Research Report
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KENTUCKY TRANSPORTATION CENTER

UTILIZATION OF INDEX STATIONS FOR PREDICTION OF INTERSTATE TRAFFIC VOLUMES

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Utilization of Index Stations for Prediction of Interstate Traffic Volumes

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16. Abstract

To facilitate the collection of traffic volumes along the Interstate System and better utilize the available resources. A method to factor adjacent traffic count locations from index counts collected on an annual basis has been proposed. This process utilized the current permanent stations along with other stations identified as Index Stations to calculate the AADT at the Estimated from Index (EFI) stations. This report provides a summary of the process which was developed and a measure of the potential accuracy of the predicted traffic volumes.

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Executive Summary

The Kentucky Transportation Cabinet annually collects Average Annual Daily Traffic (AADT) data at over 200 locations along the Interstate System. Historically, data has been collected at these sites using either permanent traffic counting equipment or portable equipment which counted for a 48-hr sample. In some instances, traffic loops have been installed to facilitate the traffic data collection, however, the installation and maintenance of these loops can prove to be costly. To potentially reduce the number of actual traffic counts collected along the interstate, a method to factor adjacent traffic count locations from index counts collected on an annual basis has been proposed. This process utilized the current permanent stations along with other stations identified as Index Stations to calculate the AADT at the Estimated from Index (EFI) stations. This report provides a summary of the process which was developed and a measure of the potential accuracy of the predicted traffic volumes. After review by the Study Advisory Committee, it was determined that at the present time the procedure would not be implemented into the current traffic count program.

Introduction

The Kentucky Transportation Cabinet currently collects annual traffic volumes at over 200 locations along the Interstate System. With increasing traffic volumes it is becoming more difficult to collect traffic count data using the conventional portable data collection equipment. In some instances, traffic loops have been installed to facilitate the traffic data collection, however, the installation and maintenance of these loops can prove to be costly. To potentially reduce the number of actual traffic counts collected along the interstates, a method to factor adjacent locations from index counts collected on an annual basis has been proposed. This procedure has been outlined by a report prepared by the Division of Multimodal Programs (1). It is the goal of this research project to evaluate the feasibility of this procedure and to determine what long term effects may be realized on the traffic count program.

Background

The Cabinet utilized the concept of control stations (stations counted for seven days at least twice per year) for several years. The historical purpose of these stations was been to provide high quality data that is more accurate than a traditional 48-hour count, but easier to obtain than permanent continuous data.

The concept of Index Stations was proposed to follow a similar scenario. Specific stations were to be selected along a corridor (such as I-75) which best represent the traffic level of several adjacent count stations. These Index Stations would include all permanent count stations and other stations which may have pavement loop detectors installed and have been historically stable. These Index Stations would be counted on an annual basis and then used to determine the traffic volume of adjacent stations. It is anticipated that the relationship between the index stations and the adjacent stations would be developed from historical data. It was also proposed that some means of QC/QA of future factored counts would also be necessary. This may be accomplished by using short term visual counts or counts by other emerging technologies.

It is anticipated that expanding and strengthening the control station concept into the Index Station procedure would be beneficial to the Cabinet. The use of these types of stations would optimize the investment in permanent count stations and stations where loop detectors may be installed. In addition, this process would reduce the number of actual interstate counts which would be required on an annual basis, allowing for more efficient use of resources.

Interstate Traffic Counting Procedure

Traffic count stations have been established along the Interstate Highway System, with each station generally representing a roadway section which contains a consistent traffic volume. These stations historically were counted on an annual basis. These counts have been obtained by several different methodologies, including permanent stations that are identified as Automatic Traffic Recorder (ATR) stations, 24 to 48-hour portable traffic counts (using portable data collection and pneumatic tubes), estimation from adjacent stations, or potentially from short duration counts (less than 8 hours). In some instances, traffic may have been counted in a single direction and then doubled to determine the overall Average Annual Daily Traffic (AADT) for a particular traffic section.

At each of the ATR stations, permanent traffic loops and in some instances axle sensors are installed along with permanent data collection equipment. Other count stations are typically counted for a short duration using either pneumatic tubes, or in-place loops which are connected to a portable data collector.

The concept of Index Stations came from work that was done by both the Division of Multi-Modal Programs and Division of Planning in their historical use of control stations. This concept was expected to provide a means to collect higher quality data than normally be expected from a typical traffic count. They were typically of longer duration (7 days) instead of a typical 48-hour portable count, but they were more economical than a continuous counting station. Each of these stations typically included traffic loops installed in the pavement, which provide better, more consistent data to be

collected. In a report prepared by the Transportation Cabinet (2), it was proposed that these control stations be expanded to provide even more benefits as follows:

- Optimize the investment in permanent counting sensors such as loops
- Optimize the personnel resources, a fully expanded system would allow many dangerous high volume locations to be factored with control station growth factors.

Selection of Index Stations

Traffic count stations to be selected as Index Stations were to be either a permanent ATR stations which provided continuous traffic counting, or other stations along the corridor which have traffic loops installed. These stations were also required to have a minimum of 10 years of historical data. These stations were then used to determine the AADT of the remaining traffic count stations (Estimated from Index, EFI) along the corridor. Typically a minimum of four Index Stations were used to calculate the EFI station traffic volume, one of which was required to be a permanent ATR site, while the others were the closest adjacent stations.

The traffic volumes determined for the EFI stations would be based on the annual traffic counts of the Index Stations. To help reduce the inherent variability due to seasonal variations of traffic, it was determined that the Index Stations should be counted in the fall and/or spring of each year. During this time, the seasonal adjustment factor necessary to determine the AADT used in the analysis would be very small.

AADT Estimation for EFI Stations

Several methodologies were evaluated to calculate the AADT of the EFI stations from the Index Stations which were actually counted. The first methodology used a simple ratio between the historical AADT of the EFI stations and selected Index Stations. However it was observed that there was variability in the resulting predicted AADT of the EFI station depending on which Index Stations were used. There was also variation in the predicted AADT associated with which year of data was utilized. Based on this

information, it was determined that an efficient methodology was needed which could include multiple Index Stations and utilize significant historical data.

After review of the historical traffic counts from many stations similar to the data given in Figure 1 it was determined that some type of smoothing technique may be necessary before the development of the count estimation process.

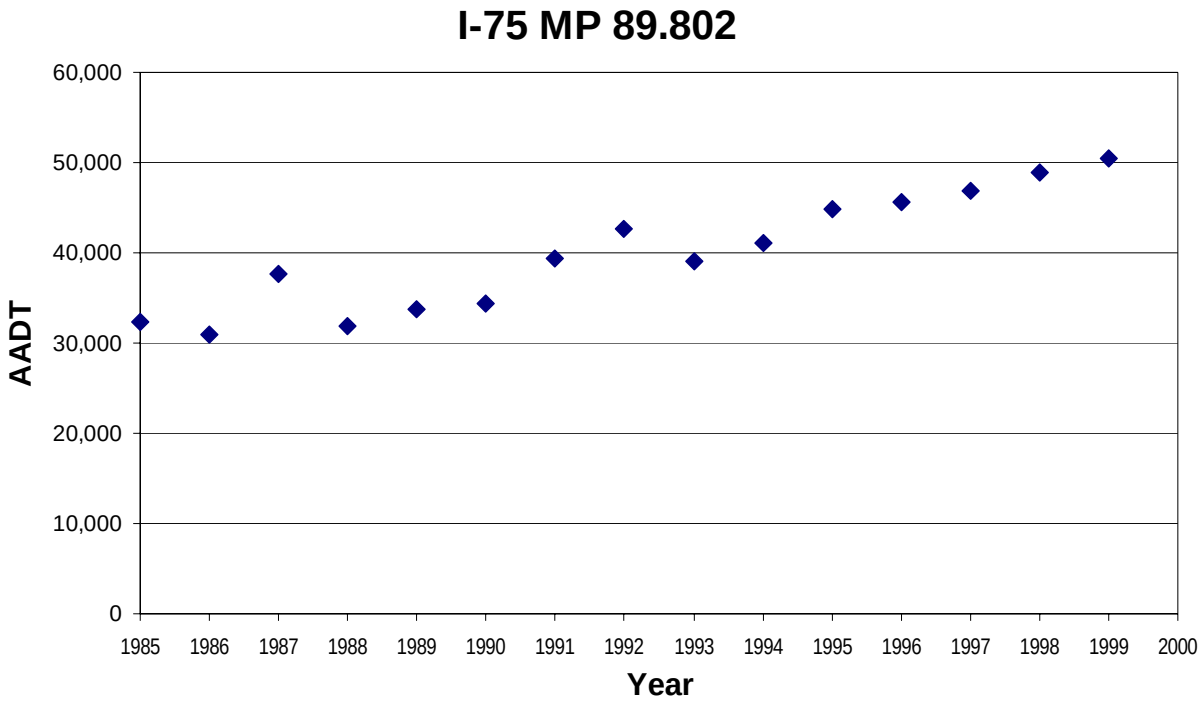

Figure 1. Typical Interstate Traffic Count History.

It may be seen from this Figure 1 that there is some year to year variability as great as 10 to 20 percent from the previous year. This variability may be due to a variety of factors associated with seasonal, day of the week, or axle factor variations or other unexplained anomalies in the collected data. In an effort to minimize the variability, a technique was developed to minimize the effects of the large year to year variations, by smoothing each individual year's data by the data from the surrounding years. This smoothing technique utilizes weights for various years as follows:

Smoothed $AADT_{current\ yr}$ = 0.4 *x* $AADT_{current\ yr}$ + 0.2 *x* ($AADT_{yr-1}$ + $AADT_{yr+1}$) + 0.1 *x* ($AADT_{yr-2}$ + $AADT_{yr+2}$)

An example of this smoothed technique for the data in Figure 1 is given in Figure 2.

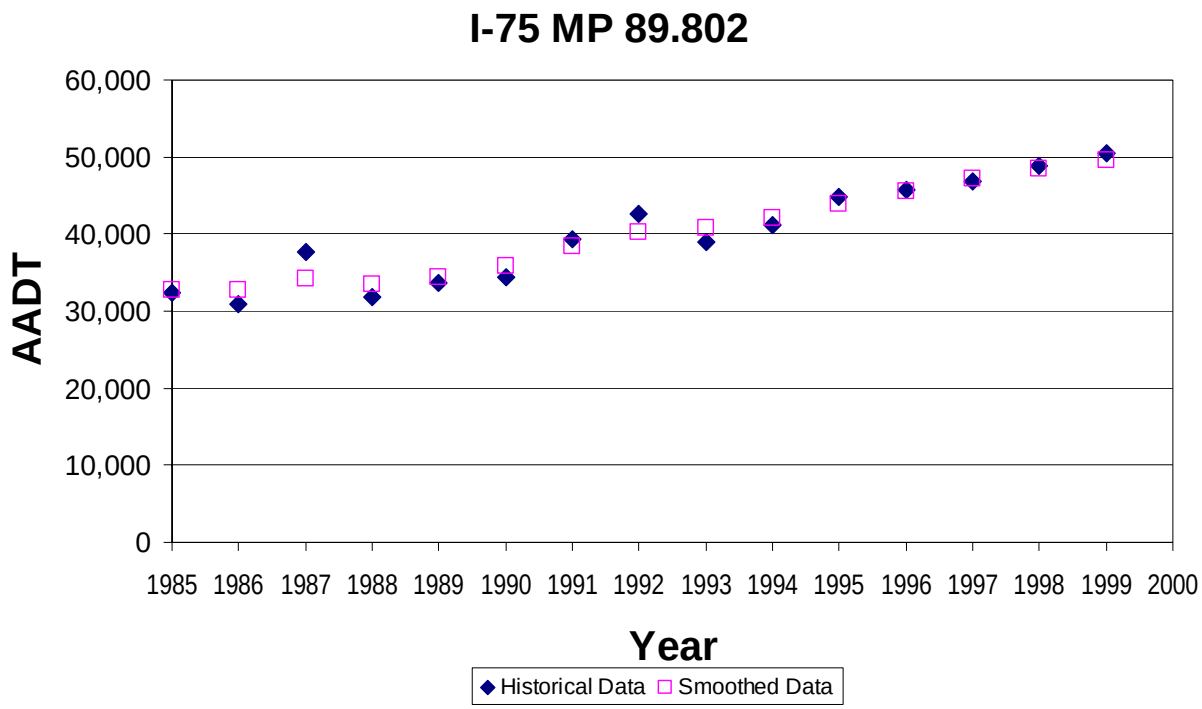

Figure 2. Example of Data Smoothing Technique

It may be seen from these results that the smoothing technique reduces the influence of the AADT spike in a given year and provides data which is more consistent and therefore more appropriate to develop the Index Station/EFI Station relationships. This type of smoothing was conducted on all historical data of both Index Stations and EFI stations to be used in the analysis.

EFI Estimation Process Overview

To accomplish the goal of using multiple Index Stations and historical data, the technique of multiple linear regressions was utilized. Multiple linear regression is a statistical technique for determining the linear relationship between one dependent variable (EFI Stations) and two or more independent variables (Index Stations). This regression is

accomplished by fitting the historical data of an EFI stations with a “least squares” model which has the general form as follows:

$$\text{EFI Station Predicted ADT} = C_1 \times \mathbf{I_1} + C_2 \times \mathbf{I_2} + C_3 \times \mathbf{I_3} + C_4 \times \mathbf{I_4} + C_5 \times \mathbf{I_5} + C_6$$

Where: C_1, C_2, C_3, C_4, C_5 and C_6 are regression coefficients

$\mathbf{I_1}$, $\mathbf{I_2}$, $\mathbf{I_3}$, $\mathbf{I_4}$, **and** $\mathbf{I_5}$ are the AADT of the Index Stations assigned to a particular EFI Station.

This regression analysis was conducted for each EFI station using Microsoft Excel. A typical result for a specific station is given in Figure 3. It may be seen from this figure that the agreement with the historical data is excellent, the R^2 for this analysis was 0.99. which would indicate that the analysis procedure fits the historical data very well and should be adequate to predict future EFI station AADT as well. The R^2 values found for the other EFI multiple regressions were generally greater than 0.85 which would indicate good agreement between the prediction models and the actual historical data.

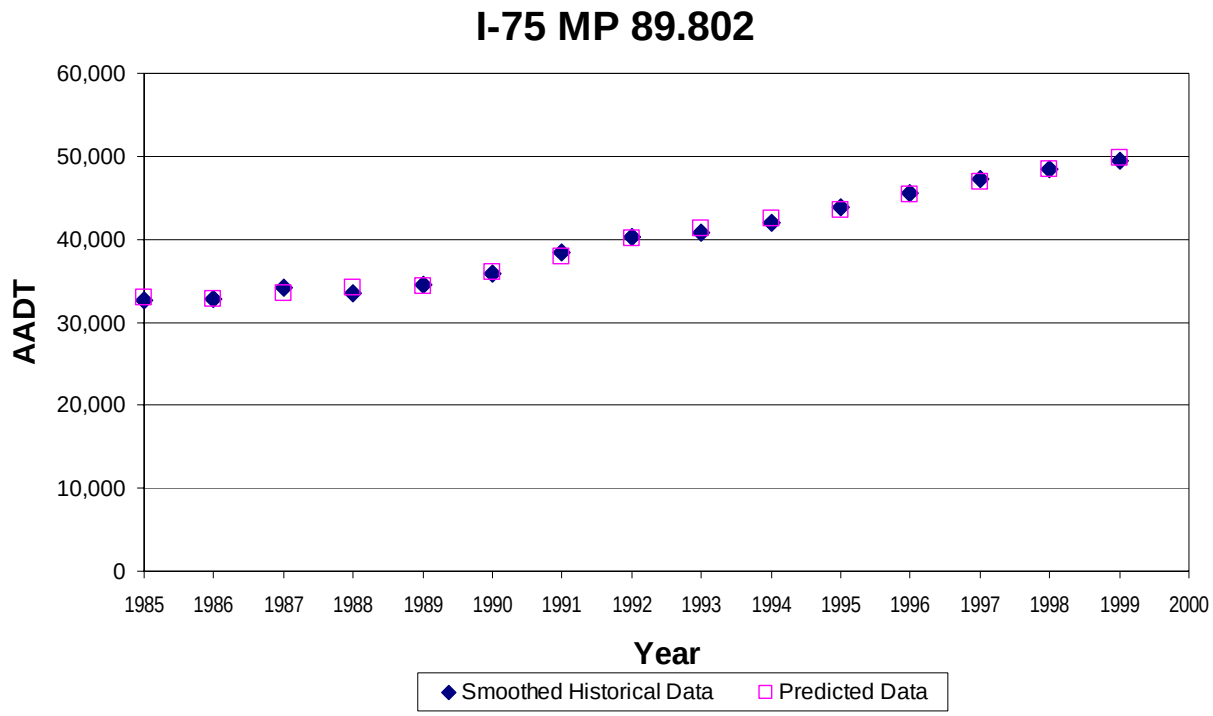

Figure 3. Example of Multiple Linear Regression Results.

Analysis of Prediction Accuracy

To evaluate the potential accuracy of this methodology, historical data from 1985 through 1994 was used to calculate the regression coefficients for the EFI stations along I-75. These regression coefficients were used along with the appropriate Index Stations to predict AADT for the EFI stations from 1995 through 1999. These results were then compared to the actual AADT measured at the EFI stations for these years. A summary graph which shows actual versus predicted AADT is given in Figure 4.

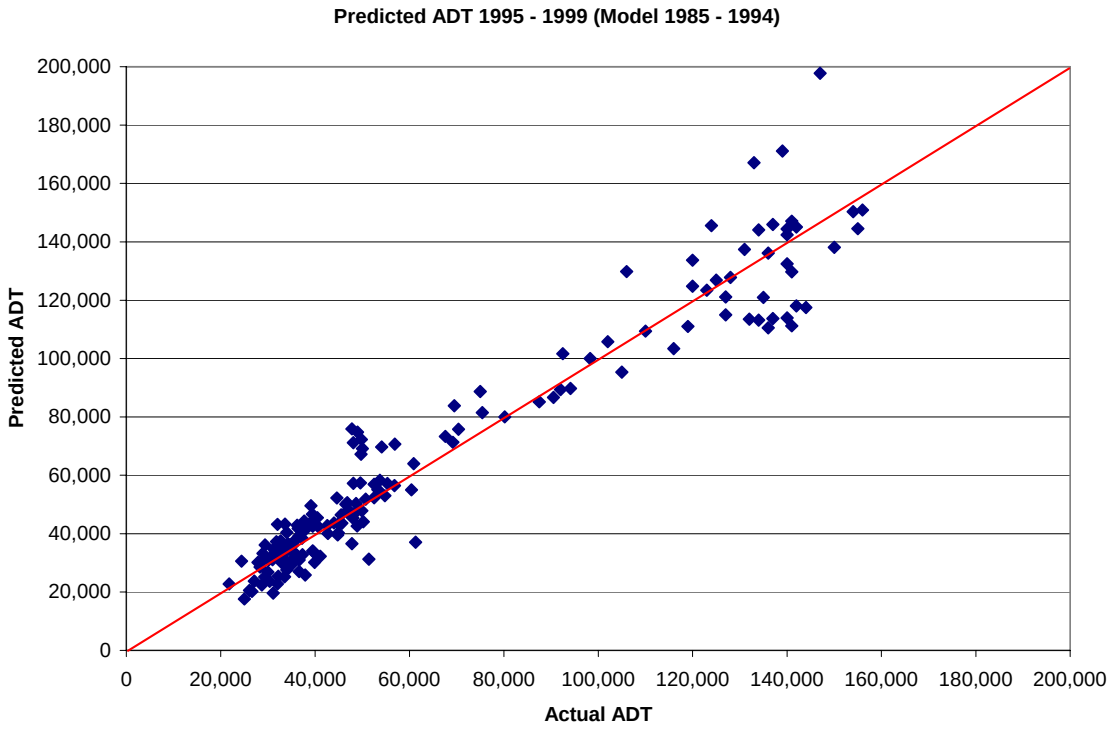

Figure 4. Comparison of Actual verses Predicted AADT,

This figure illustrates good agreement between the actual and predicted AADT. It should be noted that a portion of these data points were predicted five years beyond the last year of data used in the development of the regression analysis. In addition, the Index Station AADT used was from the standard historical data which, with the exception of the permanent stations was only collected from a 48-hour portable count. It is anticipated that by counting the non-permanent Index Stations as proposed (7-days Spring/Fall), better accuracy will be achieved.

To further evaluate the actual accuracy of the predicted AADT, the difference between the actual and predicted AADT given in Figure 4 was calculated. These results are summarized in a cumulative distribution plot in Figure 5.

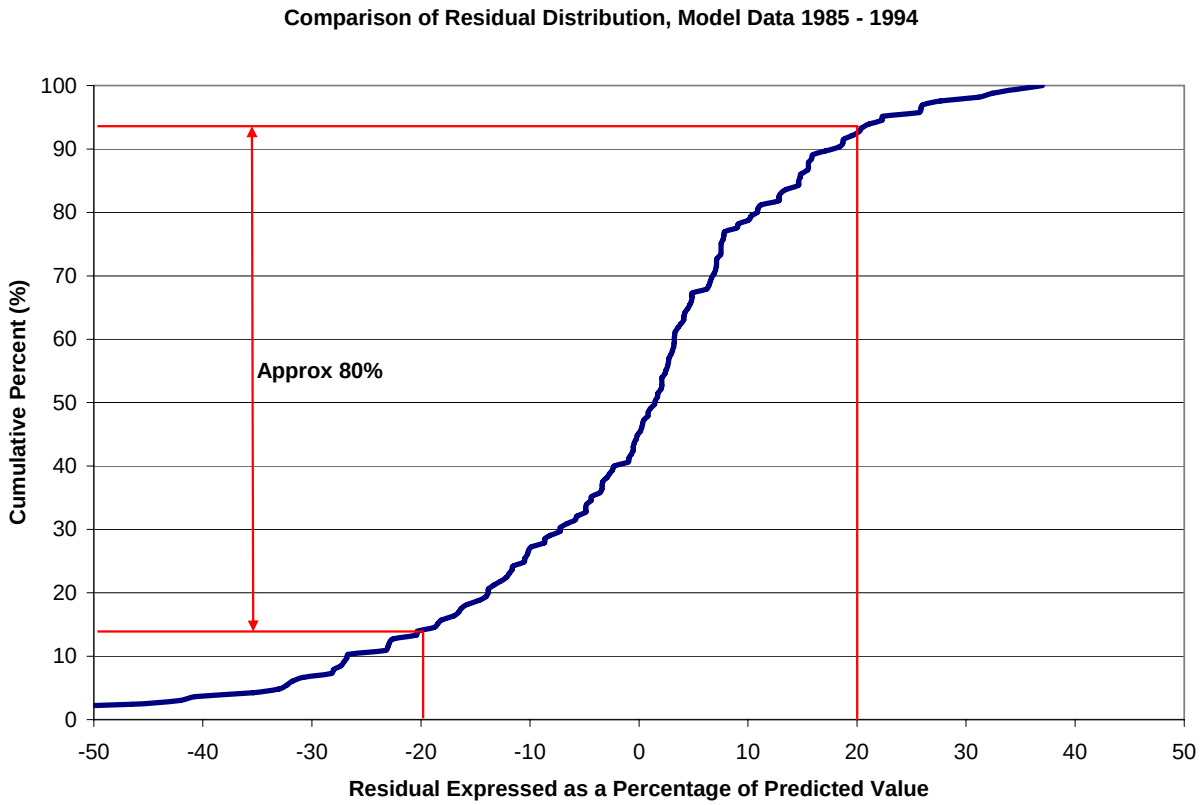

Figure 5. Summary of Residual of Predicted Values.

It may be seen from this figure that approximately 80% of the results were within +/- 20% of the actual value. This would indicate the process appears to work very well in prediction of the EFI station AADT. These errors of +/- 20% were deemed to be acceptable and comparable to what has been seen due to variation in between years on interstate facilities. This type of variation was observed in the historical data, indicating variations of more than 20% from one year to the next. The sources of these differences may be attributed to many different factors, such as variation in the AADT of the Index Stations used to predict data for 1995 – 1999, variation in the actual counts used as comparison, or simply inaccuracies of the perdition models.

EFI Count Spreadsheets

To facilitate the utilization of this process, Excel spreadsheets were developed for each Interstate corridor. These spreadsheets were designed to allow the user to input the AADT of the Index stations each year and automatically calculate the EFI stations based on the multiple regression analysis. An example of one of the spreadsheets is given in Figure 6.

I-24 Index Station Summary

Index Stations	1999	2000	2001	2002	EST. 2003
73-I20-0	29,200	26,900	27,200	27,300	27,200
73-I21-6.387	35,500	38,400	35,600	37,700	36,200
72-P51-30.721	25,200	24,100	24,500	24,400	25,900
72-I22-41.603	15,200	16,000	15,500	16,200	16,100
24-I23-72.757	14,000	17,000	15,000	16,500	15,600
24-I24-88.785	25,700	27,700	32,100	28,600	35,300

Estimated Station	Actual 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients						
						Index Stations						
						Intercept	73-I20-0	73-I21-6.387	70-P51-30.721	72-I22-41.603	24-I23-72.757	24-I24-88.785
73-D13-2.958	29,400	33,450	30,811	32,816	30,087	4,200	0.6295	0.8824	-0.8949			
73-C67-4.328	39,200	36,433	38,149	37,362	39,062	3,706	1.0346	-0.3852	0.8169			
73-006-11.035	27,900	31,330	30,958	31,327	33,531	-333	-0.7765	0.2941	1.7119			
79-850-17.32	26,400	25,097	25,778	25,506	27,258	244	0.0613	-0.0806	1.0913			
79-044-24.941	28,700	30,281	29,840	30,196	33,387	-3,176	-1.3898	0.3489	2.3836			
79-049-26.558	25,600	28,905	28,430	29,519	30,014	-5,750		-0.1536	0.3139	2.0617		
72-756-39.505	22,400	24,751	22,860	24,370	23,126	1,871		0.5654	-0.2351	0.4271		
72-054-44.693	15,100	14,931	14,140	15,230	14,423	-513			0.2919	1.2202	-0.3122	-0.2096
111-046-57.389	15,600	13,504	13,289	13,813	13,704	-693			0.9996	0.3230	-0.4124	-0.2906
111-043-65.349	13,500	13,324	14,347	13,854	15,044	2,527			0.1094	0.8400	-0.4762	0.1017
24-328-85.633	24,800	25,916	27,321	26,449	28,922	4,812			-0.1424	0.8960	-0.0616	0.4060

Figure 6. EFI Spreadsheet, I-24

In the EFI spreadsheet, both the Index Station and the EFI station labels are in the following format:

County Number – Station Number – Beginning Milepoint, such as 73-D13-2.958,

County 73

Station Number D13

Beginning Milepoint 2.958.

The top portion of the spreadsheet provides an area to input the actual AADT for each Index Station, the lower left portion provides the predicted AADT for the EFI stations for each year of analysis. The lower right side of the spreadsheet provides the regression coefficients for the multiple regressions used to predict each EFI station. The spreadsheets for all Interstate corridors are given in Appendix A.

It may be seen that these coefficients may be either positive or negative and have varying magnitudes. It should be noted that one cannot interpret any single coefficient alone. In multiple regressions it is the interactions of each of these coefficients which are used in the predictive equation. In some cases these coefficients may not seem intuitive to the user since these coefficients on an individual basis represent the relationships between one independent variable and the dependent variable, when all other independent variables are held at some constant value. Therefore interpretation must be in terms of the model as a whole and not individual independent variables.

Summary and Conclusions

Based on the analysis of the historical relationships between the selected Index Stations and the EFI stations, a procedure was developed based on multiple linear regression which would allow the prediction of the EFI AADT for future years on the interstate highways in Kentucky. The accuracy of the procedure was illustrated to be acceptable for predicting at least 5 years into the future, with 80% of the data being within 20% of the actual measured AADT. This concept was also evaluated for parkways across the state, but it was determined that the variability of some of the historical data along with the ease of obtaining parkway traffic counts made this concept impractical.

After careful review by the Study Advisory Committee, it was determined that the concept appeared to be a viable option and could be a useful tool in the normal traffic count program of the Transportation Cabinet. However, it was determined that at the present time it would not be included in the normal count program, due to some additional technologies for counting high volume facilities and the ability of the Cabinet to install additional traffic loops along the interstates.

Based on these results, the annual check/calibration procedure which would be necessary for the continued use of this concept, was not completed. Additional research may be necessary in the future to recalibrate the regression models contained in this report and to outline the check/calibration procedure, if it is to be implemented.

References

1. “Control Station Analysis and Implementation Plan”, Traffic Monitoring System Team, Kentucky Transportation Cabinet, Draft Report, September 1999.

2. “Traffic Monitoring System Documentation”, Traffic Monitoring System Team, Kentucky Transportation Cabinet, Draft Report, March 1999.

Appendix A (EFI Count Spreadsheets)

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Index Stations	1999	2000	2001	2002	EST. 2003
73-I20-0	29,200	26,900	27,200	27,300	27,200
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72-P51-30.721	25,200	24,100	24,500	24,400	25,900
72-I22-41.603	15,200	16,000	15,500	16,200	16,100
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Estimated Station	Actual 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients						
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72-054-44.693	15,100	14,931	14,140	15,230	14,423	-513			0.2919	1.2202	-0.3122	-0.2096
111-046-57.389	15,600	13,504	13,289	13,813	13,704	-693			0.9996	0.3230	-0.4124	-0.2906
111-043-65.349	13,500	13,324	14,347	13,854	15,044	2,527			0.1094	0.8400	-0.4762	0.1017
24-328-85.633	24,800	25,916	27,321	26,449	28,922	4,812			-0.1424	0.8960	-0.0616	0.4060

I-64 Index Station Summary

Index Stations	1999	2000	2001	2002	EST. 2003
P92-56-0.85	63,700	63,200	65,900	69,300	70,800
I40-56-5.6	84,800	82,800	81,800	94,900	93,000
I41-56-14.894	83,900	86,500	86,500	100,000	100,000
P22-106-35.163	36,400	36,800	38,100	39,200	39,000
P74-105-71	29,000	30,700	28,800	29,600	30,100
I42-34-81.037	36,200	33,200	33,700	35,200	35,100
I43-87-101.735	21,000	21,500	21,000	25,000	23,800
I44-103-132.918	18,800	17,500	16,700	20,800	18,600
P47-22-161.452	15,900	15,200	16,100	15,700	16,400
I45-10-190.724	21,400	20,800	21,300	26,600	24,900

	Actual ADT						Estimated Station Regression Coefficients									
Estimated Station	1999	Predicted ADT	Predicted ADT	Predicted ADT	Predicted ADT		Index Stations									
		2000	2001	2002	2003	INTERCEPT	56-P92-0.85	56-I40-5.6	56-I41-14.894	106-P22-35.163	105-P74-68.936	34-I42-81.037	87-I43-104.26	103-I44-132.918	22-P47-161.452	10-I45-190.724
56-753-0	67,300	78,697	83,086	81,476	81,592	-3,047	0.0869	-0.3043	-0.0872	2.9618						
56-T98-2.6	66,800	75,223	78,273	79,735	80,583	10,055	0.5762	-0.1037	-0.0233	1.0694						
56-863-3.8	76,400	80,100	83,099	86,240	87,373	8,308	0.7213	-0.1040	0.0925	0.7287						
56-M40-4.5	99,700	103,958	106,536	111,655	111,663	16,453	0.1596	-0.0481	0.2541	1.6148						
56-M84-5.1	99,700	162,020	163,197	194,309	197,928	-23,745	2.9568	0.9074	1.0492	-4.5378						
56-N09-6.454	81,400	74,425	69,479	80,431	77,507	78,299	-1.1888	0.6855	0.5113	-0.8076						
56-A28-7.945	95,400	101,349	101,538	120,001	119,071	-30,791	0.3552	0.7702	0.5308							
56-A26-10.308	86,900	90,622	92,171	106,077	105,363	-38,918	0.4117	0.6156	0.2631	0.8097						
56-220-12.275	126,000	143,078	153,831	153,113	154,468	-66,453	1.0848	-0.4536	-0.3482	5.6699						
56-222-17.074	69,100	73,846	70,892	77,881	78,803	3,244	0.0945		0.4488	-0.4507	1.3810					
56-019-18.888	42,700	42,873	42,055	44,753	42,465	54,748	-1.2051		0.4411	1.1328	-0.5066					
106-520-27.569	40,200	44,452	42,811	43,964	43,670	6,409	-0.3799		0.0634	0.8067	0.8756					
106-509-31.842	35,600	38,801	37,815	39,282	38,744	10,378	-0.4121		0.1188	0.7997	0.4808					
106-254-43.332	34,500	36,996	36,307	35,193	35,500	-6,213			-0.2084	0.8917	0.9637	-0.0351				
37-507-47.761	35,600	33,777	30,771	34,801	35,453	3,043			0.2706	-1.0970	0.9732	0.5366				
37-503-53.118	38,400	36,121	31,276	37,066	38,069	11,338			0.4463	-2.0602	1.3124	0.6537				
120-798-57.86	33,500	30,838	26,294	29,655	30,632	6,418			0.2219	-1.7085	1.4175	0.7403				
105-539-65.27	30,600	29,656	24,636	29,666	30,730	3,601			0.3784	-1.9312	1.4725	0.5777				
25-755-87.488	34,300	35,322	34,019	37,985	37,142	3,696				-0.1997	0.3851	0.2510	0.8753			
25-751-94.233	40,400	42,540	43,032	46,866	45,856	-1,771				0.6684	0.0290	0.0910	0.7349			
25-004-96.245	37,500	38,408	37,893	39,058	39,247	1,309				0.3264	0.5577	0.2400				
25-001-97.675	24,500	25,909	26,737	27,469	27,355	-359				0.7505	0.0539	-0.0905				
87-002-109.621	18,900	19,115	17,739	24,545	21,515	144					-0.1198		1.1340	0.5087	-0.6996	
06-520-112.496	19,100	19,108	20,391	21,299	21,731	-3,480					-0.1689		0.4969	-0.1086	1.2494	
06-288-121.23	18,000	18,095	19,106	19,966	20,313	-2,408					-0.1085		0.4164	-0.0716	1.0615	
103-775-123.025	17,000	16,125	16,067	19,546	18,077	-1,876					-0.1437		0.4007	0.5160	0.3137	
103-027-137.285	11,600	9,974	12,724	10,757	12,367	-1,448					-0.4352			-0.2647	1.8788	0.0411
22-554-156.265	11,086	11,189	11,831	14,649	13,855	-2,776					-0.0609				0.2733	0.5616
22-031-171.607	18,200	19,526	16,952	22,803	20,081	2,617					0.5881			0.5688	-1.3752	0.4714
10-821-181.369	13,200	13,558	14,226	14,064	14,772	259					0.1047			-0.2148	0.6769	0.1709
10-022-185.469	20,900	21,002	19,254	26,517	23,225	-1,512					0.3272			0.7488	-0.9581	0.6696

I-65 Index Station Summary

Index Stations	1999	2000	2001	2002	EST. 2003
P91-107-1.981	33,700	35,400	37,800	41,000	41,200
I50-114-22.349	38,800	44,500	40,400	43,500	44,800
I51-114-37.511	37,100	36,700	37,000	37,900	38,600
I52-50-64.151	33,800	31,300	33,200	31,900	32,600
P50-47-85.579	40,700	40,400	39,700	35,400	40,100
P72-15-104.701	51,800	52,100	48,300	49,300	49,800
I53-56-121.59	84,000	84,500	79,600	86,800	88,100
I54-56-126.673	128,000	141,000	117,000	129,000	135,000
I55-56-130.772	118,000	121,000	127,000	136,000	135,000
P99-56-132.955	123,000	121,000	123,000	122,000	127,000

Estimated Station	Actual ADT 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients										
						Index Stations										
						Intercept	P91-107-1.981	114I50-22.349	114-I51-37.511	50-I52-64.151	47-P50-85.579	15-P72-104.701	56-I53-123.180	56-I54-126.673	56-I55-130.772	56-P99-132.955
107-285-0	32,900	36,039	32,744	30,743	34,464	8724.4474	0.0087	0.6206	-0.8357		0.7441					
114-573-5.997	32,700	45,518	42,310	58,635	51,768	-5509.9810	0.3794	1.4808	1.5623		-2.1196					
114-065-28.006	40,800	48,782	43,572	52,479	50,120	-5642.8484	-0.3263	1.3572	1.3188		-1.0598					
114-061-35.562	43,200	51,678	49,302	63,172	58,688	-15994.5086	0.6093	1.3011	1.3798		-1.5454					
50-537-53.956	32,000	32,155	33,485	29,737	33,206	2529.3016	0.3942		-0.9649	0.6380	0.7701					
50-535-57.627	37,700	34,051	35,434	27,632	33,240	-714.5343	0.1929		-1.6420	1.2042	1.2502					
50-038-70.407	31,200	31,367	28,586	30,562	29,881	6832.4001			0.1497	-0.2345	-0.2030	0.6637				
47-330-75.896	35,500	34,894	33,943	31,816	33,789	-4851.9034			-0.3809	0.5492	0.3490	0.4307				
47-256-80.391	36,500	36,269	37,421	32,143	36,447	-11360.1560			-0.4476	0.9745	0.8379	-0.0057				
47-136-91.13	49,700	49,262	46,255	44,841	46,601	-13726.7200				0.2834	0.2575	1.0653	-0.1395			
47-144-93.207	47,500	45,521	44,302	46,303	46,194	-14055.1079				0.8247	-0.2572	0.5217	0.2009			
15-762-111.829	58,300	60,030	58,093	56,540	59,112	-6278.8550				0.4706	0.4029	0.6447	0.0203			
15-752-116.666	69,600	68,937	69,594	54,586	69,612	-4714.5235				-0.3567	3.3551	-0.9528	-0.0129			
56-G23-128.302	162,000	165,039	147,966	154,766	160,240	-29716.8976						1.6757		0.4711	-0.0191	0.3581
56-783-129.802	142,000	127,304	138,870	143,432	137,741	-46854.6456						3.6029		-0.7957	1.1323	-0.3171
56-M38-136.5	122,000	118,919	118,513	120,460	122,159	7443.1549						0.9634		-0.0521	0.2176	0.3496

I-71 Index Station Summary

Index Stations	1999	2000	2001	2002	2003
56-I10-4.966	54,100	58,700	59,400	58,200	58,400
93-I11-14.479	42,800	41,100	45,100	46,700	48,500
52-P48-33.86	25,900	26,800	27,000	26,400	27,700
39-I12-61.774	26,900	30,400	30,300	30,600	31,000

Estimated Station	ADT 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients				
						Index Stations				
						Intercept	56-I10-4.966	93-I11-17.478	52-P48-33.86	39-I12-61.774
56-M80-0	64,600	60,280	64,522	68,174	70,127	34,941	-0.8374	1.2598	-0.4704	1.1619
56-A03-1.752	59,300	63,566	64,052	65,162	66,580	24,290	-0.4487	0.2184	0.3908	1.5186
56-A05-9.063	49,000	55,117	55,095	53,701	56,361	-12,362	0.0779	-0.1125	2.0672	0.3988
93-311-14.479	46,800	50,887	51,890	51,553	53,709	-10,328	0.0689	0.1919	1.2118	0.5529
93-329-18.5	50,000	41,412	45,363	47,002	48,763	-320	-0.0037	0.9921	-0.0411	0.0749
93-315-21.869	50,000	27,805	31,310	32,707	33,502	8,712	0.1416	0.8665	-0.4923	-0.3827
52-782-27.71	26,500	29,143	29,295	28,768	29,948	-2,957	0.0571	-0.0090	0.8462	0.2118
21-279-42.802	27,000	28,870	28,772	28,266	29,252	-4,137	0.0776	-0.0639	0.7138	0.3930
39-525-53.433	26,400	24,394	24,272	23,932	24,690	1,681	0.0095	-0.0526	0.5611	0.3052
39-537-54.98	26,400	25,831	25,454	25,365	26,084	1,228	-0.0976	-0.0833	0.4693	0.6967
39-522-56.674	24,600	25,861	25,766	25,280	25,957	-1,804	0.1386	-0.0658	0.5022	0.2887
08-340-72.087	30,000	29,977	30,882	30,850	31,786	-1,517	0.1340	0.1884	0.3818	0.1859

I-75 Index Station Summary

Index Stations	1999	2000	2001	2002	2003
118-I70-24.663	34,900	34,600	33,500	32,700	35,300
063-827-40.704	32,900	33,800	33,800	33,700	34,000
102-I71-62.008	41,500	38,600	37,300	45,600	42,500
079-I72-82.93	46,800	44,300	45,300	44,900	48,800
034-P90-98.516	56,200	57,400	60,500	60,900	62,800
034-I73-109.705	79,000	66,900	68,900	69,600	70,000
034-I74-115.242	73,700	74,500	79,200	74,200	71,200
105-I75-129.199	33,000	33,900	36,400	34,200	33,300
041-P23-158.544	46,500	44,400	41,200	43,800	44,800
059-I76-166.263	44,300	44,600	43,500	50,400	48,700
08-P63-175.364	89,400	89,000	94,700	101,000	96,900
08-I78-182.46	158,000	138,000	160,000	173,000	169,000
08-I77-178.083	103,000	105,000	104,000	118,000	121,000
059-P93-188.678	123,000	135,000	141,000	145,000	142,000
059-I79-191.222	143,000	146,000	147,000	137,000	148,000

Estimated Station	Actual ADT 1999	Predicted ADT 2001	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients															
						Index Stations															
						Intercept	118-I70-24.663	063-827-40.704	102-I71-62.008	079-I72-78.00	034-P90-98.516	034-I73-109.705	034-I74-115.242	105-I75-129.199	041-P23-58.544	059-I76-166.263	08-P63-175.364	08-I77-178.083	08-I78-182.46	059-P93-188.678	059-I79-191.222
118-257-0	31,100	23,704	22,208	31,266	28,121	24,782	0.2361	-1.6202	1.0918		0.0588										
118-515-10.548	32,000	32,014	30,674	34,527	34,032	906	0.4635	-0.0466	0.5110		-0.0536										
118-771-15.456	30,800	25,263	24,866	32,107	30,535	26,619	0.3940	-2.0715	0.8673		0.3754										
063-547-28.851	36,400	36,750	39,610	40,159	41,075	11,732	-0.2123	-0.4795	-0.0008		0.8468										
063-829-38.187	36,600	35,346	33,640	41,084	39,382	14,939		-0.5700	0.9298	0.5039	-0.3229										
063-279-49.132	32,000	33,180	34,624	38,225	34,680	11,078		0.0994	0.3343	-1.1222	0.9678										
102-088-58.954	34,200	32,164	32,042	38,235	35,254	4,432		-0.1394	0.7081	-0.3753	0.3787										
076-623-75.516	37,300	37,932	38,876	41,239	40,891	3,642		0.1008	0.2591	-0.1094	0.4482										
076-607-87.185	49,000	50,446	53,757	53,757	58,128	-5,210		-0.4811		0.6947	1.0018	-0.2446									
076-753-89.802	48,100	50,238	52,710	52,937	55,231	6,669		-0.3262		0.2800	0.6727	0.0535									
076-757-94.73	49,700	52,034	53,334	53,377	54,753	8,565		0.4934		0.1266	0.3903	-0.0182									
076-353-97.038	50,200	51,365	52,832	52,880	54,709	10,984		0.1316		0.2831	0.3506	0.0489									
034-336-103.69	48,800	44,756	45,713	47,164	44,494	16,504				-0.9989	0.4257	0.6011			0.1769						
034-250-108.2	61,300	62,891	63,429	67,738	66,116	-22,908				-1.5995	1.8338	0.0230			1.1229						
034-391-111.227	75,000	78,298	81,367	88,255	96,529	-8,178					2.5193	0.3138	-1.0995		0.0628						
034-049-112.826	71,900	71,515	70,559	73,917	76,831	-10,987					0.8659	-0.0307	-0.1059		0.9628						
034-782-117.944	47,000	48,108	44,884	45,749	44,912	-8,687					-0.4544		0.3417	0.1451	1.1825						
034-291-119.873	53,700	52,097	48,518	52,406	54,479	-16,379					0.3237		-0.0017	-0.1960	1.2764						
105-283-124.868	45,500	40,589	42,996	41,450	41,100	-15,367					0.2249		0.0982	0.7735	0.2142						
105-250-125.528	42,600	36,154	35,500	36,459	37,037	2,905					0.1822		0.1075	-0.1332	0.4347						
105-002-136.468	51,400	30,989	31,900	32,470	32,384	-230					0.1812			0.3149	0.0888	0.1391					
041-261-144.443	33,000	33,724	33,790	37,162	36,878	2,476					0.2306			-0.0638	-0.0042	0.4565					
041-251-154.175	36,100	57,082	56,760	63,225	64,662	-11,521					0.8658			-0.5872	0.2759	0.5956					
08-338-171.448	54,800	57,513	62,980	70,287	65,858	540									-0.8039	0.6672	0.6456	0.0519			
08-266-172.68	80,200	78,923	77,538	83,011	85,824	28,644									0.3256	-0.3996	-0.0415	0.5461			
08-272-180.106	119,000	139,860	141,498	149,572	151,665	69,132						0.2285					-0.2266	0.5401	0.1370		
08-033-181.257	147,000	143,916	135,201	143,173	147,756	57,737									1.6938		-0.3372	0.4458	-0.0421		
059-792-183.771	141,000	149,224	165,041	180,138	169,251	-46,159											0.3365		0.2773	1.3651	-0.3912
059-799-184.716	155,000	149,543	169,735	184,847	176,572	-18,153											-0.0752		0.7130	0.8699	-0.2838
059-794-186.347	142,000	155,730	157,836	155,420	158,925	-21,252											1.2433		-0.2609	0.0114	0.6903
059-801-187.721	134,000	131,104	140,603	147,963	143,794	26,123											0.2681		0.2501	0.4237	-0.0725
059-072-190.281	136,000	135,909	149,790	161,492	154,051	13,590											-0.0742		0.4316	0.8538	-0.3144
059-077-190.666	124,000	118,491	127,599	129,211	131,141	34,263											-0.5423		0.4728	0.2633	0.2171

I-264 Index Station Summary

Index Stations	1999	2000	2001	2002	2003	
56-I80-1.5	57100	50,000	50,200	55200	47100	
56-I81-7.48	92600	82,100	84,900	90200	82200	
56-I82-12.841	168000	166,000	161,000	177000	176000	
56-P94-14.646	145000	148,000	146,000	141000	147000	
56-I83-19.939	63200	63,600	64,000	68500	67600	

	Actual ADT						Estimated Station Regression Coefficients				
Estimated Station	1999	Predicted ADT	Predicted ADT	Predicted ADT	Predicted ADT		Index Stations				
		2000	2001	2002	2003	INTERCEPT	56-I80-1.5	56-I81-7.48	56-I82-12.841	56-P94-14.646	56-I83-19.939
56-N17-0	38,400	39,100	39,023	39,363	37,734	20261	0.3909	-0.1339	-0.0678	0.0869	0.1366
56-N13-2.697	62,200	54,189	53,553	57,453	49,021	-9823	1.3432	-0.1435	0.0076	0.1744	-0.2900
56-N15-3.894	68,300	55,134	54,612	63,563	51,140	-27970	1.5976	-0.0725	0.1209	-0.0119	-0.1437
56-N30-5.219	55,500	53,450	52,450	55,448	52,845	-5661	0.5651	-0.1494	0.0831	0.1578	0.0939
56-801-9.233	110,000	111,340	110,538	106,857	107,683	3903	0.5145	-0.0517	-0.1436	0.7401	0.0042
56-795-10.167	137,000	124,769	124,724	125,547	110,300	-50304	2.6433	0.0369	-0.2907	0.9161	-0.7461
56-791-11.034	158,000	134,941	133,708	163,989	132,734	-139339	3.3056	0.2937	0.6457	-0.2226	0.1673
56-789-11.891	178,000	161,590	154,739	197,372	172,504	-141102	2.8452	-0.5606	1.5073	-0.6694	0.8697
56-779-12.191	181,000	188,260	187,620	162,436	181,026	33296	-1.0348	0.4209	-0.5585	2.0712	-0.6553
56-773-13.491	166,000	169,617	167,660	162,653	179,063	27412	-2.0769	0.6223	0.3344	0.8491	0.2167
56-441-15.824	152,000	130,487	135,564	139,461	124,063	-57157	0.9774	1.3665	-0.4093	0.5411	0.2270
56-157-17.163	144,000	156,673	156,712	152,185	176,778	45773	-3.6172	0.7068	0.2062	0.4914	1.9934
56-153-18.049	164,000	139,924	138,908	155,093	142,142	-87115	1.9197	-0.3673	0.1228	0.2195	1.7034
56-177-19.07	113,000	88,963	88,406	120,418	88,106	-113545	3.5500	-0.2310	0.4732	-0.6697	1.0149
56-A01-22.282	51,200	58,381	54,421	57,554	63,741	21884	-0.1345	-0.6536	0.4075	0.0852	0.2614

I-265 Index Station Summary

Index Stations	1999	2000	2001	2002	2003
56-I84-10.25	73,000	75,400	76,800	89,500	88,500
56-P98-15.186	58,500	59,800	63,000	65,900	67,000
56-I85-17.308	47,000	50,100	50,200	58,700	57,900
56-I86-25.5	59,000	60,600	60,100	68,000	68,400
56-I87-32.561	56,000	43,100	42,200	49,700	49,800

Estimated Station	Actual ADT 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients					
						Index Stations					
						Intercept	56-I84-10.250	56-P98-15.186	56-I85-17.308	56-I86-25.5	56-I87-32.561
56-D28-11.738	63,400	71,837	71,366	79,293	79,296	6,909	-0.6228	0.1019	1.3422	0.9737	-0.4745
56-D09-13.54	64,000	63,228	63,715	59,661	62,139	26,500	-1.8498	0.9814	1.1760	1.3609	-0.5538
56-D35-21.493	45,100	46,360	46,727	53,463	53,189	2,128	0.2391	0.0484	0.2037	0.1712	0.0634
56-D01-23.759	50,000	50,612	51,317	55,781	55,955	7,470	0.0023	0.1827	0.2797	0.6088	-0.4377
56-B14-26.837	46,000	43,536	43,648	47,150	48,205	1,111	0.0598	0.1785	-0.6484	1.0042	-0.0263
56-A76-30.484	41,600	26,807	28,189	34,094	33,663	-2,991	1.0640	0.0695	-0.9053	-0.5635	0.5782
56-A11-34.115	51,000	48,454	47,553	54,090	54,971	-7,087		-0.0523	-0.4871	1.3709	

I-275 Index Station Summary

Index Stations	1999	2000	2001	2002	2003
08-I30-8-3.968	47,300	45,200	45,000	45,900	46,900
08-I31-1.582	73,100	71,800	66,000	81,400	82,600
P97-19-75.5	81,800	72,300	72,000	72,200	75,300
59-I32-78.764	97,300	95,600	91,100	95,900	102,000

Estimated Station	ADT 1999	Predicted ADT 2000	Predicted ADT 2001	Predicted ADT 2002	Predicted ADT 2003	Estimated Station Regression Coefficients				
						Index Stations				
						Intercept	08-I30-3.968	08-I31-1.582	19-P97-75.5	59-I32-78.764
08-073-1.993	71,400	69,517	67,729	75,205	75,041	12031.3577	1.0330	0.5283	0.0661	-0.3338
08-766-7.037	35,900	32,308	32,153	31,549	33,417	-7060.7304	0.2973	-0.1020	0.2831	0.1338
08-767-11.431	30,500	29,910	29,237	29,342	31,018	-669.21044	0.3433	-0.0926	-0.0385	0.2563
19-811-73.061	72,700	59,879	59,986	54,843	60,787	-17911.309	-0.6660	-0.4799	1.2537	0.5409
59-078-77.039	105,000	99,537	97,163	98,865	103,888	2969.12277	0.8052	-0.1490	0.0834	0.6783
19-818-74.902	74,500	69,387	67,603	69,468	73,135	365.238744	0.0249	0.0000	0.4564	0.3650
59-804-79.796	102,000	100,427	97,981	98,141	104,047	4768.56729	0.6753	-0.3161	-0.0032	0.9212
59-805-82.475	105,000	100,611	97,159	104,053	108,418	-7370.1227	0.1614	0.3457	0.6951	0.2679

I-471 Index Station Summary

Index Stations	1,999	2000	2001	2002	2003
P96-19-0	93,600	89,100	84,500	90,600	91,400
I33-19-3.858	77,500	87,600	67,600	55,000	69,000
I34-19-4.718	89,400	85,500	71,500	97,900	95,600

	Actual ADT					Estimated Station Regression Coefficients			
Estimated Station	1999	Predicted ADT	Predicted ADT				Index Stations		
		2000	2001			Intercept	19-P96-0	19-I33-3.858	19-I34-4.718
19-814-1.745	102,000	93,549	83,178	98,765	99,057	-26212.16274	0.9422	0.0307	0.3873
19-815-3.232	105,000	89,322	80,315	125,210	114,692	-36316.48005	0.8199	-0.5967	1.2263

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