.
Section Begins: Dayton City Limit	Section Ends; Clinton Co. Line
9. SR 38	Speed 55.1 mph
County: Clinton	Length: 1.20 mi.
Section Begins: Tippecanoe Co. Line	Section Ends: Mulberry City Limit
10. SR 39	Speed: 62.0 mph
County: Boone	Length: 2.40 mi.
Section Begins: JCT SR 47	Section Ends: 2.40 mi. North
11. US 41	Speed: 56.8 mph
County: Warren	Length: 4.84 mi.
Section Begins: JCT SR 63	Section Ends: JCT SR 28

*: Measured average running speed as obtained in this research.

12.	US 41
County: Warren
Section Begins: JCT SR 28	Speed: 49.6 mph
Length: 1.49 mi.
Section Ends: JCT SR 55
13.	US 41
County: Fountain
Section Begins: Attica City Limit	Speed: 56.9 mph
Length: 3.09 mi.
Section Ends: JCT SR 55
14.	SR 43
County: Montgomery
Section Begins: JCT SR 234	Speed: 57.7 mph
Length: 4.09 mi.
Section Ends: Putnam Co. Line
15.	SR 43
County: Putnam
Section Begins: Montgomery Co. Line	Speed: 54.2 mph
Length: 1.18 mi.
Section Ends: JCT SR 236
16.	SR 47
County: Boone
Section Begins: Montgomery Co. Line	Speed: 50.9 mph
Length: 4.10 mi.
Section Ends: Thorntown City Limit
17.	SR 47
County: Boone
Section Begins: JCT SR 39	Speed: 61.2 mph
Length: 8.15 mi.
Section Ends: JCT US 421
18.	SR 53
County: White
Section Begins: Tippecanoe Co. Line	Speed: 59.2 mph
Length: 3.0 mi.
Section Ends: JCT SR 18
19.	US 421
County: Clinton
Section Begins: Frankfort City Limit	Speed: 49.4 mph
Length: 1.27 mi.
Section Ends: 1.27 mi. North
20.	US 421
County: Boone
Section Begins: Clinton Co. Line	Speed: 62.0 mph
Length: 3.80 mi.
Section Ends: JCT SR 47

Fort Wayne District

1.	SR 3
County: Noble
Section Begins: JCT SR 8	Speed: 56.0 mph
Length: 1.71 mi.
Section Ends: Avilla City Limit
2.	SR 3
County: Huntington
Section Begins: JCT SR 124,	Speed: 59.4 mph
Length: 6.03 mi.
Section Ends: Wells Co. Line
3.	SR 3
County: Wells
Section Begins: JCT SR 218	Speed: 61.3 mph
Length: 6.03 mi.
Section Ends: Blackford Co. Line

4.	SR 3
County: Blackford
Section Begins: Wells Co. Line	Speed: 56.6 mph
Length: 1.00 mi.
Section Ends: JCT SR 18
5.	SR 5
County: Huntington
Section Begins: JCT I 69	Speed: 61.5 mph
Length: 2.01 mi.
Section Ends: Warren City Limit
6.	US 6
County: Noble
Section Begins: JCT SR 9	Speed: 57.8 mph
Length: 4.68 mi.
Section Ends: Kendallville City Limit
7.	SR 15
County: Elkhart
Section Begins: JCT US 6	Speed: 54.0 mph
Length: 1.05 mi.
Section Ends: Kosciusko Co. Line
8.	SR 15
County: Kosciusko
Section Begins: Elkhart Co. Line	Speed: 53.9 mph
Length: 1.47 mi.
Section Ends: Milford City Limit
9.	SR 15
County: Wabash
Section Begins: JCT SR 124	Speed: 62.0 mph
Length: 3.09 mi.
Section Ends: Wabash City Limit
10.	SR 18
County: Grant
Section Begins: JCT SR 13	Speed: 54.2 mph
Length: 5.98 mi.
Section Ends: Marion City Limit
11.	SR 18
County: Grant
Section Begins: 45 mi. E. Marion	Speed: 54.5 mph
Length: 4.65 mi.
Section Ends: 10 W Divided Hwy.
12.	SR 19
County: Elkhart
Section Begins: Nappanee City Limit	Speed: 61.9 mph
Length: 3.88 mi.
Section Ends: JCT SR 119
13.	US 31
County: Miami
Section Begins: JCT SR 218	Speed: 39.4 mph
Length: 1.13 mi.
Section Ends: JCT SR 218
14.	US 31
County: Miami
Section Begins: JCT SR 218	Speed: 52.9 mph
Length: 5.21 mi.
Section Ends: JCT SR 18
15.	US 33
County: Whitley
Section Begins: Allen Co. Line	Speed: 60.0 mph
Length: 1.30 mi.
Section Ends: Churubusco City Limit
16.	SR 105
County: Huntington
Section Begins: JCT SR 124	Speed: 51.5 mph
Length: 5.10 mi.
Section Ends: JCT SR 218

17. SR 124	Speed: 43.9 mph
County: Miami	Length: 5.20 mi.
Section Begins: Wabash Co. Line	Section Ends: 5.20 mi East
18. SR 124	Speed: 62.0 mph
County: Huntington	Length: 1.0 mi.
Section Begins: Wabash Co. Line	Section Ends: JCT SR 105
19. SR 124	Speed: 55.9 mph
County: Huntington	Length: 2.01 mi.
Section Begins: JCT SR 3	Section Ends: Wells Co. Line
20. SR 124	Speed: 58.3 mph
County: Wells	Length: 2.89 mi.
Section Begins: Huntington Co. Line	Section Ends: JCT SR 303

Greenfield District

1. SR 3	Speed: 58.5 mph
County: Delaware	Length: 5.61 mi.
Section Begins: JCT US 35	Section Ends: Henry Co. Line
2. SR 3	Speed: 62.0 mph
County: Henry	Length: 4.78 mi.
Section Begins: Delaware Co. Line	Section Ends: Divided Hwy. 4.78 Mi. S.
3. SR 19	Speed: 58.9 mph
County: Tipton	Length: 3.77 mi.
Section Begins: Tipton City Limit	Section Ends: Hamilton Co. Line
4. SR 19	Speed: 57.0 mph
County: Hamilton	Length: 2.06 mi.
Section Begins: Cicero City Limit	Section Ends: Arcadia City Limit
5. SR 26	Speed: 54.3 mph
County: Grant	Length: 1.60 mi.
Section Begins: JCT US 35	Section Ends: JCT SR 221
6. SR 26	Speed: 62.0 mph
County: Grant	Length: 4.84 mi.
Section Begins: Fairmont City Limit	Section Ends: JCT I 69
7. US 31	Speed: 53.1 mph
County: Hamilton	Length: 1.29 mi.
Section Begins: JCT US 431	Section Ends: JCT SR 234
8. US 31	Speed: 57.2 mph
County: Hamilton	Length: 3.76 mi.
Section Begins: JCT SR 234	Section Ends: Divided Highway
9. SR 32	Speed: 60.6 mph
County: Randolph	Length: 3.61 mi.
Section Begins: Parker City Limit	Section Ends: Farmland City Limit

10.	US 35
County: Howard
Section Begins: JCT SR 19	Speed: 57.1 mph
Length: 3.04 mi.
Section Ends: Greentown City Limit
11.	US 36
County: Henry
Section Begins: Sulphur Springs
City Limit	Speed: 61.8 mph
Length: 2.46 mi.
Section Ends: Mt. Summit City
Limit
12.	US 36
County: Madison
Section Begins: JCT SR 38	Speed: 60.3 mph
Length: 4.32 mi.
Section Ends: JCT SR 109
13.	US 36
County: Madison
Section Begins: JCT SR 109	Speed: 58.2 mph
Length: 1.04 mi.
Section Ends: JCT SR 109
14.	SR 37
County: Hamilton
Section Begins: JCT SR 32	Speed: 53.8 mph
Length: 1.62 mi.
Section Ends: JCT SR 238
15.	SR 38
County: Madison
Section Begins: Hamilton Co. Line	Speed: 52.2 mph
Length: 1.05 mi.
Section Ends: JCT SR 13
16.	SR 38
County: Madison
Section Begins: JCT SR 13	Speed: 50.4 mph
Length: 4.00 mi.
Section Ends: JCT I 69
17.	SR 67
County: Hancock
Section Begins: JCT SR 234	Speed: 57.5 mph
Length: 4.00 mi.
Section Ends: Fortville City Limit
18.	SR 67
County: Hancock
Section Begins: Fortville City Limit	Speed: 61.3 mph
Length: 1.15 mi.
Section Ends: Madison Co. Line
19.	SR 109
County: Madison
Section Begins: JCT US 36	Speed: 51.2 mph
Length: 1.57 mi.
Section Ends: JCT SR 38
20.	SR 221
County: Grant
Section Begins: JCT SR 26	Speed: 52.9 mph
Length: 2.05 mi.
Section Ends: JCT SR 22

LaPorte District

1.	SR 2
County: LaPorte
Section Begins: JCT US 6 | Speed: 56.3 mph
Length: 1.18 mi.
Section Ends: Porter Co. Line |
|----|---|--|

2.	US 6	Speed: 59.2 mph
	County: Porter	Length: 4.90 mi.
	Section Begins: LaPorte Co. Line	Section Ends: 4.90 mi. East
3.	US 6	Speed: 59.0 mph
	County: LaPorte	Length: 2.27 mi.
	Section Begins: JCT SR 39	Section Ends: JCT US 35
4.	US 6	Speed: 57.9 mph
	County: Marshal	Length: 4.45 mi.
	Section Begins: Bremen City Limit	Section Ends: Elkhart Co. Line
5.	SR 8	Speed: 52.9 mph
	County: Starke	Length: 4.05 mi.
	Section Begins: Knox City Limit	Section Ends: JCT SR 23
6.	SR 16	Speed: 50.7 mph
	County: Newton	Length: 2.63 mi.
	Section Begins: Brook City Limit	Section Ends: JCT SR 55
7.	SR 18	Speed: 60.5 mph
	County: Carroll	Length: 6.05 mi.
	Section Begins: JCT US 421	Section Ends: Flora City Limits
8.	SR 24	Speed: 58.8 mph
	County: Newton	Length: 1.08 mi.
	Section Begins: Goodlands City Limit	Section Ends: Jasper Co. Line
9.	SR 24	Speed: 59.0 mph
	County: Newton	Length: 5.83 mi.
	Section Begins: Kentland City Limit	Section Ends: JCT SR 55
10.	SR 25	Speed: 61.2 mph
	County: Fulton	Length: 2.38 mi.
	Section Begins: Cass Co. Line	Section Ends: Fulton City Limit
11.	US 31	Speed: 52.1 mph
	County: Fulton	Length: 3.57 mi.
	Section Begins: JCT SR 110	Section Ends: 4.50 mi. South
12.	US 35	Speed: 61.8 mph
	County: Starke	Length: 1.24 mi.
	Section Begins: JCT SR 10	Section Ends: JCT SR 10
13.	US 35	Speed: 52.5 mph
	County: Starke	Length: 1.0 mi.
	Section Begins: Pulaski Co. Line	Section Ends: Bass City Limit
14.	SR 39	Speed: 62.0 mph
	County: Carroll	Length: 2.47 mi.
	Section Begins: Delphi City Limit	Section Ends: JCT SR 18

15.	SR 53
County: Jasper
Section Begins: Rensselaer City Limit	Speed: 52.8 mph
Length: 4.10 mi.
Section Ends: JCT SR 16
16.	SR 104
County: St. Joseph
Section Begins: JCT SR 10	Speed: 48.5 mph
Length: 2.12 mi.
Section Ends: Porter Co. Line
17.	SR 117
County: Marshall
Section Begins: JCT SR 10	Speed: 37.2 mph
Length: 4.27 mi.
Section Ends: JCT SR 110
18.	US 421
County: LaPorte
Section Begins: JCT US 6	Speed: 57.5 mph
Length: 2.87 mi.
Section Ends: 2.87 mi. East
19.	US 421
County: Pulaski
Section Begins: JCT SR 114	Speed: 56.5 mph
Length: 1.75 mi.
Section Ends: White Co. Line
20.	US 421
County: White
Section Begins: Pulaski Co. Line	Speed: 57.9 mph
Length: 2.81 mi.
Section Ends: Monon City Limit

Seymour District

1.	SR 11
County: Floyd
Section Begins: JCT SR 62	Speed: 38.4 mph
Length: 5.72 mi.
Section Ends: Harrison Co. Line
2.	SR 37
County: Morgan
Section Begins: Johnson Co. Line	Speed: 60.0 mph
Length: 2.00 mi.
Section Ends: JCT SR 252
3.	SR 37
County: Johnson
Section Begins: Morgan Co. Line	Speed: 58.1 mph
Length: 0.62 mi.
Section Ends: JCT SR 144
4.	SR 37
County: Johnson
Section Begins: Marion Co. Line	Speed: 53.4 mph
Length: 2.86 mi.
Section Ends: 2.86 mi. South
5.	SR 44
County: Johnson
Section Begins: Morgan Co. Line	Speed: 43.8 mph
Length: 5.19 mi.
Section Ends: JCT SR 135
6.	SR 46
County: Bartholomew
Section Begins: Brown Co. Line	Speed: 59.6 mph
Length: 2.15 mi.
Section Ends: 2.15 mi. East.

7.	SR 46	Speed: 54.8 mph
	County: Bartholomew	Length: 2.35 mi.
	Section Begins: JCT I 65	Section Ends: 2.35 mi East
8.	US 50	Speed: 59.8 mph
	County: Jennings	Length: 1.92 mi.
	Section Begins: N. Vernon City Limit	Section Ends: JCT Co. Rd. 161.
9.	US 50	Speed: 59.1 mph
	County: Ripley	Length: 3.88 mi.
	Section Begins: Jennings Co. Line	Section Ends: Holton City Limit
10.	SR 58	Speed: 37.9 mph
	County: Jackson	Length: 4.81 mi.
	Section Begins: JCT SR 258	Section Ends: Bartholomew Co. Line
11.	SR 62	Speed: 55.1 mph
	County: Harrison	Length: 1.36 mi.
	Section Begins: Lanesville City Limit	Section Ends: Floyd Co. Line
12.	SR 62	Speed: 54.8 mph
	County: Floyd	Length: 1.54 mi.
	Section Begins: Harrison Co. Line	Section Ends: JCT SR 11
13.	SR 62	Speed: 39.3 mph
	County: Ripley	Length: 5.67 mi.
	Section Begins: JCT SR 129	Section Ends: Dearborn Co. Line
14.	SR 135	Speed: 60.5 mph
	County: Johnson	Length: 5.75 mi.
	Section Begins: JCT SR 252	Section Ends: Morgan Co. Line
15.	SR 135	Speed: 56.1 mph
	County: Johnson	Length: 8.09 mi.
	Section Begins: JCT SR 144	Section Ends: Marion Co. Line
16.	US 150	Speed: 60.1 mph
	County: Harrison	Length: 4.20 mi.
	Section Begins: Palmyra City Limit	Section Ends: Floyd Co. Line
17.	US 150	Speed: 57.0 mph
	County: Floyd	Length: 1.73 mi.
	Section Begins: Harrison Co. Line	Section Ends: Greenville City Limit
18.	SR 250	Speed: 45.6 mph
	County: Jackson	Length: 2.19 mi.
	Section Begins: Brownstown City Limit	Section Ends: JCT SR 39
19.	SR 252	Speed: 60.4 mph
	County: Johnson	Length: 1.11 mi.
	Section Begins: JCT SR 135	Section Ends: 1.11 mi. East
20.	US 421	Speed: 58.4 mph
	County: Ripley	Length: 3.57 mi.
	Section Begins: JCT US 50	Section Ends: Osgood City Limit

Vincennes District

1.	US 41	Speed: 50.9 mph
	County: Knox	Length: 1.79 mi.
	Section Begins: Vincennes City Limit	Section Ends: 1.79 mi. South
2.	SR 45	Speed: 55.6 mph
	County: Dubois	Length: 3.88 mi.
	Section Begins: Huntingburg City Limit	Section Ends: Jasper City Limit
3.	US 50	Speed: 58.2 mph
	County: Daviess	Length: 6.50 mi.
	Section Begins: Washington City Limit	Section Ends: 6.50 mi. East
4.	SR 56	Speed: 61.4 mph
	County: Pike	Length: 1.03 mi.
	Section Begins: JCT SR 257	Section Ends: Dubois Co. Line
5.	SR 56	Speed: 53.4 mph
	County: Pike	Length: 4.08 mi.
	Section Begins: Petersburg City Limit	Section Ends: JCT SR 61
6.	SR 57	Speed: 53.4 mph
	County: Greene	Length: 2.48 mi.
	Section Begins: Newberry City Limit	Section Ends: Daviess Co. Line
7.	SR 57	Speed: 59.2 mph
	County: Daviess	Length: 2.87 mi.
	Section Begins: Greene Co. Line	Section Ends: Elnora City Limit
8.	SR 57	Speed: 53.3 mph
	County: Pike	Length: 3.60 mi.
	Section Begins: Daviess Co. Line	Section Ends: Petersburg City Limit
9.	SR 58	Speed: 55.2 mph
	County: Daviess	Length: 1.60 mi.
	Section Begins: Knox Co. Line	Section Ends: Elnora City Limit
10.	SR 62	Speed: 59.0 mph
	County: Spencer	Length: 5.09 mi.
	Section Begins: Dale City Limit	Section Ends: JCT SR 162
11.	SR 62	Speed: 45.6 mph
	County: Perry	Length: 1.01 mi.
	Section Begins: JCT SR 37	Section Ends: Crawford Co. Line
12.	SR 62	Speed: 47.5 mph
	County: Crawford	Length: 6.08 mi.
	Section Begins: Perry Co. Line	Section Ends: JCT SR 66

13.	SR 64	Speed: 58.9 mph
	County: Dubois	Length: 3.87 mi.
	Section Begins: Huntingburg City Limit	Section Ends: JCT SR 162
14.	SR 64	Speed: 57.2 mph
	County: Dubois	Length: 2.24 mi.
	Section Begins: JCT SR 162	Section Ends: St. Anthony City Limit
15.	SR 66	Speed: 43.4 mph
	County: Crawford	Length: 1.76 mi.
	Section Begins: Perry Co. Line	Section Ends: JCT SR 62
16.	SR 67	Speed: 58.2 mph
	County: Knox	Length: 0.76 mi.
	Section Begins: JCT SR 358	Section Ends: Edwardsport City Limit
17.	SR 67	Speed: 56.2 mph
	County: Knox	Length: 4.27 mi.
	Section Begins: End Divided Hwy.	Section Ends: Bruceville City Limit
18.	SR 145	Speed: 42.3 mph
	County: Dubois	Length: 4.52 mi.
	Section Begins: Perry Co. Line	Section Ends: Birdseye City Limit
19.	SR 257	Speed: 54.9 mph
	County: Pike	Length: 5.28 mi.
	Section Begins: JCT SR 356	Section Ends: Daviess Co. Line
20.	US 460	Speed: 60.8 mph
	County: Spencer	Length: 1.93 mi.
	Section Begins: Warrick Co. Line	Section Ends: JCT SR 45