Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-97/1131-8		

4. Title and Subtitle	5. Report Date
URBAN ROADWAY CONGESTION—1982 TO 1993 VOLUME 2: METHODOLOGY AND URBANIZED AREA DATA	August 1996
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
David L. Schrank and Timothy J. Lomax	Research Report 1131-8, Volume 2
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135	11. Contract or Grant No. Study No. 0-1131
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Texas Department of Transportation Research and Technology Transfer Office P. O. Box 5080 Austin, Texas 78763-5080	Interim: September 1982 - August 1993
	14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration.
Research Study Title: Measuring and Monitoring Urban Mobility in Texas

16. Abstract

This research report represents the ninth year of a ten-year research effort focused on quantifying urban mobility. This study contains the facility information for 50 urban areas throughout the country. The database used for this research contains information on vehicle travel, system length, and urban area characteristics from 1982 to 1993. Various federal, state, and local agencies provided the information used to update and verify the primary database. The primary database and original source of most of the information is the Federal Highway Administration's Highway Performance Monitoring System (HPMS).

Researchers combined vehicle travel and system length data to develop Roadway Congestion Index (RCI) values for 50 urban areas including the seven largest in Texas. The RCI values provide an indicator of the relative mobility level within an urban area.

This report includes an analysis of the cost of congestion using travel delay and increased fuel consumption as estimated quantities. The impact of congestion was also estimated by the amount of additional facility capacity required to provide urban mobility. Congestion costs were estimated on an areawide, per eligible driver, and per capita basis.

17. Key Words	18. Distribution Statement
Mobility, Congestion, Economic Analysis, Transportation Planning, Travel Delay, RCI	No Restrictions. This document is available to the public through NTIS: National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	252	

Form DOT F 1700.7 (8-72)

URBAN ROADWAY CONGESTION—1982 TO 1993
VOLUME 2: METHODOLOGY AND URBANIZED AREA DATA

by

David L. Schrank
Assistant Research Scientist
Texas Transportation Institute

and

Timothy J. Lomax
Research Engineer
Texas Transportation Institute

Research Report 1131-8
Research Study Number 0-1131
Research Study Title: Measuring and Monitoring Urban Mobility in Texas

Sponsored by the
Texas Department of Transportation
In Cooperation with
U.S. Department of Transportation
Federal Highway Administration

August 1996

TEXAS TRANSPORTATION INSTITUTE
The Texas A&M University System
College Station, Texas 77843-3135

IMPLEMENTATION STATEMENT

This report provides information that will assist the Texas Department of Transportation in planning future transportation needs for urban areas in Texas. This report quantifies congestion levels and the economic impact of congestion on urban motorists in seven large cities in Texas. The report also presents data for other large U.S. metropolitan areas to assist in determining mobility trends and the relative performance of Texas' roadway networks. This report is valuable for identifying transportation trends and prioritizing future needs.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Texas Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation. In addition, this report is not intended for construction, bidding, or permit purposes. David L. Schrank and Timothy J. Lomax (Texas Professional Engineer certification number 54597) prepared this research report.

TABLE OF CONTENTS

LIST OF FIGURES

VOLUME 2

LIST OF TABLES

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

LIST OF TABLES, Continued

VOLUME 2

SUMMARY

This report represents the ninth year of a planned ten-year study to measure and monitor urban mobility in 50 urbanized areas throughout the United States. This research study estimates the level of congestion in the seven largest Texas urban areas and 43 other areas representing a cross-section of urban areas throughout the country. Quantitative estimates of mobility levels allow comparisons of transportation systems in the various urbanized areas and assist the transportation community in analyzing urban mobility.

The level of congestion in an urban area was estimated using procedures developed in previous research (1-4). The Roadway Congestion Index (RCI) combines the daily vehicle-kilometers of travel (VKT) per lane-kilometer for freeways and principal arterial street systems in a ratio comparing the existing value to values identified with congested conditions. Equation S-1 illustrates how the areawide and congested level travel per lane values are combined into the RCI values for each urban area.

$$\text{Roadway Congestion Index} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin Art Str VKT/Ln.-Km.} \times \text{Prin Art Str VKT}}{13{,}000 \times \text{Freeway VKT} + 5{,}000 \times \text{Prin Art Str VKT}} \qquad \text{Eq. S-1}$$

An RCI value of 1.0 or greater indicates that congested conditions exist areawide. It should be noted that urban areas with areawide values less than 1.0 may have sections of roadway that experience periods of heavy congestion, but the average mobility level within the urban area could be defined as uncongested. The RCI analyses presented in this report are intended to evaluate entire urban areas and not specific locations. The nature of the RCI equation (Eq. S-1) is to underestimate point or specific facility congestion if the overall system has "good" operational characteristics.

Areawide Mobility

Table S-1 combines the freeway and principal arterial street system daily VKT and daily VKT per lane-kilometer into the 1993 estimated Roadway Congestion Index (RCI). The ten most congested urban areas in the study are displayed. The RCI values range from 1.54 (Los Angeles) to 1.16 (Atlanta). All of these urban areas have surpassed the RCI value at which undesirable levels of congestion occur (1.0).

Table S-1. 1993 Roadway Congestion Index Value

Urban Area	Freeway/Expressway		Principal Arterial Street		Roadway/[3] Congestion Index	Rank
	Daily VKT[1] (000)	Daily VKT/[2] Ln-Km	Daily VKT[1] (000)	Daily VKT/[2] Ln-Km		
Los Angeles CA	183,460	20,810	133,630	6,610	1.54	1
Washington DC	46,690	17,790	29,620	7,830	1.41	2
San Fran-Oak CA	68,830	17,560	22,860	6,040	1.33	3
Miami FL	15,920	15,450	27,370	7,540	1.32	4
Chicago IL	65,950	15,850	56,350	6,860	1.26	5
Detroit MI	47,500	16,160	41,860	6,050	1.23	6
Seattle-Everett WA	33,330	16,110	15,620	5,970	1.23	6
San Bernardino-Riv CA	24,500	16,280	17,870	5,240	1.21	8
San Diego CA	44,680	15,900	15,540	5,560	1.21	8
Atlanta GA	48,300	15,000	19,320	6,000	1.16	10

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometers of travel per lane-kilometer.
[3] See Equation S-1.

See Table 1 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

Table S-2 displays the ten urban areas that have experienced the greatest growth in congestion between 1982 and 1993. The RCI values reflect the level of congestion occurring in the urban areas. Salt Lake City experienced a 31 percent increase in congestion during the seven-year period from 1987 to 1993. The congestion increase rate in all cities in the top ten approached or exceeded two percent per year.

Table S-2. Fastest Congestion Growth Areas

Urban Area	Percent Change 1987-1993	Rank 1987-1993	Year				
			1982	1987	1991	1992	1993
Salt Lake City UT	31	1	0.63	0.70	0.88	0.90	0.92
Columbus OH	19	2	0.68	0.78	0.91	0.93	0.93
Detroit MI	18	3	1.06	1.04	1.16	1.19	1.23
Cincinnati OH	18	3	0.86	0.87	0.99	1.01	1.03
Miami FL	16	5	1.05	1.14	1.28	1.30	1.32
Charlotte NC	16	5	0.71	0.79	0.89	0.89	0.92
Minn-St. Paul MN	15	7	0.76	0.89	0.96	0.99	1.02
Baltimore MD	14	8	0.84	0.91	1.02	1.04	1.04
Oklahoma City OK	13	9	0.72	0.76	0.81	0.83	0.86
Ft Lauderdale FL	13	9	0.88	0.95	1.03	1.05	1.07

See Table 2 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

The ten urban areas with the smallest growth in congestion between 1982 and 1993 are shown in Table S-3. Of the top ten, only Jacksonsville and San Francisco-Oakland experienced small increases in congestion levels. Congestion decreases in the other eight urban areas were between zero and one percent per year.

Table S-3. Slowest Congestion Growth Areas

Urban Area	Percent Change 1987-1993	Rank 1987-1993	Year				
			1982	1987	1991	1992	1993
Phoenix AZ	(8)	1	1.15	1.18	1.08	1.08	1.08
Austin TX	(5)	2	0.84	1.00	0.94	0.95	0.95
Houston TX	(5)	2	1.17	1.19	1.11	1.12	1.13
New Orleans LA	(4)	4	0.98	1.14	1.12	1.10	1.09
Philadelphia PA	(2)	5	1.00	1.06	1.05	1.05	1.04
Norfolk VA	(1)	6	0.79	0.93	0.93	0.92	0.92
Albuquerque NM	0	7	0.78	0.96	0.96	0.95	0.96
St. Louis MO	0	7	0.83	0.96	0.95	0.95	0.96
Jacksonville FL	2	9	0.91	0.94	0.95	0.97	0.96
San Fran-Oak CA	2	9	1.01	1.31	1.34	1.33	1.33

See Table 2 (Volume 1) for complete listing of urban areas

Source: TTI Analysis

Table S-4 shows the ten urban areas with the highest amount of daily delay. Los Angeles topped this list with over 2.4 million person-hours of delay on a daily basis. New York was the only other urban area with over a million person-hours of daily delay. While Los Angeles tops the list for greatest amount of total delay, it ranks fourth among all of the study cities with 65 person-hours of delay annually per eligible driver.

Table S-5 lists the top ten urban areas based on the amount of fuel wasted annually due to congested travel. Los Angeles tops the list with almost 2.5 billion liters of wasted fuel annually. New York is second with about 2.2 billion liters. Seattle is tenth in this group with about 400 million liters of fuel wasted annually. These ten areas consume 9.8 billion liters annually due to congestion in their urban areas. Washington, D.C. led this list with about 291 liters of fuel wasted annually per eligible driver.

Table S-6 combines existing freeway and principal arterial street distances with recent (1989 to 1993) annual traffic volume growth rates to produce the number of additional lane-kilometers for both freeway and principal arterial streets that would be necessary to avoid increases in areawide congestion. This value illustrates the amount of roadway that would have to be added *every year* to maintain a constant congestion level. The average amount of roadway that was added annually during this time period was also calculated. Table S-6 also shows the annual deficiency in construction of lane-kilometers of freeway and principal arterial streets. Detroit leads this list of cities with a deficiency of 345 lane-kilometers annually between 1989 and 1993 (115 lane-kilometers of freeway and 230 lane-kilometers of principal arterial streets).

Table S-4. Daily and Annual Hours of Delay for 1993

Urban Area	Daily Person-Hours of Delay (000)				Person-Annual Hours of Delay per Capita	Rank[1]	Person-Hours of Annual Delay per Eligible Driver	Rank[1]
	Recurring	Incident	Total	Rank[1]				
Los Angeles CA	1,106	1,295	2,40	1	50	4	65	4
New York NY	750	1,378	2	2	31	15	39	17
San Fran-Oak CA	366	462	2,12	3	43	3	66	3
Washington DC	285	504	8	4	58	1	70	2
Chicago IL	365	423	828	5	26	21	34	20
Detroit MI	253	419	789	6	42	7	57	7
Houston TX	229	309	788	7	46	6	60	5
Boston MA	117	319	673	8	37	12	44	12
Atlanta GA	185	203	537	9	42	7	53	8
Philadelphia PA	162	218	437	10	18	35	23	35
			388					
			380					

Notes: [1] Rank value of 1 associated with most congested conditions.

See Table 6 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis.

Table S-5. Annual Excess Fuel Consumed Due to Traffic Congestion in 1993

Urban Area	Annual Liters of Fuel Wasted (million)				Annual Excess Fuel Consumed per Capita (liters)	Rank[1]	Annual Excess Fuel Consumed per Eligible Driver (liters)	Rank[1]
	Recurring	Incident	Total	Rank[1]				
Los Angeles CA	1,153	1,350	2,503	1	209	5	269	4
New York NY	788	1,447	2,235	2	131	16	165	16
San Fran-Oak CA	390	492	882	3	230	3	282	3
Washington DC	298	526	824	4	242	1	291	1
Chicago IL	380	440	820	5	108	21	140	21
Detroit MI	260	431	691	6	173	9	234	7
Houston TX	245	331	576	7	197	6	257	5
Boston MA	124	339	463	8	156	12	187	12
Atlanta GA	195	214	409	9	176	8	223	9
Seattle-Everett WA	172	229	401	10	214	4	251	6

Notes: [1] Rank value of 1 associated with greatest fuel consumption.

See Table 9 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

Table S-6. Illustration of Annual Capacity Increase Required to Prevent Congestion Growth

Urban Area	Existing (1993) Lane-km		Average Annual VKT Growth (%)[1]	Annual Freeway Lane-km		Annual Prin. Art. Lane-km		Lane-km Deficiency	
	Fwy	Prin. Art.		Needed	Added	Needed	Added	Fwy	Prin. Art.
Detroit MI	2,938	6,923	5.76	169	54	399	169	115	230
New York NY	9,902	12,397	1.71	170	115	213	141	55	72
Kansas City MO	2,479	1,811	5.24	130	74	95	32	56	63
Los Angeles CA	8,815	20,206	1.38	121	143	278	149	-22	129
Baltimore MD	2,206	2,737	3.40	75	56	93	10	19	83
Minn-St. Paul MN	2,471	1,932	5.06	125	34	98	87	91	11
Denver CO	1,594	2,995	3.39	54	52	101	8	2	93
Chicago IL	4,162	8,211	5.05	210	115	415	423	95	-8
Cincinnati OH	1,554	1,328	4.45	69	30	59	12	39	47
Orlando FL	990	1,787	4.33	43	16	77	20	27	57

Note: [1] Average Annual Growth rate of Freeway and Principal Arterial Streets Daily VKT between 1989-1993.

See Table 11 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

Table S-7 shows the urban areas with the highest annual congestion costs. Delay and fuel costs comprise the total congestion costs. These ten urban areas have an annual combined congestion cost of over $33 billion. Los Angeles and New York had the highest total congestion costs with values of $8.53 billion and $7.60 billion, respectively. The final urban area in the table, Seattle, had a total congestion cost of $1.35 billion annually.

Table S-7. Component and Total Congestion Costs by Urban Area for 1993

Urban Area	Annual Cost Due to Congestion ($ millions)			Rank
	Delay	Fuel	Total	
Los Angeles CA	7,660	870	8,530	1
New York NY	6,810	790	7,600	2
San Fran-Oak CA	2,670	310	2,980	3
Chicago IL	2,520	280	2,800	4
Washington DC	2,520	270	2,790	5
Detroit MI	2,130	210	2,340	6
Houston TX	1,740	180	1,920	7
Boston MA	1,410	150	1,560	8
Atlanta GA	1,240	120	1,360	9
Seattle-Everett WA	1,210	140	1,350	10

See Table 12 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis and Local Transportation Agency Reference

Congestion costs can be used in relation to eligible drivers to show the impact on each potential driver in the urban area. Table S-8 lists the top ten congestion costs per eligible driver for 1993. San Bernardino ranks first with a cost of $1,090 per driver. Dallas and Houston had costs of $760 and $860 per driver, respectively, or approximately $3.5 per driver per workday.

Table S-8. 1993 Congestion Cost per Eligible Driver

Urban Area	Total Congestion Cost	
	Per Eligible Driver (dollars)	Rank
San Bernardino-Riv. CA	1,090	1
Washington DC	980	2
San Fran-Oak CA	950	3
Los Angeles CA	920	4
Houston TX	860	5
Seattle-Everett WA	840	6
Detroit MI	790	7
Dallas TX	760	8
San Jose CA	750	9
Atlanta GA	740	10

See Table 13 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

Expressing congestion costs on a per capita basis illustrates the congestion "tax" paid by residents (Table S-9). The highest 1993 cost per capita occurred in Washington, D.C., with a cost per capita of $820. San Jose had the smallest cost per capita ($580) of the top ten urban areas with a cost of just over $2 per capita for each workday.

Table S-9. 1993 Congestion Cost per Capita

Urban Area	Total Congestion Cost	
	Per Capita (dollars)	Rank
Washington DC	820	1
San Bernardino-Riv. CA	790	2
San Fran-Oak CA	780	3
Seattle-Everett WA	720	4
Los Angeles CA	710	5
Houston, TX	660	6
Dallas, TX	600	7
Atlanta GA	590	8
Detroit MI	590	8
San Jose CA	580	10

See Table 13 (Volume 1) for complete listing of urban areas.

Source: TTI Analysis

INTRODUCTION

Volume 2 of this report contains supporting data for Volume 1, "Urban Roadway Congestion—1982 to 1993." It is divided into six appendices.

Appendix A contains a set of tables that correspond to those in the research report with the Imperial unit equivalents. Each table from the report has a matching table in Appendix A. There are some tables that are repeated in Appendix A to provide a complete set of equivalent tables based on the Imperial system.

Appendix B provides background information concerning the development of the congestion measurement methodology utilized in the report.

Appendix C contains congestion level and congestion cost data for each of the study areas, showing levels of congestion for each urban area for 1982 to 1993. Appendix C also contains background information and methodology used to calculate congestion costs.

Appendix D shows travel and system length statistics for the urban areas for 1982 to 1993. Included in this section are the same 1992 statistics, which are normalized by population and urban area size.

Appendix E contains the congestion statistics for each urban area for 1982 to 1993. The tables are organized by individual urban area, rather than by topic or statistic. They are useful for analyses of congestion trends on urban area roadway systems.

Appendix F contains congestion delay and cost statistics for each urban area for 1982 to 1993. The tables are organized by individual urban area, rather than by topic or statistic. These tables are also useful for analyses of congestion trends on urban area roadway systems.

APPENDIX A

IMPERIAL UNIT EQUIVALENT TABLES

Table A-1. 1993 Roadway Congestion Index Value

Urban Area	Freeway/Expressway		Principal Arterial Street		Roadway Congestion Index[3]	Rank
	DVMT[1] (1000)	DVMT[2] Ln-Mile	DVMT[1] (1000)	DVMT[2] Ln-Mile		
Los Angeles CA	113,950	20,810	83,000	6,610	1.54	1
Washington DC	29,000	17,790	18,400	7,830	1.41	2
San Fran-Oak CA	42,750	17,560	14,200	6,040	1.33	3
Miami FL	9,890	15,450	17,000	7,540	1.32	4
Chicago IL	40,970	15,850	35,000	6,860	1.26	5
Detroit MI	29,500	16,160	26,000	6,050	1.23	6
Seattle-Everett WA	20,700	16,110	9,700	5,970	1.23	6
San Bernardino-Riv CA	15,220	16,280	11,100	5,240	1.21	8
San Diego CA	27,750	15,900	9,650	5,560	1.21	8
Atlanta GA	30,000	15,000	12,000	6,000	1.16	10
New York NY	86,000	13,980	55,000	7,140	1.15	11
Honolulu HI	5,500	13,920	1,930	7,880	1.13	12
Houston TX	32,000	14,880	11,400	5,180	1.13	12
Portland OR	8,350	13,920	4,400	6,670	1.11	14
New Orleans LA	5,200	13,510	4,400	6,290	1.09	15
Phoenix AZ	9,800	13,800	18,500	5,520	1.08	16
Boston MA	21,500	14,240	14,000	4,840	1.07	17
Dallas TX	24,900	13,990	9,100	5,080	1.07	17
Denver CO	13,250	13,380	11,100	5,970	1.07	17
Tampa FL	3,950	12,340	4,660	6,470	1.06	20
San Jose CA	16,650	13,650	7,300	5,290	1.05	21
Baltimore MD	18,000	13,140	10,000	5,880	1.04	22
Philadelphia PA	20,200	11,950	21,660	6,580	1.04	22
Sacramento CA	10,280	12,770	7,850	6,280	1.04	22
Cincinnati OH	12,870	13,330	4,400	5,330	1.03	25
Minn-St. Paul MN	20,000	13,030	7,100	5,920	1.02	26
Milwaukee WI	7,840	12,960	5,600	5,000	1.00	27
Cleveland OH	14,970	12,580	6,200	5,410	0.98	28
Ft. Lauderdale FL	8,500	12,500	6,400	5,250	0.98	28
Albuquerque NM	2,740	11,420	4,500	5,450	0.96	30
Jacksonville FL	6,000	12,500	6,250	4,770	0.96	30
St. Louis MO	19,500	11,340	12,700	6,600	0.96	30
Austin TX	6,420	12,110	2,500	5,210	0.95	33
Fort Worth TX	13,100	12,240	4,700	5,000	0.95	33
Columbus OH	9,750	11,820	3,500	5,470	0.93	35
Hartford CT	7,030	11,520	3,790	5,790	0.93	35
Louisville KY	7,000	11,380	3,500	6,030	0.93	35
Memphis TN	5,150	11,320	5,560	5,350	0.93	35
Nashville TN	7,000	11,110	5,600	5,770	0.93	35
Charlotte NC	3,500	11,110	3,230	5,470	0.92	40
Norfolk VA	5,980	10,390	4,900	6,450	0.92	40
Salt Lake City UT	6,060	11,330	2,670	6,140	0.92	40
San Antonio TX	10,700	11,380	6,000	5,310	0.91	43
Indianapolis IN	8,900	11,410	4,500	4,890	0.89	44
Oklahoma City OK	7,700	10,480	4,500	5,630	0.86	45
Orlando FL	6,230	10,120	5,200	4,680	0.82	46
Pittsburgh PA	9,350	8,130	11,500	6,180	0.82	46
Kansas City MO	15,000	9,740	5,500	4,890	0.78	48
El Paso TX	3,700	10,000	3,340	3,880	0.77	49
Corpus Christi TX	1,950	9,290	1,600	4,320	0.75	50
Northeastern Avg	27,300	12,960	19,190	6,320	1.07	
Midwestern Avg	16,170	12,510	9,880	5,670	0.99	
Southern Avg	8,310	12,310	6,840	5,820	1.01	
Southwestern Avg	11,330	12,170	6,860	5,190	0.96	
Western Avg	29,020	15,660	16,570	6,170	1.21	
Texas Avg	13,250	11,990	5,520	4,860	0.93	
Total Avg	17,240	13,020	11,050	5,780	1.04	
Maximum Value	113,950	20,810	83,000	7,880	1.54	
Minimum Value	1,950	8,130	1,600	3,880	0.75	

Notes: [1] Daily vehicle-miles of travel.
[2] Daily vehicle-miles of travel per lane-mile.
[3] See Equation 1.

Source: TTI Analysis

Table A-2. Roadway Congestion Index Values, 1982 to 1993

Urban Area	Percent Change 1987-1993	Rank	Year							
			1982	1984	1986	1987	1989	1991	1992	1993
Phoenix AZ	(8)	1	1.15	1.10	1.20	1.18	1.03	1.08	1.08	1.08
Austin TX	(5)	2	0.84	0.86	0.94	1.00	0.96	0.94	0.95	0.95
Houston TX	(5)	2	1.17	1.25	1.21	1.19	1.13	1.11	1.12	1.13
New Orleans LA	(4)	4	0.98	1.05	1.09	1.14	1.13	1.12	1.10	1.09
Philadelphia PA	(2)	5	1.00	1.04	1.06	1.06	1.05	1.05	1.05	1.04
Norfolk VA	(1)	6	0.79	0.81	0.90	0.93	0.95	0.93	0.92	0.92
Albuquerque NM	0	7	0.78	0.89	0.96	0.96	0.98	0.96	0.95	0.96
St. Louis MO	0	7	0.83	0.88	0.93	0.96	0.96	0.95	0.95	0.96
Jacksonville FL	2	9	0.91	0.96	0.95	0.94	0.93	0.95	0.97	0.96
San Fran-Oak CA	2	9	1.01	1.12	1.24	1.31	1.36	1.34	1.33	1.33
Boston MA	3	11	0.90	0.95	1.04	1.04	1.09	1.06	1.07	1.07
Corpus Christi TX	4	12	0.67	0.69	0.71	0.72	0.70	0.72	0.74	0.75
Nashville TN	4	12	0.77	0.83	0.86	0.89	0.90	0.90	0.92	0.93
Pittsburgh PA	4	12	0.78	0.76	0.79	0.79	0.82	0.82	0.81	0.82
Sacramento CA	4	12	0.80	0.88	0.95	1.00	1.01	1.04	1.04	1.04
Tampa FL	4	12	0.94	1.03	0.96	1.02	1.03	1.05	1.07	1.06
Atlanta GA	5	17	0.91	0.97	1.09	1.11	1.14	1.16	1.17	1.16
Dallas TX	5	17	0.84	0.94	1.04	1.02	1.02	1.06	1.07	1.07
Indianapolis IN	5	17	0.67	0.75	0.81	0.85	0.86	0.84	0.84	0.89
Los Angeles CA	5	17	1.22	1.32	1.42	1.47	1.54	1.56	1.54	1.54
Milwaukee WI	5	17	0.83	0.87	0.90	0.95	0.97	1.00	1.00	1.00
Orlando FL	6	22	0.72	0.73	0.76	0.77	0.77	0.78	0.80	0.82
San Antonio TX	6	22	0.77	0.82	0.88	0.86	0.87	0.89	0.90	0.91
San Bernardino-Riv CA	6	22	1.11	1.13	1.15	1.14	1.17	1.22	1.22	1.21
San Jose CA	6	22	0.86	0.91	0.97	0.99	1.03	1.08	1.07	1.05
Harftford CT	7	26	0.76	0.86	0.85	0.87	0.89	0.89	0.91	0.93
El Paso TX	8	27	0.63	0.65	0.75	0.71	0.74	0.75	0.76	0.77
Honolulu HI	8	27	0.92	0.95	1.03	1.05	1.07	1.10	1.10	1.13
Louisville KY	8	27	0.78	0.82	0.80	0.86	0.86	0.88	0.90	0.93
New York NY	8	27	1.01	0.99	1.06	1.06	1.12	1.14	1.14	1.15
Seattle-Everett WA	8	27	0.95	1.02	1.09	1.14	1.20	1.20	1.22	1.23
Fort Worth TX	9	32	0.76	0.80	0.87	0.87	0.87	0.92	0.94	0.95
Ft. Lauderdale FL	9	32	0.87	0.86	0.85	0.90	0.92	0.95	0.96	0.98
Washington DC	9	32	1.12	1.11	1.27	1.29	1.33	1.33	1.36	1.41
Chicago IL	10	35	1.02	1.05	1.15	1.15	1.21	1.27	1.28	1.26
Cleveland OH	10	35	0.80	0.83	0.86	0.89	0.96	0.95	0.95	0.98
Kansas City MO	10	35	0.62	0.60	0.68	0.71	0.72	0.75	0.77	0.78
Memphis TN	11	38	0.83	0.79	0.80	0.84	0.90	0.91	0.92	0.93
Portland OR	12	39	0.87	0.88	0.97	0.99	1.07	1.08	1.10	1.11
San Diego CA	12	39	0.78	0.91	1.00	1.08	1.18	1.22	1.22	1.21
Denver CO	13	41	0.88	0.93	0.97	0.95	1.01	1.03	1.05	1.07
Oklahoma City OK	13	41	0.72	0.75	0.76	0.76	0.78	0.81	0.83	0.86
Baltimore MD	14	43	0.84	0.85	0.88	0.91	0.98	1.02	1.04	1.04
Minn-St. Paul MN	15	44	0.76	0.84	0.89	0.89	0.92	0.96	0.99	1.02
Charlotte NC	16	45	0.71	0.76	0.78	0.79	0.82	0.89	0.89	0.92
Miami FL	16	45	1.05	1.10	1.14	1.14	1.25	1.28	1.30	1.32
Cincinnati OH	18	47	0.86	0.82	0.84	0.87	0.94	0.99	1.01	1.03
Detroit MI	18	47	1.06	1.07	1.05	1.04	1.09	1.16	1.19	1.23
Columbus OH	19	49	0.68	0.71	0.75	0.78	0.82	0.91	0.93	0.93
Salt Lake City UT	31	50	0.63	0.65	0.68	0.70	0.81	0.88	0.90	0.92
Northeastern Avg			0.92	0.94	0.99	1.00	1.04	1.04	1.05	1.07
Midwestern Avg			0.80	0.83	0.87	0.89	0.92	0.96	0.97	0.99
Southern Avg			0.86	0.90	0.93	0.95	0.98	0.99	1.00	1.01
Southwestern Avg			0.83	0.87	0.93	0.92	0.92	0.94	0.95	0.96
Western Avg			0.95	1.01	1.09	1.13	1.18	1.20	1.20	1.21
Texas Avg			0.81	0.86	0.91	0.91	0.90	0.91	0.93	0.93
Total Avg			0.86	0.90	0.95	0.97	1.00	1.02	1.03	1.04
Maximum Value			1.22	1.32	1.42	1.47	1.54	1.56	1.54	1.54
Minimum Value			0.62	0.60	0.68	0.70	0.70	0.72	0.74	0.75

Source: TTI Analysis

Table A-3. Change in Congestion and VMT, 1982 to 1993

Urban Area	1982 to 1986				1987 to 1993			
	Roadway Congestion Index		Daily Vehicle-Kilometers of Travel		Roadway Congestion Index		Daily Vehicle-Kilometers of Travel	
	Percent Change	Rank	Percent Change	Rank	Percent Change	Rank	Percent Change	Rank
Salt Lake City UT	8	31	22	20	31	1	54	1
Columbus OH	10	26	19	27	19	2	28	14
Cincinnati OH	(2)	48	6	47	18	3	34	4
Detroit MI	(1)	47	4	49	18	3	34	4
Charlotte NC	10	26	21	23	16	5	31	10
Miami FL	9	30	13	37	16	5	32	8
Minn-St. Paul MN	17	9	27	10	15	7	30	11
Baltimore MD	5	38	24	16	14	8	23	22
Denver CO	10	26	14	34	13	9	21	26
Oklahoma City OK	6	34	13	37	13	9	25	20
Portland OR	11	24	26	13	12	11	29	13
San Diego CA	28	1	36	3	12	11	19	32
Memphis TN	(4)	50	13	37	11	13	40	2
Chicago IL	13	16	21	23	10	14	36	3
Cleveland OH	8	31	6	47	10	14	32	8
Kansas City MO	10	26	20	25	10	14	26	18
Fort Worth TX	14	13	22	20	9	17	17	38
Ft. Lauderdale FL	(2)	48	3	50	9	17	27	17
Washington DC	13	16	30	7	9	17	19	32
El Paso TX	19	7	23	18	8	20	14	43
Honolulu HI	12	19	14	34	8	20	28	14
Louisville KY	3	43	15	31	8	20	26	18
New York NY	5	38	11	43	8	20	15	41
Seattle-Everett WA	15	12	25	15	8	20	19	32
Hartford CT	12	19	31	6	7	25	19	32
Orlando FL	6	34	14	34	6	26	24	21
San Antonio TX	14	13	24	16	6	26	21	26
San Bernardino-Riv CA	4	40	11	43	6	26	21	26
San Jose CA	13	16	18	28	6	26	14	43
Atlanta GA	20	6	37	2	5	30	30	11
Dallas TX	24	2	32	5	5	30	12	46
Indianapolis IN	21	5	22	20	5	30	14	43
Los Angeles CA	16	10	23	18	5	30	15	41
Milwaukee WI	8	31	11	43	5	30	17	38
Corpus Christi TX	6	34	11	43	4	35	19	32
Nashville TN	12	19	33	4	4	35	34	4
Pittsburgh PA	1	46	16	30	4	35	22	23
Sacramento CA	19	7	29	8	4	35	28	14
Tampa FL	2	45	27	10	4	35	20	30
Boston MA	16	10	17	29	3	40	5	50
Jacksonville FL	4	40	15	31	2	41	18	37
San Fran-Oak CA	23	3	27	10	2	41	9	49
Albuquerque NM	23	3	29	8	0	43	22	23
St. Louis MO	12	19	26	13	0	43	17	38
Norfolk VA	14	13	20	25	(1)	45	21	26
Philadelphia PA	6	34	13	37	(2)	46	11	47
New Orleans LA	11	24	13	37	(4)	47	10	48
Austin TX	12	19	51	1	(5)	48	22	23
Houston TX	3	43	13	37	(5)	48	20	30
Phoenix AZ	4	40	15	31	(8)	50	34	4

Source: TTI Analysis

Table A-4. Change in Congested Daily Vehicle-Miles of Travel and Severity

Region	Year	Freeway				Principal Arterial Street			
		Percent of Daily VMT Congested	Level of Congestion (percent)			Percent of Daily VMT Congested	Level of Congestion (percent)		
			Moderate	Heavy	Severe		Moderate	Heavy	Severe
Northeastern	1982	43	51	19	30	63	26	30	44
	1993	50	26	33	41	72	13	21	66
	change	+7	(25)	+14	+11	+9	(13)	(9)	+22
Midwestern	1982	27	41	31	28	48	33	28	39
	1993	36	26	18	56	54	22	25	53
	change	+9	(15)	(13)	+28	+6	(11)	(3)	+14
Southern	1982	32	54	35	11	46	22	29	49
	1993	41	24	33	43	54	20	21	59
	change	+9	(30)	(2)	+32	+8	(2)	(8)	+10
Southwestern	1982	44	27	16	57	42	43	23	34
	1993	54	19	32	49	49	29	34	37
	change	+10	(8)	+16	(8)	+7	(14)	+11	(3)
Western	1982	60	34	23	43	40	44	37	19
	1993	68	13	15	72	55	18	27	55
	change	+8	(21)	(8)	+29	+15	(26)	(10)	+36
Texas	1982	47	18	15	67	29	35	27	38
	1993	55	19	36	45	37	29	36	35
	change	+8	+1	+21	(22)	+8	(6)	+9	(3)
Total	1982	44	39	23	38	49	33	30	37
	1993	52	20	23	57	58	19	25	56
	change	+8	(19)	0	+19	+9	(14)	(5)	+19

Table A-5. Change in Delay within Congestion Categories, 1982 to 1993

Urban Area	Percent of Delay (person-hours) by Congestion Level in 1982			Percent of Delay (person-hours) by Congestion Level in 1993			Change in Percentage Points 1982 to 1993		
	Moderate	Heavy	Severe	Moderate	Heavy	Severe	Moderate	Heavy	Severe
Northeastern Avg	27	25	48	12	25	63	(15)	0	15
Midwestern Avg	26	39	44	15	20	65	(11)	(10)	21
Southern Avg	26	33	41	14	26	60	(12)	(7)	19
Southwestern Avg	22	18	60	15	32	53	(7)	14	(7)
Western Avg	25	27	48	9	16	75	(16)	(11)	27
Texas Avg	14	16	70	14	35	51	0	19	(19)
Total Avg	25	26	49	12	22	66	(13)	(4)	17

Table A-6. Total Person-Hours of Delay for 1993

Urban Area	Daily Person-Hours of Delay (000)				Annual Person-Hours of Delay per Capita	Rank[1]	Annual Delay per Driver	Rank[1]
	Recurring	Incident	Total	Rank[1]				
Northeastern Cities								
Baltimore MD	72	131	203	19	24	22	31	22
Boston MA	116	316	432	8	36	12	44	12
Hartford CT	19	37	56	40	23	23	30	23
New York NY	747	1,368	2,115	2	31	15	39	16
Philadelphia PA	163	218	381	10	18	35	23	35
Pittsburgh PA	64	97	161	21	21	28	26	30
Washington DC	283	499	782	5	58	1	69	2
Midwestern Cities								
Chicago IL	363	420	783	4	26	21	33	20
Cincinnati OH	41	36	77	33	15	40	20	40
Cleveland OH	49	39	89	28	12	43	16	42
Columbus OH	37	31	68	35	17	37	22	36
Detroit MI	252	416	668	6	42	7	57	7
Indianapolis IN	15	20	35	45	9	47	12	47
Kansas City MO	19	41	60	39	11	44	15	44
Louisville KY	20	22	42	43	13	41	16	42
Milwaukee WI	30	31	62	38	13	41	17	41
Minn-St. Paul MN	72	71	143	23	17	37	21	38
Oklahoma City OK	17	19	35	45	11	44	14	45
St. Louis MO	85	97	182	20	23	23	29	24
Southern Cities								
Atlanta GA	183	202	385	9	41	8	53	8
Charlotte NC	23	23	47	41	23	23	28	27
Ft. Lauderdale FL	45	59	104	26	20	31	24	33
Jacksonville FL	37	46	83	32	27	19	35	19
Memphis TN	17	19	36	44	10	46	13	46
Miami FL	139	172	311	13	40	10	51	11
Nashville TN	22	24	46	42	19	33	24	33
New Orleans LA	34	51	85	30	19	33	25	32
Norfolk VA	31	58	89	28	23	23	29	24
Orlando FL	28	37	65	36	18	35	22	36
Tampa FL	29	34	63	37	21	28	27	28
Southwestern Cities								
Albuquerque NM	17	18	35	45	17	37	21	38
Austin TX	35	39	74	34	32	14	41	13
Corpus Christi TX	3	3	6	50	5	50	7	50
Dallas TX	128	214	342	12	41	8	52	9
Denver CO	103	107	210	17	33	13	41	13
El Paso TX	9	9	18	49	8	49	11	49
Fort Worth TX	54	91	145	22	30	17	39	16
Houston TX	226	305	531	7	45	6	59	5
Phoenix AZ	136	112	248	15	30	17	40	15
Salt Lake City UT	18	14	32	48	9	47	12	47
San Antonio TX	47	51	98	27	20	31	27	28
Western Cities								
Honolulu HI	33	52	85	30	31	15	37	18
Los Angeles CA	1,096	1,282	2,378	1	50	4	64	4
Portland OR	44	72	116	24	27	19	33	20
Sacramento CA	56	49	106	25	22	27	29	24
San Bernardino-Riv CA	134	156	290	14	55	2	75	1
San Diego CA	123	85	208	18	21	28	26	30
San Fran-Oak CA	362	457	819	3	53	3	65	3
San Jose CA	112	131	243	16	40	10	52	9
Seattle-Everett WA	160	213	374	11	50	4	58	6
Northeastern Avg	209	381	590		30		37	
Midwestern Avg	83	104	187		17		23	
Southern Avg	53	66	119		24		30	
Southwestern Avg	70	88	158		25		32	
Western Avg	236	278	513		39		49	
Texas Avg	72	102	173		26		34	
Total Avg	119	162	281		26		33	
Maximum Value	876,576	1,094,004	1,902,484		58		75	
Minimum Value	3	3	6		5		7	

Source: TTI Analysis and Local Transportation Agency References

Table A-7. Annual Person-Hours of Delay per Capita

Urban Area	Annual Person-Hours of Delay per Capita						Percent Change 1982 - 1993
	1982	1985	1988	1991	1992	1993	
Northeastern Cities							
Baltimore MD	10	16	17	20	24	24	140
Boston MA	21	26	38	37	37	36	71
Hartford CT	7	10	16	17	19	23	229
New York NY	19	23	26	28	30	31	63
Philadelphia PA	16	18	21	19	18	18	13
Pittsburgh PA	10	14	19	20	20	21	110
Washington DC	34	41	49	53	58	58	71
Midwestern Cities							
Chicago IL	14	19	20	23	26	26	86
Cincinnati OH	5	7	10	12	14	15	200
Cleveland OH	4	5	7	10	11	12	200
Columbus OH	9	9	13	17	18	17	89
Detroit MI	22	23	29	35	37	42	91
Indianapolis IN	3	4	5	6	7	9	200
Kansas City MO	5	6	7	8	11	11	120
Louisville KY	6	7	8	9	11	13	117
Milwaukee WI	7	9	11	12	12	13	86
Minn-St. Paul MN	7	10	15	16	17	17	143
Oklahoma City OK	7	8	10	10	11	11	57
St. Louis MO	15	19	19	21	20	23	53
Southern Cities							
Atlanta GA	22	33	36	35	36	41	86
Charlotte NC	11	16	19	23	22	23	109
Ft. Lauderdale FL	11	13	15	18	19	20	82
Jacksonville FL	16	20	20	23	25	27	69
Memphis TN	5	5	7	9	9	10	100
Miami FL	25	29	35	38	37	40	60
Nashville TN	11	15	24	22	21	19	73
New Orleans LA	11	17	20	19	19	19	73
Norfolk VA	14	19	25	24	24	23	64
Orlando FL	10	13	13	14	15	18	80
Tampa FL	16	21	22	22	22	21	31
Southwestern Cities							
Albuquerque NM	7	10	11	13	14	17	143
Austin TX	20	27	29	27	27	32	60
Corpus Christi TX	2	2	3	4	5	5	150
Dallas TX	27	34	39	40	40	41	52
Denver CO	19	21	23	29	30	33	74
El Paso TX	3	5	6	5	8	8	167
Fort Worth TX	16	20	25	27	27	30	88
Houston TX	38	45	40	43	43	45	18
Phoenix AZ	23	23	28	29	30	30	30
Salt Lake City UT	4	4	5	7	8	9	125
San Antonio TX	10	17	17	17	19	20	100
Western Cities							
Honolulu HI	20	23	24	26	29	31	55
Los Angeles CA	32	41	49	49	49	50	56
Portland OR	12	14	19	22	26	27	125
Sacramento CA	11	15	17	19	19	22	100
San Bernardino-Riv CA	31	40	52	52	54	55	77
San Diego CA	9	14	22	22	22	21	133
San Fran-Oak CA	32	47	54	54	52	53	66
San Jose CA	24	34	42	41	41	40	67
Seattle-Everett WA	22	32	45	46	50	50	127
Northeastern Avg	17	21	27	28	29	30	76
Midwestern Avg	9	10	13	15	16	17	89
Southern Avg	14	18	22	22	23	24	71
Southwestern Avg	15	19	21	22	23	25	67
Western Avg	21	29	36	37	38	39	86
Texas Avg	17	21	23	23	24	26	53
Total Avg	15	19	23	24	25	26	73
Maximum Value	38	47	54	54	58	58	53
Minimum Value	2	2	3	4	5	5	150

Table A-8. Annual Hours of Delay per Driver in 1993

Urban Area	Annual Person-Hours of Delay per Eligible Driver						Percent Change 1982 - 1993
	1982	1985	1988	1991	1992	1993	
Northeastern Cities							
Baltimore MD	13	21	22	26	30	31	138
Boston MA	26	32	46	44	45	44	69
Hartford CT	9	13	21	23	25	30	233
New York NY	25	29	33	35	38	39	56
Philadelphia PA	20	24	27	24	23	23	15
Pittsburgh PA	13	17	24	24	25	26	100
Washington DC	42	51	59	63	70	69	64
Midwestern Cities							
Chicago IL	19	25	26	30	33	33	74
Cincinnati OH	7	9	13	16	18	20	186
Cleveland OH	5	7	10	13	15	16	220
Columbus OH	11	12	16	22	23	22	100
Detroit MI	30	31	40	47	51	57	90
Indianapolis IN	4	5	7	7	8	12	200
Kansas City MO	6	7	10	10	14	15	150
Louisville KY	8	9	10	11	13	16	100
Milwaukee WI	9	12	15	16	17	17	89
Minn-St. Paul MN	9	12	19	20	22	21	133
Oklahoma City OK	9	11	13	12	14	14	56
St. Louis MO	20	24	24	27	26	29	45
Southern Cities							
Atlanta GA	29	43	46	44	46	53	83
Charlotte NC	14	21	24	29	28	28	100
Ft. Lauderdale FL	13	15	18	21	23	24	85
Jacksonville FL	22	26	26	30	32	35	59
Memphis TN	7	7	9	11	12	13	86
Miami FL	30	36	44	49	47	51	70
Nashville TN	14	19	31	28	26	24	71
New Orleans LA	14	23	27	25	25	25	79
Norfolk VA	18	25	31	31	30	29	61
Orlando FL	13	16	17	17	18	22	69
Tampa FL	21	27	27	28	28	27	29
Southwestern Cities							
Albuquerque NM	9	13	15	17	18	21	133
Austin TX	25	34	36	34	34	41	64
Corpus Christi TX	3	3	4	5	7	7	133
Dallas TX	36	44	51	52	52	52	44
Denver CO	24	27	29	36	37	41	71
El Paso TX	5	7	8	7	11	11	120
Fort Worth TX	21	26	32	35	36	39	86
Houston TX	51	60	53	56	57	59	16
Phoenix AZ	31	31	38	39	39	40	29
Salt Lake City UT	5	5	6	9	10	12	140
San Antonio TX	14	23	22	23	25	27	93
Western Cities							
Honolulu HI	25	28	30	31	35	37	48
Los Angeles CA	41	53	62	63	64	64	56
Portland OR	16	17	24	27	32	33	106
Sacramento CA	14	19	23	24	25	29	107
San Bernardino-Riv CA	42	54	71	71	75	75	79
San Diego CA	12	18	28	28	27	26	117
San Fran-Oak CA	39	57	66	66	64	65	67
San Jose CA	33	46	55	53	54	52	58
Seattle-Everett WA	26	38	53	54	58	58	123
Northeastern Avg	21	27	33	34	36	37	76
Midwestern Avg	11	14	17	19	21	23	109
Southern Avg	18	23	27	28	29	30	67
Southwestern Avg	20	25	27	28	30	32	60
Western Avg	27	37	46	46	48	49	81
Texas Avg	22	28	30	30	32	34	55
Total Avg	19	24	29	30	32	33	74
Maximum Value	51	60	71	71	75	75	47
Minimum Value	3	3	4	5	7	7	133

Table A-9. Annual Excess Fuel Consumed Due to Traffic Congestion

Urban Area	Annual Gallons of Fuel Wasted (million)				Annual Excess Fuel Consumed per Person (gallons)	Rank	Annual Excess Fuel Consumed per Driver (gallons)	Rank
	Recurring	Incident	Total	Rank				
Northeastern Cities								
Baltimore MD	26	47	73	19	35	22	44	22
Boston MA	43	116	159	8	53	12	64	12
Hartford CT	7	14	21	40	33	24	44	22
New York NY	270	494	764	2	45	15	56	16
Philadelphia PA	55	74	129	11	25	36	32	35
Pittsburgh PA	22	33	55	21	29	30	35	32
Washington DC	102	179	281	4	82	1	99	2
Midwestern Cities								
Chicago IL	130	150	280	5	37	21	48	21
Cincinnati OH	16	14	30	32	23	39	30	39
Cleveland OH	19	15	34	28	19	41	25	41
Columbus OH	13	11	24	35	25	36	31	37
Detroit MI	89	146	235	6	59	9	80	7
Indianapolis IN	6	8	14	44	14	46	18	47
Kansas City MO	7	15	22	37	17	44	22	43
Louisville KY	7	8	15	43	18	42	22	43
Milwaukee WI	11	11	22	37	18	42	24	42
Minn-St. Paul MN	27	26	53	23	25	36	31	37
Oklahoma City OK	6	7	13	45	16	45	20	45
St. Louis MO	30	35	65	20	33	24	42	24
Southern Cities								
Atlanta GA	67	73	140	9	60	8	76	9
Charlotte NC	8	8	16	42	32	26	40	28
Ft. Lauderdale FL	16	22	38	25	29	30	35	32
Jacksonville FL	13	17	30	32	39	19	51	19
Memphis TN	6	7	13	45	14	46	19	46
Miami FL	48	59	107	13	55	11	70	11
Nashville TN	8	9	17	41	28	33	35	32
New Orleans LA	12	19	31	30	28	33	37	30
Norfolk VA	11	21	32	29	34	23	42	24
Orlando FL	10	14	24	35	26	35	32	35
Tampa FL	10	12	22	37	29	30	36	31
Southwestern Cities								
Albuquerque NM	6	6	12	47	23	39	30	39
Austin TX	13	14	27	34	49	13	61	13
Corpus Christi TX	1	1	2	50	8	50	11	50
Dallas TX	48	81	129	11	62	7	79	8
Denver CO	37	38	75	18	47	14	58	15
El Paso TX	3	4	7	49	12	49	17	48
Fort Worth TX	20	35	55	21	45	15	60	14
Houston TX	84	113	197	7	67	6	88	5
Phoenix AZ	48	39	87	16	42	18	55	17
Salt Lake City UT	7	5	12	47	13	48	17	48
San Antonio TX	17	19	36	27	30	29	41	27
Western Cities								
Honolulu HI	12	19	31	30	45	15	53	18
Los Angeles CA	392	459	851	1	71	5	92	4
Portland OR	16	26	42	24	39	19	49	20
Sacramento CA	20	18	38	25	32	26	42	24
San Bernardino-Riv CA	48	56	104	14	79	2	109	1
San Diego CA	47	33	80	17	31	28	40	28
San Fran-Oak CA	133	168	301	3	79	2	96	3
San Jose CA	41	48	89	15	58	10	76	9
Seattle-Everett WA	59	78	137	10	73	4	86	6
Northeastern Avg	75	136	211		45		55	
Midwestern Avg	30	38	68		32		42	
Southern Avg	19	24	43		39		49	
Southwestern Avg	26	32	58		46		60	
Western Avg	86	102	188		64		82	
Texas Avg	27	38	65		51		67	
Total Avg	43	59	102		46		59	
Maximum Value	420	525	945		50		63	
Minimum Value	1	1	2		8		11	

Source: TTI Analysis

Table A-10. Annual Wasted Fuel Due to Congestion

Urban Area	Annual Wasted Gallons (millions)								% Change 1982 - 1993
	1982	1984	1986	1988	1990	1991	1992	1993	
El Paso TX	2	3	4	4	4	5	7	7	250
Charlotte NC	5	7	10	12	14	15	16	17	240
Cleveland OH	10	13	15	20	26	27	30	34	240
Hartford CT	6	8	9	14	15	15	17	20	233
Indianapolis IN	4	5	5	8	8	8	9	13	225
San Diego CA	26	37	46	74	79	80	82	80	208
Albuquerque NM	4	6	7	8	10	10	10	12	200
Salt Lake City UT	4	4	5	6	7	9	10	12	200
Cincinnati OH	10	11	12	18	20	23	27	29	190
Baltimore MD	26	36	44	48	57	58	70	74	185
Seattle-Everett WA	48	70	81	109	121	125	134	137	185
Minn-St. Paul MN	19	24	33	43	47	49	53	53	179
Kansas City MO	8	8	10	12	13	13	20	22	175
Sacramento CA	14	17	21	26	31	31	33	38	171
Memphis TN	5	6	7	8	9	11	12	13	160
Atlanta GA	54	67	92	100	107	109	121	140	159
Austin TX	11	15	20	22	22	23	23	28	155
Orlando FL	10	12	15	16	17	18	19	24	140
San Bernardino-Riv CA	46	57	73	80	92	97	102	105	128
San Antonio TX	16	19	28	29	29	30	33	36	125
Ft. Lauderdale FL	17	18	23	27	33	33	36	38	124
Portland OR	19	19	23	30	33	33	40	42	121
Columbus OH	11	12	14	16	22	22	24	24	118
Louisville KY	7	7	8	9	9	10	12	15	114
Nashville TN	8	11	13	18	18	18	18	17	113
Fort Worth TX	26	34	43	43	46	48	49	55	112
Pittsburgh PA	26	33	41	48	51	50	52	55	112
Washington DC	134	162	193	215	238	245	272	280	109
San Jose CA	43	57	72	83	86	90	91	89	107
Norfolk VA	16	19	28	32	34	34	34	33	106
Corpus Christi TX	1	1	1	1	1	2	2	2	100
Jacksonville FL	15	17	18	21	25	25	27	30	100
Chicago IL	145	173	212	209	237	249	276	280	93
Detroit MI	122	131	143	162	183	195	210	235	93
San Fran-Oak CA	156	213	246	287	297	294	293	301	93
Denver CO	39	49	49	52	61	65	69	75	92
Phoenix AZ	46	47	62	72	75	79	84	87	89
Oklahoma City OK	7	9	9	10	10	10	12	13	86
Miami FL	58	58	69	87	99	100	100	107	84
Milwaukee WI	12	14	17	20	21	22	22	22	83
Boston MA	87	103	130	161	155	158	161	158	82
Honolulu HI	17	20	21	24	25	25	29	31	82
New Orleans LA	17	25	28	31	31	30	30	31	82
Los Angeles CA	469	583	709	773	818	825	838	851	81
Tampa FL	12	15	16	20	20	22	22	21	75
Dallas TX	74	94	120	116	123	126	127	129	74
New York NY	479	483	547	622	691	692	736	763	59
St. Louis MO	41	47	51	52	56	58	57	65	59
Philadelphia PA	86	88	107	118	119	121	126	130	51
Houston TX	132	160	169	169	177	183	187	197	49
Northeastern Avg	120	131	153	175	189	191	205	212	77
Midwestern Avg	33	38	44	48	54	57	63	67	103
Southern Avg	20	23	29	34	37	38	39	43	115
Southwestern Avg	32	39	46	47	50	53	55	58	81
Western Avg	93	119	144	165	176	178	182	186	100
Texas Avg	38	46	55	55	58	59	61	65	71
Total Avg	53	63	74	84	90	92	97	101	91
Maximum Value	479	583	709	773	818	825	838	851	78
Minimum Value	1	1	1	1	1	2	2	2	100

Table A-11. Illustration of Annual Capacity Increase Required to Prevent Congestion Growth

Urban Area	Existing (1992) Lane-miles		Average Annual VMT Growth (%)[1]	Annual Freeway Lane-miles		Annual Prin. Art. Lane-miles		Lane-mile Deficiency	
	Fwy	Prin. Art.		Needed	Added	Needed	Added[2]	Fwy	Prin. Art
Detroit MI	1,825	4,300	5.76	105	34	248	105	71	143
New York NY	6,150	7,700	1.71	105	71	132	88	34	44
Kansas City MO	1,540	1,125	5.24	81	46	59	20	35	39
Los Angeles CA	5,475	12,550	1.38	75	89	173	93	(14)	80
Baltimore MD	1,370	1,700	3.40	47	35	58	6	12	52
Minn-St. Paul MN	1,535	1,200	5.06	78	21	61	54	57	7
Denver CO	990	1,860	3.39	34	33	63	5	1	58
Chicago IL	2,585	5,100	5.05	131	71	258	263	60	(5)
Cincinnati OH	965	825	4.45	43	19	37	8	24	29
Orlando FL	615	1,110	4.33	27	10	48	13	17	35
Washington DC	1,630	2,350	2.89	47	28	68	38	19	30
Columbus OH	825	640	4.47	37	9	29	10	28	19
Dallas TX	1,780	1,790	2.44	44	23	44	24	21	20
Cleveland OH	1,190	1,145	3.45	41	33	40	8	8	32
Miami FL	640	2,255	3.82	24	15	86	55	9	31
Fort Worth TX	1,070	940	3.52	38	14	33	19	24	14
San Antonio TX	940	1,130	3.88	36	29	44	13	7	31
Ft. Lauderdale FL	680	1,220	4.65	32	23	57	30	9	27
Nashville TN	630	970	5.20	33	38	50	9	(5)	41
Phoenix AZ	710	3,350	4.57	32	26	153	125	6	28
Oklahoma City OK	735	800	4.07	30	4	33	30	26	3
Salt Lake City UT	535	435	5.57	30	6	24	20	24	4
Houston TX	2,150	2,200	3.35	72	73	74	48	(1)	26
Pittsburgh PA	1,150	1,860	3.02	35	43	56	23	(8)	33
Seattle-Everett WA	1,285	1,625	2.77	36	31	45	25	5	20
Atlanta GA	2,000	2,000	5.34	107	80	107	110	27	(3)
Charlotte NC	315	590	4.72	15	5	28	15	10	13
Louisville KY	615	580	3.86	24	8	22	18	16	4
Memphis TN	455	1,040	6.37	29	19	66	56	10	10
San Diego CA	1,745	1,735	1.19	21	6	21	16	15	5
Philadelphia PA	1,690	3,290	1.52	26	46	50	11	(20)	39
Indianapolis IN	780	920	2.79	22	15	26	18	7	8
Sacramento CA	805	1,250	3.75	30	19	47	43	11	4
Hartford CT	610	655	2.46	15	8	16	9	7	7
Honolulu HI	395	245	5.19	21	14	13	6	7	7
El Paso TX	370	860	2.12	8	5	18	8	3	10
Portland OR	600	660	4.16	25	13	27	26	12	1
Austin TX	530	480	5.07	27	26	24	14	1	10
Corpus Christi TX	210	370	4.58	10	6	17	10	4	7
Jacksonville FL	480	1,310	2.86	14	10	37	30	4	7
Norfolk VA	575	760	3.68	21	29	28	9	(8)	19
Milwaukee WI	605	1,120	2.49	15	4	28	30	11	(2)
San Jose CA	1,220	1,380	1.82	22	15	25	24	7	1
Tampa FL	320	720	3.15	10	6	23	23	4	0
St. Louis MO	1,720	1,925	1.02	18	9	20	33	9	(13)
San Bernardino-Riv CA	935	2,120	3.47	32	14	74	99	18	(25)
Albuquerque NM	240	825	2.72	7	6	22	31	1	(9)
New Orleans LA	385	700	1.85	7	9	13	20	(2)	(7)
Boston MA	1,510	2,890	0.56	9	(1)	16	46	10	(30)
San Fran-Oak CA	2,435	2,350	0.57	14	21	13	53	(7)	(40)

Notes: [1] Average annual growth rate of freeway and principal arterial streets between 1989 and 1993.
[2] Average lane-kilometers added annually from 1989 to 1993.

Table A-12. Component and Total Congestion Costs by Urban Area for 1993

Urban Area	Annual Cost Due to Congestion ($ millions)			Rank
	Delay	Fuel	Total	
Los Angeles CA	7,600	1,130	8,730	1
New York NY	6,770	1,020	7,790	2
San Fran-Oak CA	2,640	400	3,040	3
Chicago IL	2,500	350	2,850	4
Washington DC	2,500	340	2,840	5
Detroit MI	2,120	270	2,390	6
Houston TX	1,720	230	1,950	7
Boston MA	1,390	200	1,590	8
Atlanta GA	1,240	150	1,390	9
Seattle-Everett WA	1,210	170	1,380	10
Philadelphia PA	1,190	160	1,350	11
Dallas TX	1,120	160	1,280	12
Miami FL	980	130	1,110	13
San Bernardino-Riv CA	930	130	1,070	14
Phoenix AZ	790	110	900	16
San Jose CA	780	110	890	16
San Diego CA	680	100	780	17
Denver CO	670	100	770	18
Baltimore MD	650	90	740	19
St. Louis MO	580	70	650	20
Pittsburgh PA	510	70	580	21
Fort Worth TX	480	60	540	22
Minn-St. Paul MN	460	60	520	23
Portland OR	370	60	430	24
Sacramento CA	330	50	380	25
Ft. Lauderdale FL	330	50	390	26
San Antonio TX	320	40	360	27
Cleveland OH	290	40	330	29
Norfolk VA	290	40	330	29
Honolulu HI	280	50	330	29
Jacksonville FL	270	40	310	32
New Orleans LA	270	40	310	32
Cincinnati OH	260	40	300	33
Austin TX	240	40	280	34
Columbus OH	220	30	250	35
Orlando FL	210	30	240	36
Milwaukee WI	200	20	220	38
Tampa FL	190	30	220	38
Kansas City MO	200	30	220	40
Hartford CT	180	20	210	40
Charlotte NC	150	20	170	42
Nashville TN	140	20	160	42
Louisville KY	130	20	150	43
Indianapolis IN	110	20	130	47
Albuquerque NM	110	20	130	47
Memphis TN	110	20	130	47
Oklahoma City OK	110	20	130	47
Salt Lake City UT	110	20	120	48
El Paso TX	60	0	70	49
Corpus Christi TX	20	0	20	50
Northeastern Avg	1,890	270	2,160	
Midwestern Avg	600	80	680	
Southern Avg	380	50	430	
Southwestern Avg	510	70	580	
Western Avg	1,650	250	1,900	
Texas Avg	560	80	640	
Total Avg	900	130	1,030	
Maximum Value	7,600	1,130	8,730	
Minimum Value	20	0	20	

Source: TTI Analysis and Local Transportation Agency References

Table A-13. Estimated Unit Costs of Congestion in 1993

Urban Area	Congestion Cost	
	Per Registered Vehicle (dollars)	Per Capita (dollars)
Northeastern Cities		
Baltimore MD	450	350
Boston MA	640	530
Hartford CT	440	340
New York NY	570	460
Philadelphia PA	330	260
Pittsburgh PA	370	300
Washington DC	1,000	840
Midwestern Cities		
Chicago IL	490	380
Cincinnati OH	300	230
Cleveland OH	240	180
Columbus OH	320	250
Detroit MI	810	600
Indianapolis IN	180	140
Kansas City MO	210	170
Louisville KY	230	180
Milwaukee WI	240	180
Minn-St. Paul MN	310	250
Oklahoma City OK	200	160
St. Louis MO	420	330
Southern Cities		
Atlanta GA	760	600
Charlotte NC	410	330
Ft. Lauderdale FL	360	300
Jacksonville FL	520	400
Memphis TN	190	140
Miami FL	730	580
Nashville TN	350	280
New Orleans LA	370	280
Norfolk VA	420	330
Orlando FL	320	260
Tampa FL	380	300
Southwestern Cities		
Albuquerque NM	310	240
Austin TX	610	480
Corpus Christi TX	110	80
Dallas TX	780	610
Denver CO	590	480
El Paso TX	160	120
Fort Worth TX	590	450
Houston TX	870	670
Phoenix AZ	570	430
Salt Lake City UT	170	130
San Antonio TX	400	300
Western Cities		
Honolulu HI	560	470
Los Angeles CA	940	730
Portland OR	500	400
Sacramento CA	420	320
San Bernardino-Riv CA	1,110	810
San Diego CA	390	310
San Fran-Oak CA	970	790
San Jose CA	770	590
Seattle-Everett WA	860	740
Northeastern Avg	540	440
Midwestern Avg	330	250
Southern Avg	440	340
Southwestern Avg	470	360
Western Avg	720	570
Texas Avg	500	390
Total Avg	480	380
Maximum Value	1,110	840
Minimum Value	110	80

Source: TTI Analysis and Local Transportation Agency References

Table A-14. 1993 Rankings of Urban Area by Estimated Impact of Congestion

Urban Area	Roadway Congestion Index	Congestion Cost per Capita	Congestion Cost per Driver
Northeastern Cities			
Baltimore MD	22	22	22
Boston MA	17	12	12
Hartford CT	35	23	23
New York NY	11	16	16
Philadelphia PA	22	35	35
Pittsburgh PA	46	29	31
Washington DC	2	1	2
Midwestern Cities			
Chicago IL	5	21	21
Cincinnati OH	25	40	40
Cleveland OH	28	41	41
Columbus OH	35	37	36
Detroit MI	6	8	7
Indianapolis IN	44	46	47
Kansas City MO	48	44	44
Louisville KY	35	41	43
Milwaukee WI	27	41	41
Minn-St. Paul MN	26	37	38
Oklahoma City OK	45	45	45
St. Louis MO	30	24	24
Southern Cities			
Atlanta GA	10	8	10
Charlotte NC	40	24	27
Ft. Lauderdale FL	28	29	33
Jacksonville FL	30	19	19
Memphis TN	35	46	46
Miami FL	4	11	11
Nashville TN	35	33	34
New Orleans LA	15	33	31
Norfolk VA	40	24	24
Orlando FL	46	35	36
Tampa FL	20	29	30
Southwestern Cities			
Albuquerque NM	30	39	38
Austin TX	33	13	13
Corpus Christi TX	50	50	50
Dallas TX	17	7	8
Denver CO	17	13	14
El Paso TX	49	49	49
Fort Worth TX	33	17	14
Houston TX	12	6	5
Phoenix AZ	16	18	16
Salt Lake City UT	40	48	48
San Antonio TX	43	29	28
Western Cities			
Honolulu HI	12	15	18
Los Angeles CA	1	5	4
Portland OR	14	19	20
Sacramento CA	22	27	24
San Bernardino-Riv CA	8	2	1
San Diego CA	8	28	29
San Fran-Oak CA	3	3	3
San Jose CA	21	10	9
Seattle-Everett WA	6	4	6

Source: TTI Analysis

Table A-15. Congestion Index and Cost Values, 1992 and 1993

Urban Area	Roadway Congestion Index				Congestion Cost per Capita[1] ($)		Annual Congestion Cost ($ millions)	
	1992 Value	1993 Value	1992 Rank	1993 Rank	1992	1993	1992	1993
Northeastern Cities								
Baltimore MD	1.04	1.04	23	22	340	350	700	750
Boston MA	1.07	1.07	17	17	540	530	1,600	1,590
Hartford CT	0.91	0.93	39	35	270	340	170	210
New York NY	1.14	1.15	11	11	430	460	7,370	7,790
Philadelphia PA	1.05	1.04	21	22	260	260	1,300	1,350
Pittsburgh PA	0.81	0.82	46	46	290	300	540	570
Washington DC	1.36	1.41	2	2	840	840	2,750	2,840
Midwestern Cities								
Chicago IL	1.28	1.26	5	5	370	380	2,790	2,850
Cincinnati OH	1.01	1.03	25	25	210	230	260	290
Cleveland OH	0.95	0.98	30	28	170	180	300	330
Columbus OH	0.93	0.93	35	35	260	250	240	250
Detroit MI	1.19	1.23	9	6	530	600	2,130	2,390
Indianapolis IN	0.85	0.89	44	44	100	140	90	130
Kansas City MO	0.77	0.78	48	48	160	170	190	220
Louisville KY	0.90	0.93	40	35	150	180	120	150
Milwaukee WI	1.00	1.00	26	27	180	180	220	230
Minn-St. Paul MN	0.99	1.02	27	26	250	250	530	520
Oklahoma City OK	0.83	0.86	45	45	160	160	120	130
St. Louis MO	0.95	0.96	30	30	280	330	560	650
Southern Cities								
Atlanta GA	1.17	1.16	10	10	520	600	1,190	1,390
Charlotte NC	0.89	0.92	43	40	320	330	160	170
Ft. Lauderdale FL	0.96	0.98	29	28	280	300	360	380
Jacksonville FL	0.97	0.96	28	30	360	400	270	300
Memphis TN	0.92	0.93	36	35	130	140	120	130
Miami FL	1.3	1.32	4	4	530	580	1,020	1,120
Nashville TN	0.92	0.93	36	35	300	280	180	170
New Orleans LA	1.1	1.09	13	15	270	280	300	310
Norfolk VA	0.92	0.92	36	40	350	330	330	330
Orlando FL	0.8	0.82	47	46	220	260	190	240
Tampa FL	1.07	1.06	17	20	320	300	230	220
Southwestern Cities								
Albuquerque NM	0.95	0.96	30	30	200	240	100	130
Austin TX	0.95	0.95	30	33	400	480	220	270
Corpus Christi TX	0.74	0.75	50	50	70	80	20	20
Dallas TX	1.07	1.07	17	17	590	610	1,230	1,270
Denver CO	1.05	1.07	21	17	430	480	690	770
El Paso TX	0.76	0.77	49	49	110	120	60	70
Fort Worth TX	0.94	0.95	34	33	400	450	480	540
Houston TX	1.12	1.13	12	12	630	670	1,830	1,950
Phoenix AZ	1.08	1.08	16	16	420	430	850	900
Salt Lake City UT	0.90	0.92	40	40	110	130	100	120
San Antonio TX	0.90	0.91	40	43	270	300	320	360
Western Cities								
Honolulu HI	1.10	1.13	13	12	430	470	290	320
Los Angeles CA	1.54	1.54	1	1	710	730	8,440	8,720
Portland OR	1.10	1.11	13	14	370	400	390	430
Sacramento CA	1.04	1.04	23	22	280	320	330	390
San Bernardino-Riv CA	1.22	1.21	6	8	780	810	1,020	1,070
San Diego CA	1.22	1.21	6	8	320	310	800	790
San Fran-Oak CA	1.33	1.33	3	3	760	790	2,900	3,040
San Jose CA	1.07	1.05	17	21	600	590	900	900
Seattle-Everett WA	1.22	1.23	6	6	720	740	1,330	1,380

Source: TTI Analysis

Table A-16. 1993 Freeway System Length and Travel Volume

Urban Area	Daily VMT[1] (1000)	Lane-Miles	Avg. No. Lanes[2]	Daily VMT/ Lane-Mile[3]	Rank[4]
Los Angeles CA	113,950	5,480	8.20	20,810	1
Washington DC	29,000	1,630	5.40	17,790	2
San Fran-Oak CA	42,750	2,440	6.80	17,560	3
San Bernardino-Riv CA	15,220	940	7.20	16,280	4
Detroit MI	29,500	1,830	6.00	16,160	5
Seattle-Everett WA	20,700	1,290	6.00	16,110	6
San Diego CA	27,750	1,750	7.60	15,900	7
Chicago IL	40,970	2,590	5.70	15,850	8
Miami FL	9,890	640	5.50	15,450	9
Atlanta GA	30,000	2,000	6.40	15,000	10
Houston TX	32,000	2,150	6.40	14,880	11
Boston MA	21,500	1,510	5.90	14,240	12
Dallas TX	24,900	1,780	6.00	13,990	13
New York NY	86,000	6,150	5.70	13,980	14
Honolulu HI	5,500	400	5.30	13,920	15
Portland OR	8,350	600	5.20	13,920	15
Phoenix AZ	9,800	710	5.80	13,800	17
San Jose CA	16,650	1,220	6.70	13,650	18
New Orleans LA	5,200	390	5.80	13,510	19
Denver CO	13,250	990	5.30	13,380	20
Cincinnati OH	12,870	970	5.70	13,330	21
Baltimore MD	18,000	1,370	5.50	13,140	22
Minn-St. Paul MN	20,000	1,540	5.00	13,030	23
Milwaukee WI	7,840	610	5.60	12,960	24
Sacramento CA	10,280	810	7.00	12,770	25
Cleveland OH	14,970	1,190	4.90	12,580	26
Ft. Lauderdale FL	8,500	680	5.50	12,500	27
Jacksonville FL	6,000	480	4.80	12,500	27
Tampa FL	3,950	320	5.00	12,340	29
Fort Worth TX	13,100	1,070	5.90	12,240	30
Austin TX	6,420	530	5.60	12,110	31
Philadelphia PA	20,200	1,690	5.10	11,950	32
Columbus OH	9,750	830	5.90	11,820	33
Hartford CT	7,030	610	5.60	11,520	34
Albuquerque NM	2,740	240	5.10	11,420	35
Indianapolis IN	8,900	780	5.50	11,410	36
Louisville KY	7,000	620	4.60	11,380	37
San Antonio TX	10,700	940	5.40	11,380	37
St. Louis MO	19,500	1,720	5.70	11,340	39
Salt Lake City UT	6,060	540	5.70	11,330	40
Memphis TN	5,150	460	5.40	11,320	41
Charlotte NC	3,500	320	4.30	11,110	42
Nashville TN	7,000	630	4.90	11,110	42
Oklahoma City OK	7,700	740	5.20	10,480	44
Norfolk VA	5,980	580	4.70	10,390	45
Orlando FL	6,230	620	5.00	10,120	46
El Paso TX	3,700	370	5.30	10,000	47
Kansas City MO	15,000	1,540	4.60	9,740	48
Corpus Christi TX	1,950	210	5.50	9,290	49
Pittsburgh PA	9,350	1,150	4.30	8,130	50
Northeastern Avg	27,300	2,020	5.36	12,960	
Midwestern Avg	16,170	1,240	5.37	12,510	
Southern Avg	8,310	650	5.21	12,310	
Southwestern Avg	11,330	870	5.64	12,170	
Western Avg	29,020	1,660	6.67	15,660	
Texas Avg	13,250	1,010	5.73	11,990	
Total Avg	17,240	1,210	5.62	13,020	
Maximum Value	113,950	6,150	8.20	20,810	
Minimum Value	1,950	210	4.30	8,130	

Notes:
[1] Daily vehicle-miles of travel.
[2] Average number of lanes.
[3] Daily vehicle-mils of travel per lane-mile of freeway.
[4] Rank value of 1 associated with most congested condition. Ranked by daily VMT/lane-mile.

Source: TTI Analysis and Local Transportation Agency References

Table A-17. 1993 Principal Arterial Street System Length and Travel Volume[1]

Urban Area	Daily VMT[1] (1000)	Lane-Miles	Avg. No. Lanes[2]	Daily VMT/ Lane-Mile[3]	Rank[4]
Honolulu HI	1,930	250	3.80	7,880	1
Washington DC	18,400	2,350	4.00	7,830	2
Miami FL	17,000	2,260	4.60	7,540	3
New York NY	55,000	7,700	3.40	7,140	4
Chicago IL	35,000	5,100	3.90	6,860	5
Portland OR	4,400	660	3.50	6,670	6
Los Angeles CA	83,000	12,550	4.10	6,610	7
St. Louis MO	12,700	1,930	3.60	6,600	8
Philadelphia PA	21,660	3,290	3.30	6,580	9
Tampa FL	4,660	720	3.80	6,470	10
Norfolk VA	4,900	760	3.50	6,450	11
New Orleans LA	4,400	700	4.20	6,290	12
Sacramento CA	7,850	1,250	4.20	6,280	13
Pittsburgh PA	11,500	1,860	3.20	6,180	14
Salt Lake City UT	2,670	440	4.00	6,140	15
Detroit MI	26,000	4,300	4.50	6,050	16
San Fran-Oak CA	14,200	2,350	4.00	6,040	17
Louisville KY	3,500	580	3.70	6,030	18
Atlanta GA	12,000	2,000	3.80	6,000	19
Denver CO	11,100	1,860	3.90	5,970	20
Seattle-Everett WA	9,700	1,630	3.50	5,970	20
Minn-St. Paul MN	7,100	1,200	3.50	5,920	22
Baltimore MD	10,000	1,700	4.10	5,880	23
Hartford CT	3,790	660	3.80	5,790	24
Nashville TN	5,600	970	3.50	5,770	25
Oklahoma City OK	4,500	800	3.40	5,630	26
San Diego CA	9,650	1,740	3.50	5,560	27
Phoenix AZ	18,500	3,350	4.30	5,520	28
Charlotte NC	3,230	590	3.30	5,470	29
Columbus OH	3,500	640	3.50	5,470	29
Albuquerque NM	4,500	830	4.00	5,450	31
Cleveland OH	6,200	1,150	3.00	5,410	32
Memphis TN	5,560	1,040	4.60	5,350	33
Cincinnati OH	4,400	830	3.50	5,330	34
San Antonio TX	6,000	1,130	3.60	5,310	35
San Jose CA	7,300	1,380	4.20	5,290	36
Ft. Lauderdale FL	6,400	1,220	4.50	5,250	37
San Bernardino-Riv CA	11,100	2,120	4.20	5,240	38
Austin TX	2,500	480	4.20	5,210	39
Houston TX	11,400	2,200	4.50	5,180	40
Dallas TX	9,100	1,790	4.90	5,080	41
Fort Worth TX	4,700	940	4.20	5,000	42
Milwaukee WI	5,600	1,120	3.40	5,000	42
Indianapolis IN	4,500	920	3.80	4,890	44
Kansas City MO	5,500	1,130	3.60	4,890	44
Boston MA	14,000	2,890	2.50	4,840	46
Jacksonville FL	6,250	1,310	3.90	4,770	47
Orlando FL	5,200	1,110	3.80	4,680	48
Corpus Christi TX	1,600	370	4.10	4,320	49
El Paso TX	3,340	860	4.30	3,880	50
Northeastern Avg	19,190	2,920	3.47	6,320	
Midwestern Avg	9,880	1,640	3.62	5,670	
Southern Avg	6,840	1,150	3.95	5,820	
Southwestern Avg	6,860	1,290	4.18	5,190	
Western Avg	16,570	2,660	3.89	6,170	
Texas Avg	5,520	1,110	4.26	4,860	
Total Avg	11,050	1,820	3.84	5,780	
Maximum Value	83,000	12,550	4.90	7,880	
Minimum Value	1,600	250	2.50	3,880	

Notes:
[1] Daily vehicle-miles of travel.
[2] Average number of lanes.
[3] Daily vehicle-miles of travel per lane-mile of freeway.
[4] Rank value of 1 associated with most congested condition. Ranked by daily VMT/lane-mile.

Source: TTI Analysis and Local Transportation Agency References

Table A-18. Freeway and Expressway Recurring and Incident Hours of Daily Delay for 1993

Urban Area	Recurring Hours of Delay[1]				Incident Hours of Delay[1]			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	6,790	6,420	20,920	34,130	15,620	14,760	48,120	78,500
Boston MA	8,680	17,000	36,900	62,580	30,380	59,490	129,140	219,010
Hartford CT	1,830	4,190	2,250	8,270	4,940	11,320	6,080	22,340
New York NY	65,600	127,410	118,730	311,740	164,010	318,540	296,830	779,380
Philadelphia PA	6,750	7,970	16,380	31,100	14,180	16,740	34,410	65,330
Pittsburgh PA	1,940	4,100	5,660	11,700	5,640	11,880	16,410	33,930
Washington DC	14,960	23,880	97,230	136,070	32,910	52,540	213,900	299,350
Midwestern Cities								
Chicago IL	19,330	18,300	128,600	166,230	23,190	21,950	154,320	199,460
Cincinnati OH	6,140	12,370	7,970	26,480	4,910	9,900	6,380	21,190
Cleveland OH	10,620	7,600	11,670	29,890	7,430	5,320	8,170	20,920
Columbus OH	910	5,920	13,130	19,960	640	4,140	9,190	13,970
Detroit MI	11,070	8,870	80,670	100,610	24,350	19,510	177,470	221,330
Indianapolis IN	4,050	1,360	1,370	6,780	6,080	2,040	2,060	10,180
Kansas City MO	3,730	1,620	2,830	8,180	11,570	5,010	8,760	25,340
Louisville KY	1,130	790	2,330	4,250	1,240	870	2,560	4,670
Milwaukee WI	2,500	4,810	7,450	14,760	2,500	4,810	7,450	14,760
Minn-St. Paul MN	10,240	3,550	22,980	36,770	9,210	3,190	20,680	33,080
Oklahoma City OK	1,880	1,940	160	3,980	2,070	2,140	170	4,380
St. Louis MO	7,360	11,230	10,120	28,710	8,830	13,480	12,140	34,450
Southern Cities								
Atlanta GA	7,820	27,610	65,250	100,680	8,600	30,380	71,780	110,760
Charlotte NC	2,510	2,010	2,410	6,930	2,000	1,610	1,920	5,530
Ft. Lauderdale FL	4,030	11,210	4,800	20,040	6,040	16,810	7,210	30,060
Jacksonville FL	3,340	6,800	1,680	11,820	5,000	10,200	2,520	17,720
Memphis TN	1,790	1,490	860	4,140	1,970	1,640	940	4,550
Miami FL	6,070	5,110	27,780	38,960	9,110	7,660	41,660	58,430
Nashville TN	3,180	1,970	2,610	7,760	3,500	2,160	2,870	8,530
New Orleans LA	2,240	10,540	2,760	15,540	4,030	18,970	4,960	27,960
Norfolk VA	3,630	7,330	2,690	13,650	9,080	18,330	6,720	34,130
Orlando FL	4,230	2,670	5,760	12,660	6,350	4,010	8,650	19,010
Tampa FL	440	820	4,160	5,420	660	1,240	6,240	8,140
Southwestern Cities								
Albuquerque NM	780	1,020	1,520	3,320	860	1,120	1,680	3,660
Austin TX	4,040	7,270	10,630	21,940	4,440	7,990	11,700	24,130
Corpus Christi TX	920	490	0	1,410	1,020	540	0	1,560
Dallas TX	16,620	28,350	39,360	84,330	29,920	51,020	70,850	151,790
Denver CO	6,270	9,140	32,660	48,070	6,270	9,140	32,660	48,070
El Paso TX	1,720	2,730	630	5,080	1,900	3,000	690	5,590
Fort Worth TX	7,150	12,200	16,940	36,290	12,870	21,960	30,500	65,330
Houston TX	8,710	52,820	88,400	149,930	12,190	73,950	123,760	209,900
Phoenix AZ	5,390	6,190	30,900	42,480	2,160	2,480	12,360	17,000
Salt Lake City UT	1,770	3,540	3,970	9,280	1,060	2,120	2,380	5,560
San Antonio TX	2,840	9,000	16,190	28,030	3,130	9,900	17,810	30,840
Western Cities								
Honolulu HI	2,450	3,460	12,230	18,140	4,400	6,220	22,010	32,630
Los Angeles CA	26,090	23,650	567,000	616,740	31,300	28,380	680,400	740,080
Portland OR	3,990	5,330	11,640	20,960	7,990	10,660	23,280	41,930
Sacramento CA	5,900	11,910	2,240	20,050	3,540	7,140	1,350	12,030
San Bernardino-Riv CA	5,460	12,840	54,770	73,070	6,560	15,410	65,730	87,700
San Diego CA	24,800	25,190	30,440	80,430	14,880	15,120	18,260	48,260
San Fran-Oak CA	19,800	39,640	173,880	233,320	25,730	51,540	226,050	303,320
San Jose CA	6,580	12,260	48,580	67,420	7,890	14,710	58,300	80,900
Seattle-Everett WA	5,380	30,360	62,400	98,140	7,530	42,510	87,360	137,400
Northeastern Avg	15,220	27,280	42,580	85,080	38,240	69,330	106,410	213,980
Midwestern Avg	6,580	6,530	24,110	37,220	8,500	7,700	34,110	50,310
Southern Avg	3,570	7,050	10,980	21,600	5,120	10,270	14,130	29,520
Southwestern Avg	5,110	12,070	21,930	39,110	6,890	16,660	27,670	51,220
Western Avg	11,160	18,290	107,020	136,470	12,200	21,300	131,420	164,920
Texas Avg	6,000	16,120	24,590	46,710	9,350	24,050	36,470	69,870
Total Avg	7,630	12,890	38,250	58,770	12,230	21,310	55,940	89,480
Maximum Value	65,600	127,410	567,000	760,010	164,010	318,540	680,400	1162,950
Minimum Value	440	490	0	930	640	540	0	1,180

Notes: [1] Delay calculated based on vehicular speed in Table B-1, Volume 1.

Source: TTI Analysis

Table A-19. Principal Arterial Street Recurring and Incident Hours of Daily Delay for 1993

Urban Area	Recurring Hours of Delay[1]				Incident Hours of Delay[1]			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	1,650	4,270	17,820	23,740	1,810	4,700	19,610	26,120
Boston MA	4,730	6,290	19,490	30,510	5,200	6,920	21,440	33,560
Hartford CT	1,310	2,510	2,890	6,710	1,440	2,760	3,180	7,380
New York NY	10,560	52,870	222,600	286,030	11,620	58,160	244,850	314,630
Philadelphia PA	5,430	13,520	80,130	99,080	5,970	14,870	88,140	108,980
Pittsburgh PA	7,700	6,690	25,270	39,660	8,470	7,360	27,790	43,620
Washington DC	8,080	17,940	64,650	90,670	8,890	19,730	71,110	99,730
Midwestern Cities								
Chicago IL	14,820	41,320	67,990	124,130	16,300	45,460	74,790	136,550
Cincinnati OH	1,540	1,710	3,390	6,640	1,700	1,880	3,720	7,300
Cleveland OH	1,540	3,970	4,030	9,540	1,700	4,360	4,430	10,490
Columbus OH	1,470	1,520	6,680	9,670	1,620	1,680	7,350	10,650
Detroit MI	8,060	10,840	82,420	101,320	8,860	11,920	90,660	111,440
Indianapolis IN	1,470	1,780	2,130	5,380	1,620	1,960	2,350	5,930
Kansas City MO	1,790	1,700	3,270	6,760	1,970	1,870	3,600	7,440
Louisville KY	1,430	2,830	7,440	11,700	1,570	3,120	8,190	12,880
Milwaukee WI	930	2,620	5,920	9,470	1,020	2,880	6,510	10,410
Minn-St. Paul MN	1,750	2,340	17,110	21,200	1,930	2,570	18,820	23,320
Oklahoma City OK	1,530	2,980	4,970	9,480	1,680	3,280	5,470	10,430
St. Louis MO	8,290	9,570	21,330	39,190	9,120	10,530	23,460	43,110
Southern Cities								
Atlanta GA	4,240	6,110	35,560	45,910	4,670	6,720	39,120	50,510
Charlotte NC	370	2,590	8,870	11,830	400	2,850	9,760	13,010
Ft. Lauderdale FL	3,730	4,860	7,320	15,910	4,100	5,350	8,050	17,500
Jacksonville FL	4,010	3,420	10,240	17,670	4,410	3,760	11,260	19,430
Memphis TN	2,640	2,670	4,090	9,400	2,900	2,940	4,500	10,340
Miami FL	4,640	8,620	58,920	72,180	5,100	9,480	64,810	79,390
Nashville TN	2,170	3,830	3,600	9,600	2,390	4,210	3,960	10,560
New Orleans LA	2,020	3,470	6,010	11,500	2,230	3,820	6,610	12,660
Norfolk VA	950	3,020	7,230	11,200	1,040	3,330	7,950	12,320
Orlando FL	270	1,340	8,130	9,740	300	1,480	8,950	10,730
Tampa FL	1,600	3,420	12,490	17,510	1,760	3,760	13,740	19,260
Southwestern Cities								
Albuquerque NM	2,490	2,620	4,970	10,080	2,740	2,880	5,470	11,090
Austin TX	1,530	1,990	2,600	6,120	1,680	2,190	2,860	6,730
Corpus Christi TX	520	400	0	920	570	440	0	1,010
Dallas TX	4,560	5,810	7,330	17,700	5,020	6,390	8,060	19,470
Denver CO	4,450	6,580	23,080	34,110	4,900	7,240	25,380	37,520
El Paso TX	310	340	1,160	1,810	340	370	1,280	1,990
Fort Worth TX	1,770	2,250	2,840	6,860	1,940	2,470	3,120	7,530
Houston TX	2,730	13,890	14,410	31,030	3,000	15,280	15,850	34,130
Phoenix AZ	11,860	25,050	29,310	66,220	13,040	27,550	32,240	72,830
Salt Lake City UT	2,170	1,990	930	5,090	2,390	2,190	1,020	5,600
San Antonio TX	2,020	2,250	4,940	9,210	2,220	2,480	5,430	10,130
Western Cities								
Honolulu HI	1,250	700	6,180	8,130	1,380	770	6,800	8,950
Los Angeles CA	24,580	65,950	169,310	259,840	27,040	72,540	186,240	285,820
Portland OR	1,740	5,560	7,050	14,350	1,910	6,120	7,760	15,790
Sacramento CA	2,250	4,990	17,790	25,030	2,480	5,490	19,570	27,540
San Bernardino-Riv CA	7,370	9,420	16,950	33,740	8,110	10,360	18,640	37,110
San Diego CA	1,630	10,670	5,570	17,870	1,790	11,740	6,130	19,660
San Fran-Oak CA	3,030	7,550	45,810	56,390	3,340	8,310	50,390	62,040
San Jose CA	3,560	3,570	14,810	21,940	3,910	3,930	16,290	24,130
Seattle-Everett WA	3,730	5,270	21,180	30,180	4,100	5,790	23,300	33,190
Northeastern Avg	5,640	14,870	61,830	82,340	6,200	16,360	68,020	90,580
Midwestern Avg	3,720	6,930	18,890	29,540	4,090	7,630	20,780	32,500
Southern Avg	2,420	3,940	14,770	21,130	2,660	4,340	16,250	23,250
Southwestern Avg	3,130	5,740	8,320	17,190	3,440	6,320	9,160	18,920
Western Avg	5,460	12,630	33,850	51,940	6,010	13,890	37,230	57,130
Texas Avg	1,920	3,850	4,750	10,520	2,110	4,230	5,230	11,570
Total Avg	3,890	8,150	24,360	36,400	4,270	8,960	26,800	40,030
Maximum Value	24,580	65,950	222,600	313,130	27,040	72,540	244,850	344,430
Minimum Value	270	340	0	610	300	370	0	670

Notes: [1] Delay calculated based on vehicular speed in Table B-1, Volume 1.

Source: TTI Analysis

Table A-20. Congested Daily Vehicle-Miles of Travel by Average Annual Daily Traffic per Lane Volumes

Functional Class	Parameters	Uncongested	Congested Daily VMT[1,2]		
			Moderate	Heavy	Severe
Freeway/Expressway	ADT/Lane	Under 15,000	15,000 - 17,500	17,501 - 20,000	Over 20,000
	Speed (mph)	60	38	33	30
Principal Arterial Streets	ADT/Lane	Under 5,750	5,750 - 7,000	7,001 - 8,500	Over 8,500
	Speed (mph)	35	28	25	23

Note: [1] Assumes congested freeway operation when ADT/Lane exceeds 15,000.
[2] Assumes congested principal arterial street operations when ADT/lane exceeds 5,750.

Source: TTI Analysis and Houston-Galveston Regional Transportation Study (Volume 2, Appendix B) (12)

Table A-21. 1993 Congestion Cost Estimate Variables

Urban Area	Daily VMT		State Average Fuel Cost, ($/gallon)	Population (1000)	Eligible Drivers (000)
	Freeway (1000)	Prin. Art. St. (1000)			
Northeastern Cities					
Baltimore MD	18,000	10,000	1.27	2,110	1,660
Boston MA	21,500	14,000	1.26	2,980	2,480
Hartford CT	7,030	3,790	1.36	620	470
New York NY	86,000	55,000	1.33	17,000	13,570
Philadelphia PA	20,200	21,660	1.21	5,200	4,110
Pittsburgh PA	9,350	11,500	1.21	1,900	1,570
Washington DC	29,000	18,400	1.22	3,400	2,830
Midwestern Cities					
Chicago IL	40,970	35,000	1.26	7,600	5,870
Cincinnati OH	12,870	4,400	1.18	1,250	970
Cleveland OH	14,970	6,200	1.18	1,800	1,370
Columbus OH	9,750	3,500	1.18	980	780
Detroit MI	29,500	26,000	1.16	4,000	2,950
Indianapolis IN	8,900	4,500	1.14	960	740
Kansas City MO	15,000	5,500	1.09	1,300	1,020
Louisville KY	7,000	3,500	1.14	820	650
Milwaukee WI	7,840	5,600	1.20	1,230	930
Minn-St. Paul MN	20,000	7,100	1.19	2,120	1,680
Oklahoma City OK	7,700	4,500	1.12	800	620
St. Louis MO	19,500	12,700	1.09	1,990	1,550
Southern Cities					
Atlanta GA	30,000	12,000	1.10	2,320	1,830
Charlotte NC	3,500	3,230	1.18	520	410
Ft. Lauderdale FL	8,500	6,400	1.26	1,300	1,080
Jacksonville FL	6,000	6,250	1.26	770	590
Memphis TN	5,150	5,560	1.17	890	680
Miami FL	9,890	17,000	1.26	1,940	1,530
Nashville TN	7,000	5,600	1.17	600	480
New Orleans LA	5,200	4,400	1.25	1,110	840
Norfolk VA	5,980	4,900	1.19	980	780
Orlando FL	6,230	5,200	1.26	920	750
Tampa FL	3,950	4,660	1.26	740	590
Southwestern Cities					
Albuquerque NM	2,740	4,500	1.28	530	410
Austin TX	6,420	2,500	1.19	570	450
Corpus Christi TX	1,950	1,600	1.19	290	210
Dallas TX	24,900	9,100	1.19	2,090	1,630
Denver CO	13,250	11,100	1.28	1,610	1,290
El Paso TX	3,700	3,340	1.19	570	410
Fort Worth TX	13,100	4,700	1.19	1,210	920
Houston TX	32,000	11,400	1.19	2,930	2,240
Phoenix AZ	9,800	18,500	1.30	2,070	1,570
Salt Lake City UT	6,060	2,670	1.18	880	680
San Antonio TX	10,700	6,000	1.19	1,200	890
Western Cities					
Honolulu HI	5,500	1,930	1.59	690	580
Los Angeles CA	113,950	83,000	1.32	11,950	9,300
Portland OR	8,350	4,400	1.35	1,080	870
Sacramento CA	10,280	7,850	1.32	1,210	920
San Bernardino-Riv CA	15,220	11,100	1.32	1,330	960
San Diego CA	27,750	9,650	1.32	2,530	1,010
San Fran-Oak CA	42,750	14,200	1.32	3,830	3,130
San Jose CA	16,650	7,300	1.32	1,530	1,170
Seattle-Everett WA	20,700	9,700	1.27	1,880	1,600
Northeastern Avg	27,300	19,190	1.27	4,740	3,810
Midwestern Avg	16,170	9,880	1.16	2,070	1,590
Southern Avg	8,310	6,840	1.21	1,100	870
Southwestern Avg	11,330	6,860	1.22	1,270	970
Western Avg	29,020	16,570	1.35	2,890	2,280
Texas Avg	13,250	5,520	1.19	1,270	960
Total Avg	17,240	11,050	1.23	2,200	1,730
Maximum Value	113,950	83,000	1.59	17,000	13,570
Minimum Value	1,950	1,600	1.09	290	210

Source: TTI Analysis and Local Transportation Agency References

Table A-22. 1993 Congested Daily Vehicle-Miles of Travel

Urban Area	Daily Vehicle-Miles of Travel		Percent of Peak-Period[1,2] VMT on Congested Roads		Peak Period Congested Daily VMT[1,3]		
	Freeway (1000)	Prin.Art.St. (1000)	Freeway (%)	Prin.Art.St. (%)	Freeway (1000)	Prin.Art.St. (1000)	Freeway & Prin.Art.St. (1000)
Northeastern Cities							
Baltimore MD	18,000	10,000	30	40	2,430	1,800	4,230
Boston MA	21,500	14,000	45	40	4,350	2,520	6,870
Hartford CT	7,030	3,790	20	35	630	600	1,230
New York NY	86,000	55,000	60	85	23,220	21,040	44,260
Philadelphia PA	20,200	21,660	25	75	2,270	7,310	9,580
Pittsburgh PA	9,350	11,500	20	65	840	3,360	4,210
Washington DC	29,000	18,400	70	85	9,140	7,040	16,170
Midwestern Cities							
Chicago IL	40,970	35,000	60	65	11,060	10,240	21,300
Cincinnati OH	12,870	4,400	35	30	2,030	590	2,620
Cleveland OH	14,970	6,200	35	30	2,360	840	3,190
Columbus OH	9,750	3,500	30	50	1,320	790	2,100
Detroit MI	29,500	26,000	50	65	6,640	7,610	14,240
Indianapolis IN	8,900	4,500	15	25	600	510	1,110
Kansas City MO	15,000	5,500	10	25	680	620	1,290
Louisville KY	7,000	3,500	10	60	320	950	1,260
Milwaukee WI	7,840	5,600	30	30	1,060	760	1,810
Minn-St. Paul MN	20,000	7,100	30	50	2,700	1,600	4,300
Oklahoma City OK	7,700	4,500	10	40	350	810	1,160
St. Louis MO	19,500	12,700	25	60	2,190	3,430	5,620
Southern Cities							
Atlanta GA	30,000	12,000	50	65	6,750	3,510	10,260
Charlotte NC	3,500	3,230	35	60	550	870	1,420
Ft. Lauderdale FL	8,500	6,400	40	50	1,530	1,440	2,970
Jacksonville FL	6,000	6,250	35	55	950	1,550	2,490
Memphis TN	5,150	5,560	15	35	350	880	1,220
Miami FL	9,890	17,000	60	70	2,670	5,360	8,030
Nashville TN	7,000	5,600	20	35	630	880	1,510
New Orleans LA	5,200	4,400	50	50	1,170	990	2,160
Norfolk VA	5,980	4,900	40	40	1,080	880	1,960
Orlando FL	6,230	5,200	35	30	980	700	1,680
Tampa FL	3,950	4,660	20	65	360	1,360	1,720
Southwestern Cities							
Albuquerque NM	2,740	4,500	20	45	250	910	1,160
Austin TX	6,420	2,500	55	50	1,590	560	2,150
Corpus Christi TX	1,950	1,600	15	15	130	110	240
Dallas TX	24,900	9,100	55	40	6,160	1,640	7,800
Denver CO	13,250	11,100	55	55	3,280	2,750	6,030
El Paso TX	3,700	3,340	25	10	420	150	570
Fort Worth TX	13,100	4,700	45	30	2,650	630	3,290
Houston TX	32,000	11,400	70	50	10,080	2,570	12,650
Phoenix AZ	9,800	18,500	65	70	2,870	5,830	8,690
Salt Lake City UT	6,060	2,670	25	45	680	540	1,220
San Antonio TX	10,700	6,000	40	30	1,930	810	2,740
Western Cities							
Honolulu HI	5,500	1,930	50	75	1,240	650	1,890
Los Angeles CA	113,950	83,000	75	55	38,460	20,540	59,000
Portland OR	8,350	4,400	40	60	1,500	1,190	2,690
Sacramento CA	10,280	7,850	35	55	1,620	1,940	3,560
San Bernardino-Riv CA	15,220	11,100	70	60	4,790	3,000	7,790
San Diego CA	27,750	9,650	50	35	6,240	1,520	7,760
San Fran-Oak CA	42,750	14,200	80	65	15,390	4,150	19,540
San Jose CA	16,650	7,300	60	55	4,500	1,810	6,300
Seattle-Everett WA	20,700	9,700	70	55	6,520	2,400	8,920
Northeastern Avg	27,300	19,190	39	61	6,130	6,240	12,360
Midwestern Avg	16,170	9,880	28	44	2,610	2,390	5,000
Southern Avg	8,310	6,840	36	50	1,550	1,670	3,220
Southwestern Avg	11,330	6,860	43	40	2,730	1,500	4,230
Western Avg	29,020	16,570	59	57	8,920	4,130	13,050
Texas Avg	13,250	5,520	44	32	3,280	920	4,200
Total Avg	17,240	11,050	40	49	4,030	2,890	6,920
Maximum Value	113,950	83,000	80	85	38,460	21,040	59,000
Minimum Value	1,950	1,600	10	10	130	110	240

Notes:
[1] Daily vehicle-miles of travel.
[2] Represents the percentage of daily vehicle-miles of travel on each roadway system during the peak period operating on congestion conditions.
[3] Daily vehicle-miles of travel by peak-period vehicle travel and percent of congested daily VMT.

Source: TTI Analysis and Local Transportation Agency References

Table A-23. Recurring and Incident Delay Relationships for 1993

Urban Area	Peak Period Congested Daily VMT[1]			Ratio of Incident[2] Delay to Recurring Delay		Daily Recurring Vehicle[3] Hours of Delay			Daily Incident Vehicle[3] Hours of Delay		
	Freeway (1000)	Prin.Art.St. (1000)	Freeway and Prin. Art. St. (1000)	Freeway	Prin.Art.St.	Freeway	Hours of Delay Prin.Art.St.	Total	Freeway	Prin.Art.St.	Total
Northeastern Cities											
Baltimore MD	2,430	1,800	4,230	2.3	1.1	34,130	23,740	57,880	78,510	26,120	104,620
Boston MA	4,350	2,520	6,870	3.5	1.1	62,570	30,510	93,080	219,010	33,560	252,570
Hartford CT	630	600	1,230	2.7	1.1	8,270	6,710	14,980	22,340	7,380	29,720
New York NY	23,220	21,040	44,260	2.5	1.1	311,750	286,030	597,780	779,370	314,630	1,094,000
Philadelphia PA	2,270	7,310	9,580	2.1	1.1	31,110	99,080	130,190	65,330	108,980	174,310
Pittsburgh PA	840	3,360	4,210	2.9	1.1	11,700	39,660	51,360	33,930	43,630	77,560
Washington DC	9,140	7,040	16,170	2.2	1.1	136,060	90,670	226,730	299,340	99,740	399,080
Midwestern Cities											
Chicago IL	11,060	10,240	21,300	1.2	1.1	166,220	124,130	290,350	199,460	136,540	336,000
Cincinnati OH	2,030	590	2,620	0.8	1.1	26,480	6,640	33,120	21,190	7,300	28,490
Cleveland OH	2,360	840	3,190	0.7	1.1	29,890	9,540	39,420	20,920	10,490	31,410
Columbus OH	1,320	790	2,100	0.7	1.1	19,960	9,680	29,640	13,970	10,650	24,620
Detroit MI	6,640	7,610	14,240	2.2	1.1	100,610	101,310	201,920	221,330	111,440	332,770
Indianapolis IN	600	510	1,110	1.5	1.1	6,790	5,380	12,170	10,180	5,920	16,100
Kansas City MO	680	620	1,290	3.1	1.1	8,180	6,760	14,940	25,350	7,440	32,790
Louisville KY	320	950	1,260	1.1	1.1	4,250	11,710	15,960	4,680	12,880	17,550
Milwaukee WI	1,060	760	1,810	1.0	1.1	14,750	9,460	24,220	14,750	10,410	25,170
Minn-St. Paul MN	2,700	1,600	4,300	0.9	1.1	36,770	21,200	57,960	33,090	23,320	56,410
Oklahoma City OK	350	810	1,160	1.1	1.1	3,980	9,480	13,460	4,370	10,430	14,800
St. Louis MO	2,190	3,430	5,620	1.2	1.1	28,710	39,190	67,900	34,450	43,110	77,560
Southern Cities											
Atlanta GA	6,750	3,510	10,260	1.1	1.1	100,680	45,920	146,600	110,750	50,510	161,260
Charlotte NC	550	870	1,420	0.8	1.1	6,920	11,830	18,740	5,540	13,010	18,540
Ft. Lauderdale FL	1,530	1,440	2,970	1.5	1.1	20,040	15,910	35,950	30,060	17,500	47,560
Jacksonville FL	950	1,550	2,490	1.5	1.1	11,810	17,660	29,480	17,720	19,430	37,150
Memphis TN	350	880	1,220	1.1	1.1	4,140	9,400	13,540	4,550	10,340	14,890
Miami FL	2,670	5,360	8,030	1.5	1.1	38,950	72,170	111,130	58,430	79,390	137,820
Nashville TN	630	880	1,510	1.1	1.1	7,750	9,600	17,350	8,530	10,560	19,080
New Orleans LA	1,170	990	2,160	1.8	1.1	15,530	11,500	27,030	27,950	12,650	40,610
Norfolk VA	1,080	880	1,960	2.5	1.1	13,650	11,200	24,850	34,130	12,320	46,460
Orlando FL	980	700	1,680	1.5	1.1	12,670	9,750	22,420	19,000	10,720	29,730
Tampa FL	360	1,360	1,720	1.5	1.1	5,420	17,520	22,940	8,130	19,270	27,400

Table A-23. Recurring and Incident Delay Relationships for 1993 (continued)

Urban Area	Peak Period Congested Daily VMT[1]			Ratio of Incident[2] Delay to Recurring Delay		Daily Recurring Vehicle[3] Hours of Delay			Daily Incident Vehicle[3] Hours of Delay		
	Freeway (1000)	Prin.Art.St. (1000)	Freeway and Prin. Art. St. (1000)	Freeway	Prin.Art.St.	Freeway	Hours of Delay Prin.Art.St.	Total	Freeway	Prin.Art.St.	Total
Southwestern Cities											
Albuquerque NM	250	910	1,160	1.1	1.1	3,320	10,080	13,400	3,650	11,090	14,740
Austin TX	1,590	560	2,150	1.1	1.1	21,930	6,120	28,050	24,130	6,730	30,860
Corpus Christi TX	130	110	240	1.1	1.1	1,410	920	2,330	1,550	1,010	2,570
Dallas TX	6,160	1,640	7,800	1.8	1.1	84,330	17,690	102,020	151,790	19,460	171,250
Denver CO	3,280	2,750	6,030	1.0	1.1	48,070	34,110	82,180	48,070	37,520	85,590
El Paso TX	420	150	570	1.1	1.1	5,080	1,800	6,880	5,590	1,980	7,570
Fort Worth TX	2,650	630	3,290	1.8	1.1	36,300	6,850	43,150	65,330	7,540	72,870
Houston TX	10,080	2,570	12,650	1.4	1.1	149,930	31,040	180,970	209,900	34,140	244,040
Phoenix AZ	2,870	5,830	8,690	0.4	1.1	42,480	66,220	108,700	16,990	72,840	89,830
Salt Lake City UT	680	540	1,220	0.6	1.1	9,270	5,090	14,360	5,560	5,600	11,160
San Antonio TX	1,930	810	2,740	1.1	1.1	28,030	9,210	37,240	30,830	10,130	40,970
Western Cities											
Honolulu HI	1,240	650	1,890	1.8	1.1	18,130	8,130	26,260	32,630	8,940	41,570
Los Angeles CA	38,460	20,540	59,000	1.2	1.1	616,740	259,840	876,580	740,090	285,820	1,025,910
Portland OR	1,500	1,190	2,690	2.0	1.1	20,960	14,350	35,320	41,920	15,790	57,710
Sacramento CA	1,620	1,940	3,560	0.6	1.1	20,050	25,030	45,080	12,030	27,530	39,560
San Bernardino-Riv CA	4,790	3,000	7,790	1.2	1.1	73,080	33,740	106,820	87,690	37,110	124,810
San Diego CA	6,240	1,520	7,760	0.6	1.1	80,430	17,870	98,300	48,260	19,650	67,910
San Fran-Oak CA	15,390	4,150	19,540	1.3	1.1	233,320	56,390	289,710	303,320	62,030	365,340
San Jose CA	4,500	1,810	6,300	1.2	1.1	67,420	21,940	89,360	80,900	24,140	105,040
Seattle-Everett WA	6,520	2,400	8,920	1.4	1.1	98,150	30,180	128,330	137,400	33,200	170,600
Northeastern Avg	6,130	6,240	12,360	2.6	1.1	85,090	82,340	167,430	213,980	90,580	304,550
Midwestern Avg	2,610	2,390	5,000	1.3	1.1	37,220	29,540	66,750	50,310	32,490	82,810
Southern Avg	1,550	1,670	3,220	1.4	1.1	21,600	21,130	42,730	29,530	23,240	52,770
Southwestern Avg	2,730	1,500	4,230	1.1	1.1	39,100	17,190	56,300	51,220	18,910	70,130
Western Avg	8,920	4,130	13,050	1.3	1.1	136,470	51,940	188,420	164,920	57,140	222,050
Texas Avg	3,280	920	4,200	1.3	1.1	46,720	10,520	57,240	69,870	11,570	81,450
Total Avg	4,030	2,890	6,920	1.5	1.1	58,760	36,400	95,160	89,480	40,040	129,520
Maximum Value	38,460	21,040	59,000	3.5	1.1	616,740	286,030	876,580	779,370	314,630	1,094,000
Minimum Value	130	110	240	0.4	1.1	1,410	920	2,330	1,550	1,010	2,570

Notes:
[1] Daily vehicle-miles of travel. Represents the percentage of Daily Vehicle-Miles of travel on each roadway system during the peak period operating in congested conditions.
[2] Percentage of Incident Delay related to Recurring Delay.
[3] Facility delays as calculated by type and urban area.

Source: TTI Analysis and Local Transportation Agency References

Table A-24. Component and Total Congestion Costs by Urban Area for 1993

Urban Area	Annual Cost Due to Congestion ($ millions)					Rank
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total	
Los Angeles CA	3,500	4,100	520	610	8,730	1
New York NY	2,390	4,380	360	660	7,790	2
San Fran-Oak CA	1,170	1,470	180	220	3,040	3
Chicago IL	1,160	1,340	160	190	2,850	4
Washington DC	910	1,590	120	220	2,840	5
Detroit MI	800	1,320	100	170	2,390	6
Houston TX	730	990	100	130	1,950	7
Boston MA	370	1,020	50	150	1,590	8
Atlanta GA	590	650	70	80	1,390	9
Seattle WA	520	690	70	100	1,380	10
Philadelphia PA	510	680	70	90	1,350	11
Dallas TX	420	700	60	100	1,280	12
Miami FL	440	540	60	70	1,110	13
San Bernardino-Riv CA	430	500	60	70	1,060	14
Phoenix AZ	430	360	60	50	900	16
San Jose CA	360	420	50	60	890	16
San Diego CA	400	280	60	40	780	17
Denver CO	330	340	50	50	770	18
Baltimore MD	230	420	30	60	740	19
St. Louis MO	270	310	30	40	650	20
Pittsburgh PA	200	310	30	40	580	21
Fort Worth TX	180	300	20	40	540	22
Minn-St. Paul MN	230	230	30	30	520	23
Portland OR	140	230	20	40	430	24
Sacramento CA	180	160	30	20	390	25
Ft. Lauderdale FL	140	190	20	30	380	26
San Antonio TX	150	170	20	20	360	27
Cleveland OH	160	130	20	20	330	29
Norfolk VA	100	190	10	30	330	29
Honolulu HI	110	170	20	30	330	29
Jacksonville FL	110	160	20	20	310	32
New Orleans LA	120	150	20	20	310	32
Cincinnati OH	140	120	20	20	300	33
Austin TX	110	130	20	20	280	34
Columbus OH	120	100	20	10	250	35
Orlando FL	90	120	10	20	240	36
Milwaukee WI	100	100	10	10	220	39
Tampa FL	60	130	10	20	220	39
Kansas City MO	90	110	10	10	220	39
Hartford CT	60	120	10	20	210	40
Charlotte NC	70	70	10	10	170	41
Nashville TN	70	80	10	10	160	42
Louisville KY	60	70	10	10	150	43
Indianapolis IN	50	60	10	10	130	46
Albuquerque NM	50	60	10	10	130	46
Memphis TN	50	60	10	10	130	46
Oklahoma City OK	50	60	10	10	130	46
Salt Lake City UT	60	50	10	10	130	48
El Paso TX	30	30	0	0	60	49
Corpus Christi TX	10	10	0	0	20	50
Northeastern Avg	670	1,220	100	180	2,160	
Midwestern Avg	270	330	40	40	680	
Southern Avg	170	210	20	30	430	
Southwestern Avg	230	280	30	40	580	
Western Avg	760	890	110	130	1,890	
Texas Avg	230	330	30	50	640	
Total Avg	380	520	50	70	1,030	
Maximum Value	3,500	4,380	520	660	8,730	
Minimum Value	10	10	0	0	20	

Source: TTI Analysis and Local Transportation Agency References

APPENDIX B

DEVELOPMENT OF THE URBAN AREAWIDE CONGESTION MEASUREMENT METHODOLOGY

(Reprinted from TTI Research Report 1131-3)

Previous research (1-4) on areawide mobility levels in Texas resulted in a methodology to compare urban roadway congestion levels. This section summarizes the purpose, database, analysis procedure, and major findings of that research effort and an FHWA research report on urban freeway congestion.

Purpose of Congestion Measurement Techniques

Transportation professionals and the general public are increasingly aware of the traffic congestion levels experienced in major cities. This interest resulted in research to develop a procedure that would allow quantitative comparisons of urbanized areawide traffic volumes and roadway length. Obviously, a procedure that utilizes generally available data would be more desirable than one which required new or more extensive data collection.

Previous Urban Mobility Comparison Studies

Lack of comparable and significant urban travel data has hampered the analysis of congestion levels on a national basis. The amount of roadway system performance statistics collected and reported by local and state agencies varies significantly across the nation. Differences in roadway functional classification terminology have resulted in significant variations between major and minor arterial street facility length. This analysis used the Highway Performance Monitoring System (HPMS) database (5) compiled by FHWA since 1980. Local planning and transportation agencies and state departments of transportation (DOT) were also contacted to obtain relevant data and provide local review.

State DOTs submit HPMS data which include information on state and locally maintained roadway systems. This should give a more accurate representation of the urbanized area roadway condition than information that could be developed from a single organization. The differences in functional classification and the amount of data used to update the database each year varies in each state. Locally developed planning data were, therefore, used to provide another source of information concerning the urban roadway system.

The boundary chosen for inclusion in a mobility analysis is also significant. City or county jurisdictions vary in the percentage of urbanized area included and the density of development. State laws pertaining to municipal incorporation and the time and manner in which the area developed also have a substantial impact on land use patterns.

In conducting the initial relative mobility studies, data availability proved to be the largest problem. Consistent data that allowed an accurate comparative assessment of urban congestion are not available from any agency or group of agencies. Data collected in several ways by many sources were acquired. In the opinion of the research staff and reviewers of the research report, however, the quantitative measures used in the studies (1-4) did provide a reasonably accurate measure of overall urban mobility. The general nature of the mobility assessment and the variety of data sources, as well as the experience of the reviewing agencies, combined to provide analysis results consistent with the accuracy level desired.

Comparability of the measures was achieved using several estimates of both travel and area statistics. For example, in defining urbanized area, it was not always possible to use jurisdictional limits as the defining boundaries due to either lack of data on related travel measures or non-comparability of information. County boundaries may appear to provide consistency, but variations in county size, as well as percentage of urbanization, significantly impaired the utility of county-based data. This study uses a population density of more than 1,000 persons per square kilometer as the criterion for urbanized area delineation.

A 1986 FHWA research report entitled, "Quantification of Urban Freeway Congestion and Analysis of Remedial Measures" (6) utilized the HPMS database to develop detailed estimates of congestion due to recurring delay (usual, high traffic volumes) and incident delay. Freeway systems in the 37 Metropolitan Statistical Areas (MSAs) with populations greater than one million were analyzed for travel delay and excess fuel consumption. The study ranked the urbanized areas according to a congestion severity index (total delay per million vehicle-kilometers of travel) for 1984 and 2005. The future values were derived from the traffic volume growth estimates in HPMS and applied to

the existing roadway system to illustrate the effect a construction moratorium would have on the systems.

The 1984 FHWA rankings are compared to those developed within this report. It should be noted that the FHWA report (6) focused on relatively detailed estimates of urbanized area freeway delay for large MSAs, while this project analyzed planning level estimates of delay, fuel, and insurance costs for freeways and principal arterial streets. While not directly comparable, these studies should illustrate areas of concern to transportation planners.

Study Design

The urbanized area traffic volume level that was consistent with desirable overall mobility was determined using data derived from the Houston area. During the late 1960s and early 1970s, citizens in Houston enjoyed one of the best transportation systems in the nation. Peak-hour speed on most facilities was reasonable, and congestion did not extend for a significant period beyond either peak hour. By 1980, however, Houston had acquired, and probably deserved, a reputation as one of the most congested cities in the country. At some point, transportation mobility had declined from desirable to undesirable.

The initial focus of the 1982 research effort (1) was to develop an estimate of the initial point at which mobility levels could be described as undesirable. Having estimated this point, the measures of mobility levels associated with that time could be assumed to be representative of undesirable congestion levels.

Houston's Experience with Declining Mobility

The Houston data detailing the increase in congestion were analyzed to provide a basis for quantitative indicators of mobility decline. The rapid increase in congestion on Houston area freeways and arterial streets during the 1970s emphasized the need for actions to restore and maintain good mobility.

Table B-1 and Figure B-1 quantify the disparity between increases in freeway lane-kilometers and freeway travel during the 1970s in Houston. The rate of new freeway construction in the 1970s was one-sixth that of the 1960s, while daily freeway VKT increased at approximately the same rate throughout the 20-year period (1). Vehicle registration, population, and traffic volume counts were thoroughly analyzed and also indicated the shift from relatively good mobility to relatively poor mobility in only a few years.

Table B-1. City of Houston Growth Trends, 1950 to 1985

Year	Annual Average Population (1000)	Annual Average Vehicles (1000)	Freeway Travel in VKT per Day[1] (1000)	Freeway Capacity (lane-kilometers)	Daily VKT per Freeway Lane-Km
1950	595[2]	240	322	40	8,400
1955	690[2]	375	998	161	6,200
1960	940[2]	480	1,682	298	5,600
1965	1,085	625	5,514	733	7,500
1970	1,235	775	11,785	1,224	9,600
1975	1,440	1,000	18,298	1,449	12,700
1980	1,610	1,270	26,259	1,546	17,000
1985	1,730	1,450	33,166	1,771	18,700
Percent Increase per Year					
1960-70	2.8	4.9	19.6	15.1	5.5
1970-80	2.6	5.1	8.4	2.4	5.9

Notes: [1] VKT--Vehicle-Kilometers of Travel
[2] As of April 1

Source: References 2,3,5,7

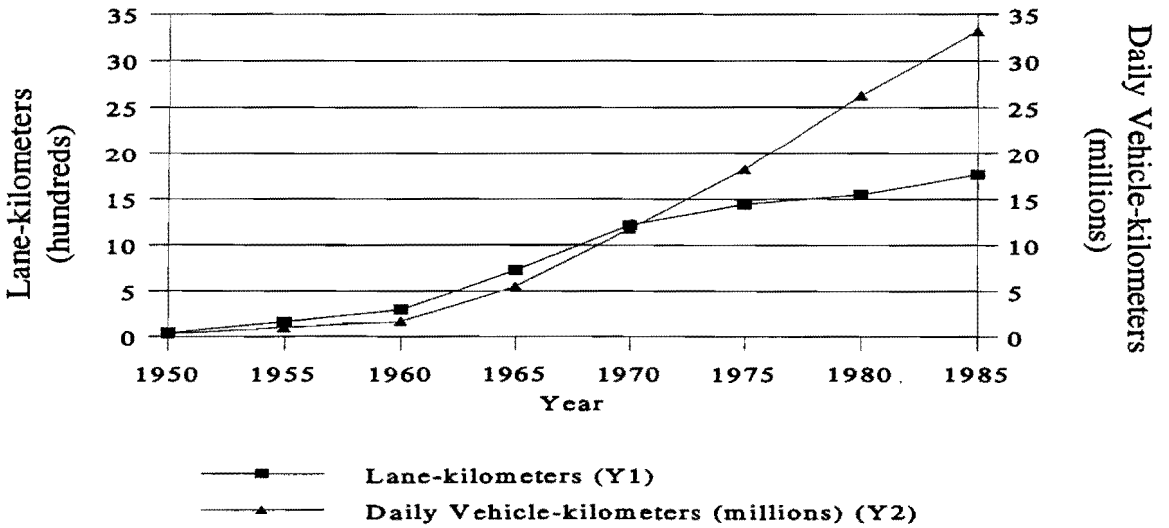

Figure B-1. Freeway Capacity and Travel in Houston, 1950 to 1985

Note: The values presented are averages of the six freeways studied (I-10W, I-10E, US 59S, US 59N, I-45S, I-45N)

Source: References 1,3,8,9

Congestion increases were also apparent in the travel delay estimates. Peak-period volume and travel time information were utilized to generate the data in Table B-2 and Figure B-2. Six major radial freeways were evaluated in each of four travel studies conducted by the Houston-Galveston Regional Transportation Study (HGRTS) (10). The dramatic (380 percent) increase in delay between I-610 and Beltway 8 (Figure B-2) from 1969 to 1979 indicates the decline in mobility outside the central city area. The decrease in delay inside I-610 (a major circumferential freeway approximately eight kilometers from downtown) may be attributable to several factors, including the completion of certain freeway sections and the traffic metering effect of I-610. As on most radial freeways, the number of lanes outside Loop 610 is less than that inside the Loop. Volumes, however, are not significantly lower, resulting in greater congestion outside I-610.

Table B-2. Average Evening Peak-Period Delay by Freeway Segment Per Major Radial Freeway

Year	Inside I-610 (veh-hours)	I-610 to Beltway 8 (veh-hours)	Total (veh-hours)
1969	1,315	390	1,705
1973	1,560	685	2,245
1976	2,110	1,165	3,275
1979	1,830	1,860	3,690
1982	1,480	3,000	4,480
1985	1,615	2,565	4,180

Note: Evening peak period used for analysis was 3:30 to 6:30 P.M.

Source: References 1,3,7,8

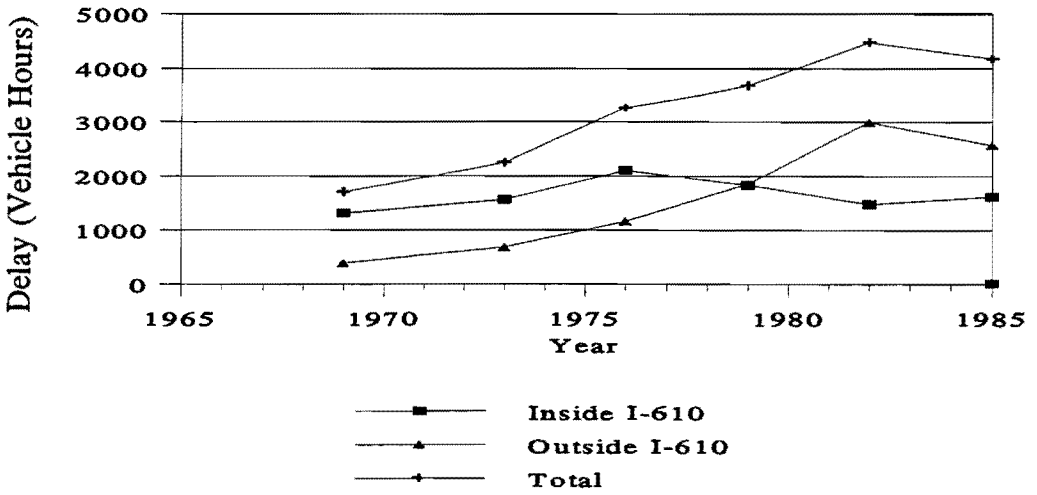

Figure B-2. Delay by Segments for Houston Freeways, P.M. Peak Period

Note: The values presented are averages of the six freeways studied (I-10W, I-10E, US 59S, US 59N, I-45S, I-45N).

Source: References 1,3,7,8,11

The maximum freeway service flow rate for level-of-service C (LOS C) is 1,550 passenger cars per lane per hour (volume/capacity ratio equal to 0.77) for a 113 kph design speed facility (12). Using average values for k-factor (the percentage of daily traffic volume during the peak hour) and directional distribution, and including some adjustment for trucks, these values can be interpreted to indicate that 15,000 vehicles per lane per day is an estimate of the beginning of level-of-service D operation. (The development of this value is consistent with the planning level analysis methodology presented in this report.)

The use of the boundary between level-of-service C and D as the beginning of congestion is consistent with reports by the Department of Transportation to Congress on the status of highways in the United States (13) (congestion begins at a volume/capacity ratio of 0.8) and the AASHTO Policy on Geometric Design of Highways and Streets (14) (urban freeways and streets should be designed for level-of-service C). While the use of a single number tends to mask the myriad of factors used in roadway capacity analyses, the level of accuracy of the database, and the planning nature of the ultimate use of the results of this methodology are compatible with this approach.

Figure B-3 quantifies the increase in congested freeway lane-kilometers in Harris County between 1965 and 1985. Although it is not known what percentage of the freeway system exceeding 15,000 vehicles per lane per day (operating at LOS D or worse in the peak hour) is an "acceptable" measure, it can be assumed that the 10 percent value in 1970 did not suggest county-wide deficiencies; however, the 45 percent in 1980 would appear to suggest that such deficiencies did exist.

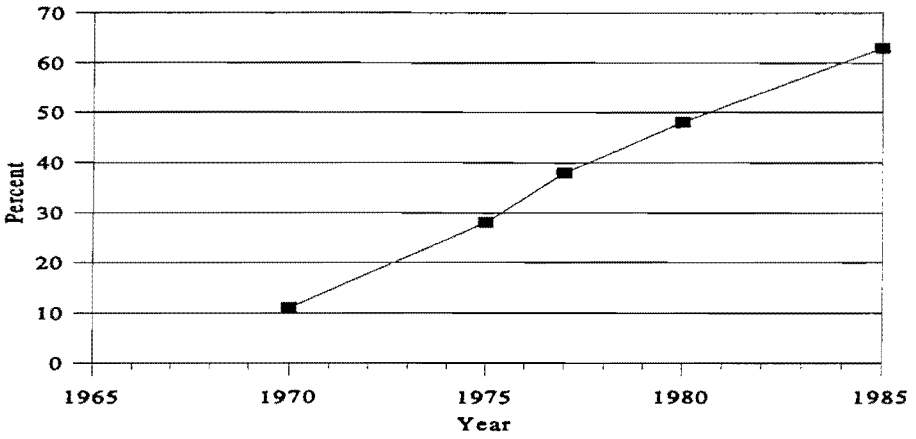

Figure B-3. Percent of Freeway Lane-kilometers with More than 15,000 ADT for Harris County (Houston), 1970 to 1985

Source: References 1,3,10

The data available to the study team did not allow the determination of a specific date at which Houston's traffic problems became critical. For purposes of the overall analysis, however, this was not required. Prior to 1975, mobility in Houston could be characterized as "reasonably good." Peak-period speeds on freeways and major arterials were fairly high, and traffic delay was not a major concern. By the late 1970s, however, peak-period travel delay had doubled from 1970 levels, and volume per lane values reflected two or more hours of congested operation during both the morning and evening peak periods. Congested freeway lane-kilometers in Harris County (Figure B-2) increased from 10 percent in 1970 to 40 percent in 1978. When rural areas of Harris County were subtracted from the analysis, the 1978 congested urban freeway system length approached 50 percent.

Congestion Indicator Determination

The data on mobility decline for Houston indicated that an "unacceptable" level of transportation service was reached somewhere in the 1975-1976 time frame. That assumption allowed quantitative measures of impending congestion problems to be developed and compared for the major urbanized areas of Texas. The following factors, listed in apparent order of reliability and usefulness, represent guidelines that can be used to determine if congestion in an urbanized area is becoming critical.

Traffic Per Lane

As shown previously, 15,000 vehicles per lane per day for freeways can be interpreted to represent the beginning of LOS D operation. Once traffic volume has entered that range, congestion is becoming critical. As a measure of approaching congestion, the 13,000 vehicles per lane per day value used by the Federal Highway Administration in the highway needs estimate (15) and by the Texas Department of Highways and Public Transportation in their Project Development Process (9) would appear to represent a more appropriate value. That standard also was attained on an average urbanized area basis in Houston during the period when mobility was becoming unacceptable (1975-76).

The corresponding measure for urban arterial streets would appear to be approximately 5,000 vehicles per lane per day. This value was not reached in Houston until 1979-80, but the design of the Houston area principal arterial street system would not accommodate traffic volumes representative of congestion in other urbanized areas. An inconsistent arterial system with respect to both the number of lanes and continuous roadway length, reduced the levels of traffic volume necessary to cause undesirable congestion. This value is also in general agreement with values presented in the Highway Capacity Manual (12).

- Urbanized Area Average Traffic Volume:
  - Freeway: 13,000 daily vehicle-kilometers of travel per lane-kilometer.
  - Principal Arterial Street: 5,000 daily vehicle-kilometers of travel per lane-kilometer.

Roadway Congestion Index

Combining the freeway and principal arterial street traffic volume per lane values into one indicator (Equation B-1) generates a value to compare the major mobility providing roadways of each urbanized area. Weighing the vehicle-kilometers of travel (VKT) per lane values by the amount of VKT in each functional class provides flexibility in applying the formula to areas with very different

freeway and street travel characteristics. The congestion levels are normalized, with a value of 1.0 representing the beginning of undesirable mobility levels.

$$\text{Roadway Congestion Index} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin Art Str VKT/Ln.-Km.} \times \text{Prin Art Str VKT}}{13{,}000 \times \text{Freeway VKT} + 5{,}000 \times \text{Prin Art Str VKT}} \quad \text{Eq. B-1}$$

Percentage of Congested Freeway

The percentage of the freeway system operating under congested conditions (15,000 vehicles per lane per day or more) was determined to be another description of congestion and mobility levels. Those data for the Houston area were presented previously (Figure B-3). From that information, using the 1975-76 time frame, it appears that once 30 percent of the lane-kilometers are operating at or above 15,000 vehicles per day, mobility has become significantly impaired.

- Percentage of Freeway System with ADT Greater than 15,000 Per Lane: 30 percent.

Summary

These measures are only some of the variables examined during the assessment of possible mobility indicators (1). While all of the measures have limitations due to the reliability and accuracy of the database, the three indicators below are illustrative of urban travel conditions:

- Urbanized Area traffic volumes,
- Roadway Congestion Index, and
- Percentage of freeway system with ADT per lane greater than 15,000.

These factors are also available without any new data collection requirements, which allows the use of historical traffic data collected during the usual urban planning process. A single variable may not be indicative of the traffic congestion in an urbanized area, but if all of the measures are

examined, the relative mobility levels should become apparent. The analysis in the following section used the indicators to assess relative mobility levels in the study areas.

APPENDIX C

CONGESTION CLASSIFICATION AND COST ESTIMATES

Relationship Between Travel Demand and Urban Area Population

In previous reports (1-4), reference was made to relationships of daily vehicle-kilometers of travel (DVKT) and facility lane-kilometers to urban area population and size. The relationship between travel demand, lane-kilometers, and population indicates on what facilities motorists place the highest demand, while the relationship between DVKT, facility lane-kilometers, and area size indicates the density of both the freeway and principal arterial street systems.

Tables C-1 and C-2 show the relationship between travel, facility length, urban area population, and size. Both tables rank the urban areas by DVKT and facility lane-kilometers per person. Comparison of the summary statistics of these tables indicates:

- The DVKT per person value shows each geographic region studied depends on the freeway system for service of the majority of travel demand;
- The freeway systems in the Texas region and the principal arterial street systems in the Southern region are the most dense across the regions; and
- The greatest travel per capita occurs on the freeways in the Western region and on the principal arterial street system in the Southern region.

Tables C-3 through C-14 show the congestion information for the freeways and principal arterial street travel for 1982 through 1992.

Table C-1. Summary of Freeway Travel Frequency and Urban Population Statistics for 1993

Urban Area	Population (1000)	Urban Area (sq. km.)	Population Density Person/sq km	DVKT[1] per Person	Rank[3]	Lane Km[2] per 1000 Persons	Rank[3]
Northeastern Cities							
Baltimore MD	2,110	1,850	1,140	13.73	23	1.05	25
Boston MA	2,980	2,850	1,040	11.64	32	0.82	13
Hartford CT	620	950	660	18.24	6	1.58	48
New York NY	17,000	8,680	1,960	8.15	46	0.58	6
Philadelphia PA	5,200	3,860	1,350	6.25	50	0.53	1
Pittsburgh PA	1,900	2,330	820	7.92	47	0.98	19
Washington DC	3,400	2,530	1,350	13.73	23	0.77	11
Midwestern Cities							
Chicago IL	7,600	5,960	1,280	8.68	42	0.55	3
Cincinnati OH	1,250	1,660	750	16.57	14	1.24	37
Cleveland OH	1,800	1,810	990	13.40	26	1.06	27
Columbus OH	980	1,040	950	16.02	15	1.35	41
Detroit MI	4,000	3,350	1,190	11.88	31	0.74	9
Indianapolis IN	960	1,150	830	14.92	20	1.30	40
Kansas City MO	1,300	1,810	720	18.58	4	1.90	50
Louisville KY	820	1,010	810	13.75	22	1.21	36
Milwaukee WI	1,230	1,420	860	10.26	39	0.79	12
Minn-St. Paul MN	2,120	3,100	680	15.23	19	1.18	34
Oklahoma City OK	800	1,450	550	15.50	17	1.48	46
St. Louis MO	1,990	1,990	1,000	15.78	16	1.38	43
Southern Cities							
Atlanta GA	2,320	4,560	510	20.82	1	1.38	43
Charlotte NC	520	780	660	10.95	34	0.98	19
Ft. Lauderdale FL	1,300	1,,140	1,140	10.53	37	0.84	15
Jacksonville FL	770	1,410	550	12.54	29	1.00	23
Memphis TN	890	1,140	780	9.37	41	0.82	13
Miami FL	1,940	1,300	1,490	8.23	45	0.53	1
Nashville TN	600	1,480	410	18.79	3	1.69	49
New Orleans LA	1,110	950	1,170	7.58	49	0.56	5
Norfolk VA	980	2,120	460	9.87	40	0.95	18
Orlando FL	920	1,090	850	10.90	35	1.08	28
Tampa FL	740	1,180	630	8.60	43	0.69	7
Southwestern Cities							
Albuquerque NM	530	670	790	8.32	44	0.72	8
Austin TX	570	960	590	18.13	7	1.50	47
Corpus Christi TX	290	480	610	10.82	36	1.16	33
Dallas TX	2,090	3,770	550	19.18	2	1.37	42
Denver CO	1,610	2,380	680	13.25	27	0.98	19
El Paso TX	570	570	1,000	10.45	38	1.05	25
Fort Worth TX	1,210	2,210	550	17.44	13	1.42	45
Houston TX	2,930	4,270	690	17.58	11	1.18	34
Phoenix AZ	2,070	2,750	750	7.62	48	0.55	3
Salt Lake City UT	880	1,260	700	11.16	33	0.98	19
San Antonio TX	1,200	1,280	930	14.41	21	1.27	38
Western Cities							
Honolulu HI	690	470	1,480	12.83	28	0.92	17
Los Angeles CA	11,950	5,780	2,070	15.36	18	0.74	9
Portland OR	1,080	1,140	950	12.45	30	0.90	16
Sacramento CA	1,210	1,010	1,190	13.73	23	1.08	28
San Bernardino-Riv CA	1,330	1,330	990	18.50	5	1.14	32
San Diego CA	2,530	1,900	1,330	17.66	10	1.11	30
San Fran-Oak CA	3,830	2,400	1,600	17.97	8	1.03	24
San Jose CA	1,530	1,200	1,270	17.58	11	1.29	39
Seattle-Everett WA	1,880	1,900	980	17.77	9	1.11	30
Northeastern Avg	4,740	3,290	1,190	11.38		0.90	
Midwestern Avg	2,070	2,150	880	14.21		1.18	
Southern Avg	1,100	1,560	790	11.65		0.96	
Southwestern Avg	1,270	1,870	710	13.49		1.11	
Western Avg	2,890	1,900	1,320	15.98		1.04	
Texas Avg	1,270	1,940	700	15.43		1.28	
Total Avg	2,200	2,070	950	13.41		1.05	
Maximum Value	17,000	8,680	2,070	20.82		1.90	
Minimum Value	290	470	410	6.25		0.53	

Notes: [1] Daily vehicle-kilometers of travel per person.
[2] Lane-kilometers per 1000 persons.
[3] Rank value of 1 associated with most congested condition.

Source: TTI Analysis and Local Transportation Agency References

Table C-2. Principal Arterial Street Travel Frequency and Population Density Statistics for 1993

Urban Area	Population (1000)	Urban Area (sq. km.)	Population Density Person/sq km	DVKT[1] per Person	Rank[3]	Lane Km[2] per 1000 Persons	Rank[3]
Northeastern Cities							
Baltimore MD	2,110	1,850	1,140	7.63	28	1.30	19
Boston MA	2,980	2,850	1,040	7.58	29	1.56	30
Hartford CT	620	950	660	9.84	15	1.71	37
New York NY	17,000	8,680	1,960	5.22	48	0.72	2
Philadelphia PA	5,200	3,860	1,350	6.71	37	1.01	7
Pittsburgh PA	1,900	2,330	820	9.74	16	1.58	33
Washington DC	3,400	2,530	1,350	8.71	21	1.11	13
Midwestern Cities							
Chicago IL	7,600	5,960	1,280	7.42	31	1.08	12
Cincinnati OH	1,250	1,660	750	5.67	45	1.06	11
Cleveland OH	1,800	1,810	990	5.54	46	1.03	9
Columbus OH	980	1,040	950	5.75	44	1.05	10
Detroit MI	4,000	3,350	1,190	10.47	10	1.74	38
Indianapolis IN	960	1,150	830	7.55	30	1.55	29
Kansas City MO	1,300	1,810	720	6.81	36	1.40	23
Louisville KY	820	1,010	810	6.87	35	1.14	15
Milwaukee WI	1,230	1,420	860	7.33	32	1.47	26
Minn-St. Paul MN	2,120	3,100	680	5.41	47	0.92	4
Oklahoma City OK	800	1,450	550	9.06	19	1.61	34
St. Louis MO	1,990	1,990	1,000	10.27	11	1.56	30
Southern Cities							
Atlanta GA	2,320	4,560	510	8.32	22	1.38	21
Charlotte NC	520	780	660	10.08	14	1.85	39
Ft. Lauderdale FL	1,300	1,140	1,140	7.92	26	1.51	27
Jacksonville FL	770	1,410	550	13.07	6	2.74	50
Memphis TN	890	1,140	780	10.11	13	1.90	42
Miami FL	1,940	1,300	1,490	14.15	3	1.88	41
Nashville TN	600	1,480	410	15.02	1	2.61	48
New Orleans LA	1,110	950	1,170	6.41	39	1.01	7
Norfolk VA	980	2,120	460	8.10	24	1.26	17
Orlando FL	920	1,090	850	9.10	18	1.95	43
Tampa FL	740	1,180	630	10.14	12	1.56	30
Southwestern Cities							
Albuquerque NM	530	670	790	13.67	4	2.51	46
Austin TX	570	960	590	7.07	33	1.35	20
Corpus Christi TX	290	480	610	8.89	20	2.06	44
Dallas TX	2,090	3,770	550	7.00	34	1.38	21
Denver CO	1,610	2,380	680	11.09	8	1.87	40
El Paso TX	570	570	1,000	9.43	17	2.43	45
Fort Worth TX	1,210	2,210	550	6.25	41	1.26	17
Houston TX	2,930	4,270	690	6.26	40	1.21	16
Phoenix AZ	2,070	2,750	750	14.39	2	2.61	48
Salt Lake City UT	880	1,260	700	4.91	49	0.81	3
San Antonio TX	1,200	1,280	930	8.08	25	1.53	28
Western Cities							
Honolulu HI	690	470	1,480	4.51	50	0.58	1
Los Angeles CA	11,950	5,780	2,070	11.19	7	1.69	36
Portland OR	1,080	1,140	950	6.55	38	0.98	5
Sacramento CA	1,210	1,010	1,190	10.48	9	1.67	35
San Bernardino-Riv CA	1,330	1,330	990	13.49	5	2.58	47
San Diego CA	2,530	1,900	1,330	6.13	42	1.11	13
San Fran-Oak CA	3,830	2,400	1,600	5.97	43	0.98	5
San Jose CA	1,530	1,200	1,270	7.71	27	1.45	25
Seattle-Everett WA	1,880	1,900	980	8.32	22	1.40	23
Northeastern Avg	4,740	3,290	1,190	7.92		1.29	
Midwestern Avg	2,070	2,150	880	7.35		1.30	
Southern Avg	1,100	1,560	790	10.22		1.79	
Southwestern Avg	1,270	1,870	710	8.82		1.73	
Western Avg	2,890	1,900	1,320	8.26		1.38	
Texas Avg	1,270	1,940	700	7.57		1.60	
Total Avg	2,200	2,070	950	8.55		1.51	
Maximum Value	17,000	8,680	2,070	15.02		2.74	
Minimum Value	290	470	410	4.51		0.58	

Notes: [1] Daily vehicle-kilometers of travel per person.
[2] Lane-kilometers per 1000 persons.
[3] Rank value of 1 associated with most congested condition.

Source: TTI Analysis and Local Transportation Agency References

Table C-3. Percent of Congested DVKT by AADT Congestion Ranges for 1982

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	14	6	0	20	3	7	14	25
Boston MA	4	10	16	30	11	6	19	35
Hartford CT	9	1	0	10	7	10	3	20
New York NY	28	9	17	55	22	29	24	75
Philadelphia PA	8	4	8	20	17	10	43	70
Pittsburgh PA	15	0	0	15	20	13	17	50
Washington DC	38	10	12	60	9	25	46	80
Midwestern Cities								
Chicago IL	9	15	26	50	14	21	24	60
Cincinnati OH	19	0	1	20	8	7	4	20
Cleveland OH	20	0	0	20	20	0	0	20
Columbus OH	6	12	7	25	6	16	8	30
Detroit MI	17	13	10	40	25	9	26	60
Indianapolis IN	5	0	0	5	4	9	2	15
Kansas City MO	4	1	0	5	8	5	7	20
Louisville KY	3	2	1	5	14	32	4	50
Milwaukee WI	10	10	0	20	6	18	7	30
Minn-St. Paul MN	13	7	0	20	9	14	16	40
Oklahoma City OK	3	3	0	5	3	9	21	33
St. Louis MO	9	11	0	20	25	10	30	65
Southern Cities								
Atlanta GA	16	20	4	40	18	24	18	60
Charlotte NC	20	0	0	20	23	21	1	45
Ft. Lauderdale FL	9	4	7	20	27	14	4	45
Jacksonville FL	25	0	0	25	7	7	22	35
Memphis TN	8	2	0	10	14	12	4	30
Miami FL	7	28	10	45	2	10	49	60
Nashville TN	5	12	3	20	6	23	6	35
New Orleans LA	37	3	0	40	13	5	27	45
Norfolk VA	32	2	1	35	0	9	21	30
Orlando FL	25	0	0	25	3	5	12	20
Tampa FL	3	8	9	20	12	20	28	60
Southwestern Cities								
Albuquerque NM	5	0	0	5	17	14	5	35
Austin TX	15	25	10	50	6	26	8	40
Corpus Christi TX	5	0	0	5	3	3	4	10
Dallas TX	9	5	32	45	8	17	0	25
Denver CO	31	13	2	45	26	3	21	50
El Paso TX	15	0	0	15	1	4	0	5
Fort Worth TX	9	3	18	30	10	8	8	25
Houston TX	2	9	54	65	18	3	29	50
Phoenix AZ	44	6	0	50	30	17	18	65
Salt Lake City UT	4	4	3	10	17	2	16	35
San Antonio TX	21	7	7	35	4	1	0	5
Western Cities								
Honolulu HI	4	13	23	40	18	19	27	65
Los Angeles CA	17	19	39	75	8	22	5	35
Portland OR	16	4	10	30	33	6	21	60
Sacramento CA	25	0	0	25	16	12	12	40
San Bernardino-Riv CA	60	0	0	60	50	0	0	50
San Diego CA	23	12	0	35	25	0	0	25
San Fran-Oak CA	17	12	35	65	35	3	22	60
San Jose CA	7	18	21	45	37	2	1	40
Seattle-Everett WA	23	9	8	40	9	21	21	50

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-4. Percent of Congested DVKT by AADT Congestion Ranges for 1983

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	16	4	0	20	2	6	17	25
Boston MA	6	9	15	30	6	11	18	35
Hartford CT	9	1	0	10	11	10	4	25
New York NY	20	20	15	55	19	27	29	75
Philadelphia PA	9	3	8	20	25	18	27	70
Pittsburgh PA	9	6	0	15	19	16	20	55
Washington DC	22	27	11	60	9	13	58	80
Midwestern Cities								
Chicago IL	14	18	18	50	16	24	26	65
Cincinnati OH	16	3	1	20	9	8	4	20
Cleveland OH	20	0	0	20	20	0	0	20
Columbus OH	7	11	6	25	24	7	4	35
Detroit MI	12	12	12	35	24	6	24	55
Indianapolis IN	5	0	0	5	6	6	4	15
Kansas City MO	2	3	0	5	11	1	8	20
Louisville KY	1	2	2	5	10	35	5	50
Milwaukee WI	11	9	0	20	5	21	4	30
Minn-St. Paul MN	10	8	2	20	5	21	14	40
Oklahoma City OK	3	3	0	5	3	9	21	33
St. Louis MO	7	13	0	20	26	14	26	65
Southern Cities								
Atlanta GA	16	19	5	40	13	27	20	60
Charlotte NC	20	0	0	20	29	7	14	50
Ft. Lauderdale FL	10	4	6	20	25	15	5	45
Jacksonville FL	25	0	0	25	9	16	10	35
Memphis TN	10	0	0	10	14	13	3	30
Miami FL	19	12	14	45	8	22	29	60
Nashville TN	11	2	7	20	5	17	14	35
New Orleans LA	25	12	3	40	19	3	23	45
Norfolk VA	32	2	1	35	0	8	22	30
Orlando FL	25	0	0	25	5	2	13	20
Tampa FL	3	5	12	20	9	18	32	60
Southwestern Cities								
Albuquerque NM	5	1	0	5	27	6	7	40
Austin TX	13	28	9	50	7	26	7	40
Corpus Christi TX	5	0	0	5	2	3	6	10
Dallas TX	13	4	32	50	4	18	3	25
Denver CO	18	19	8	45	17	12	21	50
El Paso TX	15	0	0	15	2	3	0	5
Fort Worth TX	9	3	23	35	13	5	8	25
Houston TX	13	10	42	65	12	5	33	50
Phoenix AZ	48	7	0	55	34	15	16	65
Salt Lake City UT	1	9	0	10	8	5	22	35
San Antonio TX	21	7	7	35	4	1	5	10
Western Cities								
Honolulu HI	1	10	29	40	20	16	29	65
Los Angeles CA	16	15	49	80	12	6	17	35
Portland OR	20	4	6	30	29	7	24	60
Sacramento CA	25	0	0	25	16	12	12	40
San Bernardino-Riv CA	60	0	0	60	50	0	0	50
San Diego CA	25	10	0	35	23	3	0	25
San Fran-Oak CA	12	21	37	70	17	18	26	60
San Jose CA	2	9	38	50	37	2	1	40
Seattle-Everett WA	13	23	10	45	13	15	27	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-5. Percent of Congested DVKT by AADT Congestion Ranges for 1984

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	15	8	2	25	3	7	20	30
Boston MA	11	7	18	35	6	8	21	35
Hartford CT	8	2	0	10	6	10	8	25
New York NY	32	8	15	55	25	33	17	75
Philadelphia PA	10	4	6	20	14	25	32	70
Pittsburgh PA	8	3	5	15	18	12	25	55
Washington DC	20	31	14	65	12	15	53	80
Midwestern Cities								
Chicago IL	8	12	35	55	15	16	34	65
Cincinnati OH	11	7	2	20	7	8	5	20
Cleveland OH	20	5	0	25	20	0	0	20
Columbus OH	7	7	11	25	22	10	3	35
Detroit MI	13	13	14	40	12	18	30	60
Indianapolis IN	5	0	0	5	5	5	6	15
Kansas City MO	2	3	1	5	11	1	8	20
Louisville KY	1	2	2	5	23	25	3	50
Milwaukee WI	13	12	0	25	13	18	4	35
Minn-St. Paul MN	11	5	4	20	7	14	24	45
Oklahoma City OK	3	3	0	5	4	11	25	39
St. Louis MO	11	5	5	20	20	10	35	65
Southern Cities								
Atlanta GA	23	18	5	45	23	21	20	65
Charlotte NC	20	0	0	20	29	9	12	50
Ft. Lauderdale FL	8	5	7	20	16	14	14	45
Jacksonville FL	19	6	0	25	11	8	21	40
Memphis TN	6	4	0	10	14	11	6	30
Miami FL	18	12	15	45	15	4	41	60
Nashville TN	10	10	0	20	5	12	23	40
New Orleans LA	7	14	24	45	12	6	32	50
Norfolk VA	10	24	1	35	0	9	21	30
Orlando FL	21	2	3	25	3	8	14	25
Tampa FL	1	5	14	20	15	19	32	65
Southwestern Cities								
Albuquerque NM	4	1	0	5	22	16	7	45
Austin TX	15	22	13	50	10	27	8	45
Corpus Christi TX	5	0	0	5	2	5	3	10
Dallas TX	17	7	27	50	14	6	10	30
Denver CO	4	27	14	45	12	6	32	50
El Paso TX	15	0	0	15	3	2	0	5
Fort Worth TX	12	5	19	35	14	6	10	30
Houston TX	12	12	46	70	11	6	38	55
Phoenix AZ	48	12	0	60	34	15	16	65
Salt Lake City UT	6	4	0	10	20	7	13	40
San Antonio TX	18	7	11	35	2	1	7	10
Western Cities								
Honolulu HI	3	9	33	45	14	15	35	65
Los Angeles CA	16	16	48	80	11	5	24	40
Portland OR	20	5	5	30	37	5	18	60
Sacramento CA	18	7	0	25	17	16	12	45
San Bernardino-Riv CA	29	31	0	60	33	17	0	50
San Diego CA	12	14	9	35	24	6	0	30
San Fran-Oak CA	5	21	49	75	6	18	37	60
San Jose CA	7	3	39	50	33	5	7	45
Seattle-Everett WA	14	17	18	50	11	19	25	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-6. Percent of Congested DVKT by AADT Congestion Ranges for 1985

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	14	5	6	25	4	6	25	35
Boston MA	15	4	15	35	6	7	23	35
Hartford CT	8	2	0	10	6	10	9	25
New York NY	20	21	14	55	21	19	36	75
Philadelphia PA	18	3	4	25	8	27	40	75
Pittsburgh PA	5	3	7	15	21	26	13	60
Washington DC	33	12	20	65	10	24	46	80
Midwestern Cities								
Chicago IL	5	9	41	55	17	8	45	70
Cincinnati OH	9	8	3	20	6	12	6	25
Cleveland OH	17	6	2	25	20	0	0	20
Columbus OH	9	6	9	25	19	13	3	35
Detroit MI	11	11	14	35	6	11	39	55
Indianapolis IN	5	0	0	5	3	5	8	15
Kansas City MO	2	1	2	5	11	3	6	20
Louisville KY	0	1	4	5	6	39	5	50
Milwaukee WI	10	15	0	25	3	24	8	35
Minn-St. Paul MN	6	6	8	20	11	14	20	45
Oklahoma City OK	3	3	0	5	4	11	25	39
St. Louis MO	5	12	3	20	16	14	35	65
Southern Cities								
Atlanta GA	24	19	8	50	19	22	24	65
Charlotte NC	20	5	0	25	32	2	21	55
Ft. Lauderdale FL	8	5	7	20	12	22	16	50
Jacksonville FL	22	8	0	30	12	10	18	40
Memphis TN	8	2	0	10	14	9	7	30
Miami FL	28	5	17	50	11	3	56	70
Nashville TN	8	8	0	15	8	13	19	40
New Orleans LA	9	14	23	45	10	5	35	50
Norfolk VA	5	34	1	40	7	2	21	30
Orlando FL	18	0	7	25	6	6	14	25
Tampa FL	3	5	12	20	14	10	42	65
Southwestern Cities								
Albuquerque NM	6	4	0	10	21	10	9	40
Austin TX	20	18	17	55	8	23	14	45
Corpus Christi TX	5	0	0	5	2	6	2	10
Dallas TX	20	10	21	50	16	7	8	30
Denver CO	16	15	15	45	22	11	17	50
El Paso TX	20	0	0	20	3	2	0	5
Fort Worth TX	14	7	15	35	16	7	8	30
Houston TX	13	9	49	70	9	5	41	55
Phoenix AZ	49	16	0	65	31	20	19	70
Salt Lake City UT	5	2	3	10	23	4	12	40
San Antonio TX	15	6	19	40	6	2	7	15
Western Cities								
Honolulu HI	8	6	32	45	22	17	31	70
Los Angeles CA	14	17	49	80	8	11	27	45
Portland OR	16	10	4	30	36	11	13	60
Sacramento CA	24	3	3	30	14	10	21	45
San Bernardino-Riv CA	43	17	0	60	28	19	8	55
San Diego CA	13	5	17	35	23	8	0	30
San Fran-Oak CA	6	15	54	75	8	16	36	60
San Jose CA	9	5	41	55	27	13	10	50
Seattle-Everett WA	20	11	19	50	12	11	32	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-7. Percent of Congested DVKT by AADT Congestion Ranges for 1986

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	15	7	3	25	5	8	22	35
Boston MA	12	8	20	40	7	6	22	35
Hartford CT	5	3	2	10	3	13	9	25
New York NY	22	22	10	55	22	9	44	75
Philadelphia PA	18	3	4	25	14	13	48	75
Pittsburgh PA	4	7	9	20	21	20	19	60
Washington DC	25	24	16	65	13	20	47	80
Midwestern Cities								
Chicago IL	4	8	43	55	11	10	48	70
Cincinnati OH	11	7	2	20	9	7	9	25
Cleveland OH	17	6	2	25	12	8	0	20
Columbus OH	6	11	7	25	17	11	11	40
Detroit MI	13	11	17	40	4	7	50	60
Indianapolis IN	5	0	0	5	6	3	6	15
Kansas City MO	3	0	2	5	7	7	6	20
Louisville KY	2	1	3	5	7	30	13	50
Milwaukee WI	6	17	2	25	1	24	10	35
Minn-St. Paul MN	10	10	6	25	11	7	33	50
Oklahoma City OK	3	3	0	5	4	11	25	39
St. Louis MO	11	7	2	20	18	17	30	65
Southern Cities								
Atlanta GA	18	20	13	50	16	22	27	65
Charlotte NC	23	2	0	25	6	30	19	55
Ft. Lauderdale FL	15	5	5	25	6	14	30	50
Jacksonville FL	28	2	0	30	18	8	14	40
Memphis TN	10	0	0	10	22	6	8	35
Miami FL	21	11	18	50	12	22	36	70
Nashville TN	9	6	0	15	7	11	22	40
New Orleans LA	12	15	23	50	5	4	40	50
Norfolk VA	16	9	20	45	3	4	23	30
Orlando FL	22	2	6	30	1	9	15	25
Tampa FL	4	9	7	20	11	20	34	65
Southwestern Cities								
Albuquerque NM	3	6	1	10	25	8	7	40
Austin TX	18	14	22	55	9	11	25	45
Corpus Christi TX	10	0	0	10	2	5	3	10
Dallas TX	7	13	35	55	15	10	5	30
Denver CO	17	15	19	50	25	10	15	50
El Paso TX	15	5	0	20	3	2	0	5
Fort Worth TX	5	10	25	40	15	10	5	30
Houston TX	8	15	52	75	12	8	35	55
Phoenix AZ	11	39	20	70	31	13	26	70
Salt Lake City UT	3	5	2	10	30	4	11	45
San Antonio TX	6	6	28	40	6	3	6	15
Western Cities								
Honolulu HI	11	6	28	45	23	16	31	70
Los Angeles CA	6	12	63	80	9	9	32	50
Portland OR	12	15	3	30	29	20	11	60
Sacramento CA	22	6	2	30	11	24	10	45
San Bernardino-Riv CA	17	35	13	65	21	17	17	55
San Diego CA	23	4	13	40	13	17	0	30
San Fran-Oak CA	7	6	62	75	13	8	39	60
San Jose CA	3	11	40	55	13	17	24	55
Seattle-Everett WA	18	21	17	55	17	4	34	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-8. Percent of Congested DVKT by AADT Congestion Ranges for 1987

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	14	5	5	25	7	5	24	35
Boston MA	17	10	13	40	8	4	23	35
Hartford CT	5	3	2	10	9	14	8	30
New York NY	21	18	17	55	16	13	46	75
Philadelphia PA	15	7	3	25	13	12	50	75
Pittsburgh PA	3	9	9	20	20	13	28	60
Washington DC	21	25	19	65	13	18	54	85
Midwestern Cities								
Chicago IL	5	12	38	55	14	8	48	70
Cincinnati OH	16	7	2	25	11	6	8	25
Cleveland OH	16	7	2	25	11	14	0	25
Columbus OH	2	10	13	25	14	15	11	40
Detroit MI	13	7	20	40	4	6	51	60
Indianapolis IN	5	1	0	5	7	4	5	15
Kansas City MO	4	0	1	5	6	4	10	20
Louisville KY	2	1	2	5	8	31	16	55
Milwaukee WI	7	14	9	30	9	19	7	35
Minn-St. Paul MN	5	8	17	30	15	6	34	55
Oklahoma City OK	3	3	0	5	0	14	21	35
St. Louis MO	9	7	5	20	23	11	31	65
Southern Cities								
Atlanta GA	13	20	18	50	11	22	32	65
Charlotte NC	24	1	0	25	9	18	28	55
Ft. Lauderdale FL	18	6	6	30	6	17	27	50
Jacksonville FL	21	8	2	30	11	16	18	45
Memphis TN	10	0	0	10	18	8	9	35
Miami FL	21	13	15	50	11	4	55	70
Nashville TN	15	3	2	20	7	6	27	40
New Orleans LA	14	14	22	50	9	2	39	50
Norfolk VA	8	14	23	45	6	8	21	35
Orlando FL	21	2	8	30	2	4	18	25
Tampa FL	7	3	10	20	12	15	39	65
Southwestern Cities								
Albuquerque NM	1	4	5	10	24	10	6	40
Austin TX	22	11	22	55	7	15	23	45
Corpus Christi TX	10	0	0	10	2	5	3	10
Dallas TX	19	11	25	55	13	9	7	30
Denver CO	15	18	16	50	26	12	12	50
El Paso TX	7	13	0	20	3	2	0	5
Fort Worth TX	14	8	18	40	10	12	7	30
Houston TX	12	9	49	70	12	8	30	50
Phoenix AZ	3	25	42	70	32	18	20	70
Salt Lake City UT	4	9	2	15	16	14	9	40
San Antonio TX	6	3	31	40	4	1	9	15
Western Cities								
Honolulu HI	12	6	27	45	36	15	19	70
Los Angeles CA	4	11	65	80	13	12	25	50
Portland OR	17	11	7	35	12	24	25	60
Sacramento CA	16	13	1	30	7	24	14	45
San Bernardino-Riv CA	11	40	14	65	23	15	17	55
San Diego CA	13	19	13	45	5	25	0	30
San Fran-Oak CA	8	4	68	80	9	11	40	60
San Jose CA	7	8	45	60	9	8	38	55
Seattle-Everett WA	24	19	22	65	11	18	26	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-9. Percent of Congested DVKT by AADT Congestion Ranges for 1988

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	12	5	8	25	7	5	23	35
Boston MA	12	13	20	45	9	9	23	40
Hartford CT	7	4	5	15	9	13	8	30
New York NY	22	15	18	55	13	16	51	80
Philadelphia PA	16	7	2	25	11	10	54	75
Pittsburgh PA	10	3	7	20	7	10	43	60
Washington DC	20	27	19	65	9	22	54	85
Midwestern Cities								
Chicago IL	6	12	38	56	14	15	35	65
Cincinnati OH	16	11	3	30	5	7	12	25
Cleveland OH	14	10	1	25	14	13	3	30
Columbus OH	2	10	13	25	6	24	11	40
Detroit MI	11	8	26	45	9	5	46	60
Indianapolis IN	9	1	0	10	12	3	5	20
Kansas City MO	2	1	2	5	8	8	8	25
Louisville KY	2	0	3	5	17	28	10	55
Milwaukee WI	6	11	13	30	12	16	8	35
Minn-St. Paul MN	7	8	16	30	14	8	33	55
Oklahoma City OK	5	5	0	10	1	11	23	35
St. Louis MO	9	3	8	20	14	13	28	55
Southern Cities								
Atlanta GA	9	18	18	45	12	18	35	65
Charlotte NC	21	4	0	25	6	16	38	60
Ft. Lauderdale FL	18	6	6	30	5	20	25	50
Jacksonville FL	28	2	0	30	11	20	14	45
Memphis TN	10	0	0	10	14	8	13	35
Miami FL	14	16	30	60	1	18	51	70
Nashville TN	9	10	5	25	4	6	29	40
New Orleans LA	18	7	25	50	5	2	43	50
Norfolk VA	4	18	24	45	9	10	16	35
Orlando FL	21	2	7	30	3	5	16	25
Tampa FL	10	3	13	25	8	12	45	65
Southwestern Cities								
Albuquerque NM	7	8	5	20	20	11	4	35
Austin TX	20	15	20	55	14	14	18	45
Corpus Christi TX	10	0	0	10	2	6	1	10
Dallas TX	16	9	30	55	15	15	5	35
Denver CO	12	21	17	50	27	12	10	50
El Paso TX	7	13	0	20	3	2	0	5
Fort Worth TX	12	6	22	40	13	13	4	30
Houston TX	11	11	48	70	7	28	15	50
Phoenix AZ	23	9	28	60	15	17	37	70
Salt Lake City UT	8	6	1	15	17	15	8	40
San Antonio TX	8	6	26	40	7	2	11	20
Western Cities								
Honolulu HI	10	11	28	50	32	13	26	70
Los Angeles CA	4	4	67	75	12	11	32	55
Portland OR	18	10	8	35	11	26	24	60
Sacramento CA	14	15	1	30	11	22	17	50
San Bernardino-Riv CA	6	43	16	65	23	16	17	55
San Diego CA	13	10	27	50	5	20	6	30
San Fran-Oak CA	10	5	66	80	9	3	48	60
San Jose CA	10	9	41	60	10	4	45	60
Seattle-Everett WA	21	24	24	70	11	15	30	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-10. Percent of Congested DVKT by AADT Congestion Ranges for 1989

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	6	9	10	25	6	8	21	35
Boston MA	8	16	21	45	7	8	25	40
Hartford CT	6	5	4	15	9	16	10	35
New York NY	26	8	27	60	15	11	54	80
Philadelphia PA	14	7	4	25	14	9	52	75
Pittsburgh PA	12	0	8	20	9	9	43	60
Washington DC	10	29	26	65	8	20	57	85
Midwestern Cities								
Chicago IL	9	8	38	55	13	17	35	65
Cincinnati OH	20	7	3	30	10	3	12	25
Cleveland OH	15	11	4	30	10	13	7	30
Columbus OH	3	10	12	25	6	25	14	45
Detroit MI	11	5	29	45	5	8	47	60
Indianapolis IN	9	2	0	10	13	3	4	20
Kansas City MO	3	1	2	5	8	9	8	25
Louisville KY	2	0	3	5	18	26	11	55
Milwaukee WI	10	9	11	30	12	15	8	35
Minn-St. Paul MN	7	8	16	30	17	6	33	55
Oklahoma City OK	6	4	0	10	7	11	16	35
St. Louis MO	8	4	8	20	8	17	35	60
Southern Cities								
Atlanta GA	8	12	25	45	12	12	41	65
Charlotte NC	25	5	0	30	7	13	39	60
Ft. Lauderdale FL	21	10	4	35	10	18	22	50
Jacksonville FL	27	8	0	35	15	17	19	50
Memphis TN	10	0	0	10	10	14	11	35
Miami FL	11	15	33	60	2	8	60	70
Nashville TN	15	7	3	25	5	5	30	40
New Orleans LA	9	20	21	50	15	3	32	50
Norfolk VA	3	16	25	45	11	5	19	35
Orlando FL	22	2	6	30	1	6	18	25
Tampa FL	8	7	10	25	20	8	36	65
Southwestern Cities								
Albuquerque NM	7	8	5	20	17	11	11	40
Austin TX	20	17	18	55	16	17	11	45
Corpus Christi TX	10	0	0	10	6	3	1	10
Dallas TX	17	13	24	55	14	15	7	35
Denver CO	15	19	17	50	18	14	18	50
El Paso TX	9	11	0	20	3	2	1	5
Fort Worth TX	13	10	18	40	9	13	9	30
Houston TX	7	19	44	70	9	23	18	50
Phoenix AZ	18	8	34	60	18	17	35	70
Salt Lake City UT	6	3	6	15	18	14	8	40
San Antonio TX	6	16	18	40	7	2	12	20
Western Cities								
Honolulu HI	10	10	29	50	28	12	29	70
Los Angeles CA	4	3	68	75	10	15	30	55
Portland OR	16	5	13	35	10	25	26	60
Sacramento CA	14	12	4	30	3	17	30	50
San Bernardino-Riv CA	4	38	22	65	22	21	12	55
San Diego CA	13	8	29	50	4	25	2	30
San Fran-Oak CA	11	5	64	80	6	3	51	60
San Jose CA	9	13	38	60	9	7	44	60
Seattle-Everett WA	9	35	26	70	14	8	34	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-11. Percent of Congested DVKT by AADT Congestion Ranges for 1990

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	6	8	12	25	4	4	26	35
Boston MA	10	15	19	45	8	7	26	40
Hartford CT	5	6	4	15	12	12	11	35
New York NY	28	10	22	60	14	17	49	80
Philadelphia PA	12	6	7	25	13	14	48	75
Pittsburgh PA	4	6	10	20	14	9	37	60
Washington DC	12	20	34	65	6	26	53	85
Midwestern Cities								
Chicago IL	7	11	37	55	16	19	30	65
Cincinnati OH	18	8	4	30	10	3	12	25
Cleveland OH	18	10	2	30	10	10	10	30
Columbus OH	2	12	16	30	8	15	22	45
Detroit MI	11	5	28	45	9	13	43	65
Indianapolis IN	8	1	1	10	13	1	6	20
Kansas City MO	3	2	0	5	4	3	17	25
Louisville KY	3	0	2	5	14	29	12	55
Milwaukee WI	8	10	12	30	12	9	14	35
Minn-St. Paul MN	7	6	17	30	14	4	37	55
Oklahoma City OK	6	4	0	10	9	11	15	35
St. Louis MO	10	2	8	20	13	29	18	60
Southern Cities								
Atlanta GA	6	13	26	45	8	14	42	65
Charlotte NC	25	5	0	30	3	20	37	60
Ft. Lauderdale FL	24	13	3	40	7	19	24	50
Jacksonville FL	27	8	0	35	11	15	24	50
Memphis TN	9	1	0	10	8	15	12	35
Miami FL	18	8	33	60	2	8	60	70
Nashville TN	18	5	3	25	4	9	27	40
New Orleans LA	9	25	16	50	12	10	28	50
Norfolk VA	3	16	25	45	10	9	16	35
Orlando FL	19	5	6	30	1	4	20	25
Tampa FL	4	8	12	25	18	9	38	65
Southwestern Cities								
Albuquerque NM	6	9	5	20	15	20	5	40
Austin TX	18	20	17	55	15	15	15	45
Corpus Christi TX	10	0	0	10	7	2	1	10
Dallas TX	12	16	27	55	16	9	9	35
Denver CO	11	13	25	50	11	14	25	50
El Paso TX	10	9	1	20	1	2	1	5
Fort Worth TX	9	12	19	40	14	8	8	30
Houston TX	6	21	43	70	11	22	17	50
Phoenix AZ	7	32	21	60	26	23	22	70
Salt Lake City UT	7	6	2	15	18	11	11	40
San Antonio TX	6	18	17	40	7	3	11	20
Western Cities								
Honolulu HI	11	13	25	50	28	12	30	70
Los Angeles CA	4	3	68	75	12	19	24	55
Portland OR	16	8	11	35	7	26	27	60
Sacramento CA	15	11	4	30	2	13	35	50
San Bernardino-Riv CA	13	23	34	70	25	17	13	55
San Diego CA	14	12	23	50	8	20	2	30
San Fran-Oak CA	14	8	58	80	4	9	47	60
San Jose CA	12	11	38	60	13	5	41	60
Seattle-Everett WA	11	38	21	70	10	8	37	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-12. Percent of Congested DVKT by AADT Congestion Ranges for 1991

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	6	7	12	25	3	8	24	35
Boston MA	7	16	23	45	11	6	23	40
Hartford CT	6	5	4	15	14	11	10	35
New York NY	28	13	19	60	15	15	50	80
Philadelphia PA	12	5	8	25	11	20	44	75
Pittsburgh PA	4	6	10	20	16	14	30	60
Washington DC	8	22	35	65	7	21	57	85
Midwestern Cities								
Chicago IL	7	9	39	55	15	18	32	65
Cincinnati OH	17	10	3	30	11	4	14	30
Cleveland OH	18	9	3	30	11	10	9	30
Columbus OH	3	12	15	30	9	14	22	45
Detroit MI	10	6	30	45	8	14	42	65
Indianapolis IN	8	1	1	10	14	1	5	20
Kansas City MO	3	2	1	5	4	5	16	25
Louisville KY	3	0	2	5	11	30	13	55
Milwaukee WI	9	11	11	30	11	9	15	35
Minn-St. Paul MN	8	6	15	30	11	6	38	55
Oklahoma City OK	6	4	0	10	8	10	17	35
St. Louis MO	10	2	8	20	12	27	21	60
Southern Cities								
Atlanta GA	4	17	24	45	10	17	38	65
Charlotte NC	30	5	0	35	4	13	43	60
Ft. Lauderdale FL	23	13	4	40	9	17	23	50
Jacksonville FL	25	9	1	35	16	13	21	50
Memphis TN	13	2	0	15	10	14	11	35
Miami FL	20	10	30	60	3	10	58	70
Nashville TN	18	6	2	25	5	10	25	40
New Orleans LA	8	24	16	49	10	12	28	50
Norfolk VA	8	18	19	45	10	9	16	35
Orlando FL	19	5	7	30	2	3	21	25
Tampa FL	4	9	12	25	24	11	37	72
Southwestern Cities								
Albuquerque NM	7	8	5	20	18	18	4	40
Austin TX	19	21	15	55	15	17	13	45
Corpus Christi TX	9	1	0	10	10	3	2	15
Dallas TX	12	14	29	55	15	11	9	35
Denver CO	12	18	25	55	7	15	28	50
El Paso TX	11	8	1	20	1	1	2	5
Fort Worth TX	9	10	21	40	13	9	8	30
Houston TX	8	19	43	70	10	21	19	50
Phoenix AZ	10	30	21	60	27	18	26	70
Salt Lake City UT	8	9	4	20	22	10	9	40
San Antonio TX	5	16	19	40	6	4	10	20
Western Cities								
Honolulu HI	10	13	27	50	26	10	34	70
Los Angeles CA	5	3	67	75	11	16	28	55
Portland OR	16	8	11	35	6	25	28	60
Sacramento CA	15	12	3	30	4	10	35	50
San Bernardino-Riv CA	11	12	46	70	25	17	13	55
San Diego CA	13	13	24	50	7	19	4	30
San Fran-Oak CA	11	13	56	80	6	7	47	60
San Jose CA	12	11	37	60	12	3	45	60
Seattle-Everett WA	8	36	26	70	10	11	34	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-13. Percent of Congested DVKT by AADT Congestion Ranges for 1992

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	8	7	15	30	5	6	25	35
Boston MA	6	14	25	45	12	8	20	40
Hartford CT	4	6	5	15	12	13	11	35
New York NY	21	19	20	60	10	20	55	85
Philadelphia PA	7	5	14	25	11	17	47	75
Pittsburgh PA	5	6	9	20	16	11	33	60
Washington DC	7	20	42	70	13	15	56	85
Midwestern Cities								
Chicago IL	10	7	42	60	13	22	35	70
Cincinnati OH	17	14	5	35	10	7	13	30
Cleveland OH	15	7	8	30	7	16	12	35
Columbus OH	3	9	18	30	11	9	31	50
Detroit MI	9	4	32	45	5	16	44	65
Indianapolis IN	8	1	1	10	15	5	6	25
Kansas City MO	6	1	3	10	9	7	9	25
Louisville KY	2	1	2	5	8	21	31	60
Milwaukee WI	8	9	13	30	11	10	14	35
Minn-St. Paul MN	10	2	18	30	6	12	38	55
Oklahoma City OK	5	5	0	10	9	13	18	40
St. Louis MO	11	6	3	20	15	19	26	60
Southern Cities								
Atlanta GA	5	20	25	50	10	12	43	65
Charlotte NC	19	7	9	35	5	14	42	60
Ft. Lauderdale FL	16	18	6	40	13	17	20	50
Jacksonville FL	13	20	3	35	22	6	23	50
Memphis TN	10	4	2	15	12	14	9	35
Miami FL	21	8	31	60	3	12	49	65
Nashville TN	16	5	5	25	14	16	11	40
New Orleans LA	10	30	10	50	16	12	22	50
Norfolk VA	9	17	14	40	7	8	24	40
Orlando FL	14	6	10	30	1	3	21	25
Tampa FL	4	6	15	25	15	14	36	66
Southwestern Cities								
Albuquerque NM	6	7	6	20	17	12	11	40
Austin TX	19	19	17	55	16	16	14	45
Corpus Christi TX	12	3	0	15	9	5	1	15
Dallas TX	13	17	25	55	16	9	10	35
Denver CO	13	15	27	55	12	10	29	50
El Paso TX	11	11	3	25	3	2	5	10
Fort Worth TX	9	12	18	40	14	8	8	30
Houston TX	10	18	42	70	12	23	15	50
Phoenix AZ	11	9	40	60	21	23	26	70
Salt Lake City UT	6	8	6	20	26	13	6	45
San Antonio TX	6	13	21	40	9	6	10	25
Western Cities								
Honolulu HI	8	15	28	50	17	9	50	75
Los Angeles CA	5	3	67	75	8	20	28	55
Portland OR	13	8	19	40	9	25	25	60
Sacramento CA	13	15	2	30	8	12	30	50
San Bernardino-Riv CA	5	12	54	70	23	14	19	55
San Diego CA	17	11	22	50	6	21	9	35
San Fran-Oak CA	14	12	54	80	6	9	45	60
San Jose CA	12	12	36	60	13	10	37	60
Seattle-Everett WA	8	27	35	70	8	11	37	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Table C-14. Percent of Congested DVKT by AADT Congestion Ranges for 1993

Urban Area	Freeway and Expressway				Principal Arterial Street			
	Moderate	Heavy	Severe	Total	Moderate	Heavy	Severe	Total
Northeastern Cities								
Baltimore MD	9	6	15	30	5	8	27	40
Boston MA	9	13	23	45	11	9	21	40
Hartford CT	6	10	4	20	11	13	11	35
New York NY	18	24	18	60	6	19	60	85
Philadelphia PA	8	6	11	25	8	12	55	75
Pittsburgh PA	5	7	8	20	21	11	33	65
Washington DC	12	13	45	70	14	19	52	85
Midwestern Cities								
Chicago IL	11	7	42	60	13	23	29	65
Cincinnati OH	11	16	8	35	11	8	11	30
Cleveland OH	16	8	10	35	8	12	10	30
Columbus OH	2	10	18	30	13	8	28	50
Detroit MI	9	5	36	50	10	8	47	65
Indianapolis IN	10	2	2	15	10	8	7	25
Kansas City MO	6	2	3	10	10	6	9	25
Louisville KY	4	2	4	10	13	16	32	60
Milwaukee WI	7	10	13	30	5	9	16	30
Minn-St. Paul MN	12	3	15	30	8	6	36	50
Oklahoma City OK	6	4	0	10	11	13	16	40
St. Louis MO	9	9	7	25	20	15	25	60
Southern Cities								
Atlanta GA	6	15	29	50	11	10	44	65
Charlotte NC	16	9	9	35	4	16	41	60
Ft. Lauderdale FL	11	21	8	40	18	15	17	50
Jacksonville FL	13	18	4	35	20	11	24	55
Memphis TN	8	5	2	15	15	9	11	35
Miami FL	14	8	37	60	8	10	52	70
Nashville TN	10	5	5	20	12	13	10	35
New Orleans LA	10	33	7	50	14	15	20	50
Norfolk VA	14	20	6	40	6	12	22	40
Orlando FL	16	7	12	35	2	5	23	30
Tampa FL	3	3	14	20	11	14	40	65
Southwestern Cities								
Albuquerque NM	7	6	7	20	17	11	16	45
Austin TX	14	18	22	55	19	16	16	50
Corpus Christi TX	11	4	0	15	10	5	0	15
Dallas TX	15	19	21	55	16	12	12	40
Denver CO	11	11	33	55	12	12	31	55
El Paso TX	11	12	2	25	3	2	5	10
Fort Worth TX	13	15	17	45	12	9	9	30
Houston TX	6	27	37	70	7	24	19	50
Phoenix AZ	13	10	42	65	20	26	24	70
Salt Lake City UT	7	10	9	25	25	14	5	45
San Antonio TX	6	14	20	40	10	7	12	30
Western Cities								
Honolulu HI	10	10	30	50	20	7	48	75
Los Angeles CA	5	3	66	75	9	15	30	55
Portland OR	11	10	19	40	12	25	24	61
Sacramento CA	13	19	3	35	9	12	34	55
San Bernardino-Riv CA	8	14	48	70	21	17	23	60
San Diego CA	21	15	15	50	5	22	9	35
San Fran-Oak CA	11	15	54	80	7	10	48	65
San Jose CA	9	12	39	60	15	10	30	55
Seattle-Everett WA	6	24	40	70	12	11	33	55

AADT per lane ranges:

	Moderate	Heavy	Severe
Freeway and Expressway	15,000-17,500	17,501-20,000	Over 20,000
Principal Arterial Street	5,750-7,000	7,001-8,500	Over 8,500

Source: TTI Analysis and Local Transportation Agency References

Delay in travel time represents a significant cost to the motoring public. This section attempts to quantify these costs to the drivers in terms of time and fuel. The next chapter will discuss a number of constants and urbanized area/state specific variables that affect the delay calculations.

Cost Estimate Constants

The congestion cost estimate calculations are utilized in the following derived constant values.

1. Occupancy—1.25 persons per vehicle,
2. 250 working days per year,
3. Average cost of time (7)—$10.50 per person hour,[1]
4. Commercial vehicle operating cost (11)—$1.34 per kilometer,
5. Vehicle mix—95 percent passenger and 5 percent commercial, and
6. Vehicular speeds: Table C-15 (10).

The following derived constant values utilize the constants.

Table C-15. Congested Daily Vehicle-Kilometers of Travel by Average Annual Daily Traffic per Lane Volumes

Functional Class	Parameters	Uncongested	Congested DVKT[1,2]		
			Moderate	Heavy	Severe
Freeway/Expressway	ADT/Lane	Under 15,000	15,000 - 17,500	17,501 - 20,000	Over 20,000
	Speed (kph)[3]	97	61	53	48
Principal Arterial Streets	ADT/Lane	Under 5,750	5,750 - 7,000	7,001 - 8,500	Over 8,500
	Speed (kph)[3]	56	45	40	37

Note: [1] Assumes congested freeway operation when ADT/Lane exceeds 15,000.
[2] Assumes congested principal arterial street operations when ADT/lane exceeds 5,750.
[3] Represent a "soft" conversion from miles per hour

Source: TTI Analysis and Houston-Galveston Regional Transportation Study (10)

[1]Referenced value of $8.00/hr in 1985 adjusted with the Consumer Price Index to value used for 1992 wage rate.

Cost Estimate Variables

In addition to the derived constants, five urbanized area/state specific variables were identified and used in the congestion cost estimate calculations. Table C-15 illustrates these variables.

Daily Vehicle-Kilometers of Travel

The daily vehicle-kilometers of travel (DVKT) is the average daily traffic (ADT) of a section of roadway multiplied by the length (in kilometers) of that section of roadway. This allows the daily volume of all urban facilities to be represented in terms that can be quantified and utilized in cost calculations. DVKT was estimated for the freeways and principal arterial streets located in each study urbanized area. These estimates originate from the HPMS database and other local transportation data sources and are presented in a previous section of this report.

Fuel Costs

Statewide average fuel cost estimates were obtained from 1992 data published by the American Automobile Association (AAA) (16). These data represent the average reported fuel cost for 1992. Values for different fuel types used in motor vehicles, i.e., diesel and gasoline, did not vary enough to be reported separately. Therefore, an average rate for fuel was used in cost estimate calculations.

Population

Population data were obtained from the combination of 1990 U.S. Census Bureau estimates and 1992 population estimates reported in the Federal Highway Administration's Highway Performance Monitoring System (HPMS).

Table C-16. 1992 Congestion Cost Estimate Variables

Urban Area	Daily Vehicle Kilometers of Travel		State Average Fuel Cost, ($/liter)	Population (000)	Eligible Drivers (000)
	Freeway (000)	Prin. Art. St. (000)			
Northeastern Cities					
Baltimore MD	28,980	16,100	0.34	2,110	1,660
Boston MA	34,620	22,540	0.33	2,980	2,480
Hartford CT	11,310	6,100	0.36	620	470
New York NY	138,460	88,550	0.35	17,000	13,570
Philadelphia PA	32,520	34,870	0.32	5,200	4,110
Pittsburgh PA	15,050	18,520	0.32	1,900	1,570
Washington DC	46,690	29,620	0.32	3,400	2,830
Midwestern Cities					
Chicago IL	65,950	56,350	0.33	7,600	5,870
Cincinnati OH	20,710	7,080	0.31	1,250	970
Cleveland OH	24,100	9,980	0.31	1,800	1,370
Columbus OH	15,700	5,640	0.31	980	780
Detroit MI	47,500	41,860	0.31	4,000	2,950
Indianapolis IN	14,330	7,250	0.30	960	740
Kansas City MO	24,150	8,860	0.29	1,300	1,020
Louisville KY	11,270	5,640	0.30	820	650
Milwaukee WI	12,620	9,020	0.32	1,230	930
Minn-St. Paul MN	32,200	11,430	0.31	2,120	1,680
Oklahoma City OK	12,400	7,250	0.30	800	620
St. Louis MO	31,400	20,450	0.29	1,990	1,550
Southern Cities					
Atlanta GA	48,300	19,320	0.29	2,320	1,830
Charlotte NC	5,640	5,190	0.31	520	410
Ft. Lauderdale FL	13,690	10,300	0.33	1,300	1,080
Jacksonville FL	9,660	10,060	0.33	770	590
Memphis TN	8,290	8,950	0.31	890	680
Miami FL	15,920	27,370	0.33	1,940	1,530
Nashville TN	11,270	9,020	0.31	600	480
New Orleans LA	8,370	7,080	0.33	1,110	840
Norfolk VA	9,620	7,890	0.31	980	780
Orlando FL	10,020	8,370	0.33	920	750
Tampa FL	6,360	7,500	0.33	740	590
Southwestern Cities					
Albuquerque NM	4,410	7,250	0.34	530	410
Austin TX	10,340	4,030	0.31	570	450
Corpus Christi TX	3,140	2,580	0.31	290	210
Dallas TX	40,090	14,650	0.31	2,090	1,630
Denver CO	21,330	17,870	0.34	1,610	1,290
El Paso TX	5,960	5,380	0.31	570	410
Fort Worth TX	21,090	7,570	0.31	1,210	920
Houston TX	51,520	18,350	0.31	2,930	2,240
Phoenix AZ	15,780	29,790	0.34	2,070	1,570
Salt Lake City UT	9,760	4,300	0.31	880	680
San Antonio TX	17,230	9,660	0.31	1,200	890
Western Cities					
Honolulu HI	8,860	3,110	0.42	690	580
Los Angeles CA	183,460	133,630	0.35	11,950	9,300
Portland OR	13,440	7,080	0.36	1,080	870
Sacramento CA	16,550	12,640	0.35	1,210	920
San Bernardino-Riv CA	24,500	17,870	0.35	1,330	960
San Diego CA	44,680	15,540	0.35	2,530	1,010
San Fran-Oak CA	68,830	22,860	0.35	3,830	3,130
San Jose CA	26,810	11,750	0.35	1,530	1,170
Seattle-Everett WA	33,330	15,620	0.34	1,880	1,600
Northeastern Avg	43,950	30,900	0.33	4,740	3,810
Midwestern Avg	26,030	15,900	0.31	2,070	1,590
Southern Avg	13,380	11,010	0.32	1,100	870
Southwestern Avg	18,240	11,040	0.32	1,270	970
Western Avg	46,720	26,680	0.36	2,890	2,280
Texas Avg	21,340	8,890	0.31	1,270	960
Total Avg	27,760	17,790	0.33	2,200	1,730
Maximum Value	183,460	133,630	0.42	17,000	13,570
Minimum Value	3,140	2,580	0.29	290	210

Source: TTI Analysis and Local Transportation Agency References

Eligible Drivers

The number of eligible drivers for each area was obtained using the population estimate derived above, along with estimates of the percentage of population 16 years of age and older taken from the Statistical Abstract of the United States (17).

Cost Estimate Calculations

The first step in the cost estimate procedure was to convert DVKT into vehicle-hours of delay. Vehicle-hours of delay is the basis for the delay and fuel cost calculations. To obtain vehicle-hours of delay, vehicle-kilometers of travel on congested roadways during each peak period was estimated. This was accomplished by the use of two factors.

Highway Performance Monitoring System (HPMS) data were used to determine the percentage of urbanized area DVKT occurring on congested facilities. Two functional classes, freeways/expressways and principal arterial streets, were considered in the calculation of this factor. The following ADT per lane values defined congested conditions for these facilities:

- Freeways/Expressways-------ADT per lane greater than 15,000, and
- Principal Arterial Streets--------ADT per lane greater than 5,750.

Using these values, the percentage of DVKT operating in congested conditions could be calculated for each functional class. This percentage adjusts DVKT to congested DVKT, the first step in the process to obtain travel volume that occurs during congested conditions.

The congested daily travel values were adjusted by a factor to represent the percentage of travel occurring in the peak period. This factor was calculated using the Texas Department of Transportation's (TxDOT) "1986 Automatic Traffic Recorder Data" (18) for the study areas in Texas. Using these data, the percentage of ADT occurring during the morning and evening peak

periods was estimated. These data indicated that a relatively consistent value of 45 percent of total daily traffic occurred during the peak periods. This factor was applied to all the study areas.

Once the DVKT was converted to peak-period congested vehicle-kilometers of travel (Table C-17), the recurring vehicle-hours of delay were computed (Equation C-1). The peak facility conditions during normal operations causes recurring delay. This value does not include delay resulting from accidents, construction, or maintenance operations.

$$\begin{matrix}\textit{Recurring}\\ \textit{Vehicle-Hours of}\\ \textit{Delay per Day}\end{matrix} = \frac{\textit{Peak-Period Congested DVKT}}{\textit{Avg. Peak-Period Speed}} - \frac{\textit{Peak-Period Congested DVKT}}{\textit{Avg. Off-Peak Speed}} \qquad \text{Eq. C-1}$$

This calculation was performed for both freeways and principal arterial streets in a study area; the total recurring vehicle-hours of delay is the sum of the two. Table C-18 shows the result of these calculations.

Another type of delay encountered by vehicles is incident delay. This is the delay that results from an accident or disabled vehicle. Incident vehicle-hours of delay vary for each area by facility type, i.e., freeway/expressway or arterial street. For the freeway system in individual study areas, the ratio of recurring to incident delay reported by Lindley (6) were used. The resulting incident delay was calculated using Equation C-2.

$$\begin{matrix}\textit{Frwy Incident}\\ \textit{Vehicle-Hours of Delay}\\ \textit{per Day}\end{matrix} = \begin{matrix}\textit{Peak-Period}\\ \textit{Frwy Vehicle-Hours of Delay}\\ \textit{per Day}\end{matrix} \times \begin{matrix}\textit{Frwy}\\ \textit{Incident/Recurring}\\ \textit{Ratio}\end{matrix} \qquad \text{Eq. C-2}$$

Table C-17. 1992 Congested Daily Vehicle-Kilometers of Travel

Urban Area	Daily Vehicle-Kilometers of Travel		Percent of Peak-Period[1,2] VKT on Congested Roads		Peak Period Congested Daily VKT[1,3]		
	Freeway (000)	Prin.Art.St. (000)	Freeway (%)	Prin.Art.St. (%)	Freeway (000)	Prin.Art.St. (000)	Freeway & Prin.Art.St. (000)
Northeastern Cities							
Baltimore MD	28,980	16,100	30	40	3,910	2,900	6,810
Boston MA	34,620	22,540	45	40	7,010	4,060	11,070
Hartford CT	11,310	6,100	20	35	1,020	960	1,980
New York NY	138,460	88,550	60	85	37,380	33,870	71,250
Philadelphia PA	32,520	34,870	25	75	3,660	11,770	15,430
Pittsburgh PA	15,050	18,520	20	65	1,350	5,420	6,770
Washington DC	46,690	29,620	70	85	14,710	11,330	26,040
Midwestern Cities							
Chicago IL	65,950	56,350	60	65	17,810	16,480	34,290
Cincinnati OH	20,710	7,080	35	30	3,260	960	4,220
Cleveland OH	24,100	9,980	35	30	3,800	1,350	5,140
Columbus OH	15,700	5,640	30	50	2,120	1,270	3,390
Detroit MI	47,500	41,860	50	65	10,690	12,240	22,930
Indianapolis IN	14,330	7,250	15	25	970	820	1,780
Kansas City MO	24,150	8,860	10	25	1,090	1,000	2,080
Louisville KY	11,270	5,640	10	60	510	1,520	2,030
Milwaukee WI	12,620	9,020	30	30	1,700	1,220	2,920
Minn-St. Paul MN	32,200	11,430	30	50	4,350	2,570	6,920
Oklahoma City OK	12,400	7,250	10	40	560	1,300	1,860
St. Louis MO	31,400	20,450	25	60	3,530	5,520	9,050
Southern Cities							
Atlanta GA	48,300	19,320	50	65	10,870	5,650	16,520
Charlotte NC	5,640	5,190	35	60	890	1,400	2,290
Ft. Lauderdale FL	13,690	10,300	40	50	2,460	2,320	4,780
Jacksonville FL	9,660	10,060	35	55	1,520	2,490	4,010
Memphis TN	8,290	8,950	15	35	560	1,410	1,970
Miami FL	15,920	27,370	60	70	4,300	8,620	12,920
Nashville TN	11,270	9,020	20	35	1,010	1,420	2,430
New Orleans LA	8,370	7,080	50	50	1,880	1,590	3,480
Norfolk VA	9,620	7,890	40	40	1,730	1,420	3,150
Orlando FL	10,020	8,370	35	30	1,580	1,130	2,710
Tampa FL	6,360	7,500	20	65	570	2,190	2,770
Southwestern Cities							
Albuquerque NM	4,410	7,250	20	45	400	1,470	1,860
Austin TX	10,340	4,030	55	50	2,560	910	3,460
Corpus Christi TX	3,140	2,580	15	15	210	170	390
Dallas TX	40,090	14,650	55	40	9,920	2,640	12,560
Denver CO	21,330	17,870	55	55	5,280	4,420	9,700
El Paso TX	5,960	5,380	25	10	670	240	910
Fort Worth TX	21,090	7,570	45	30	4,270	1,020	5290
Houston TX	51,520	18,350	70	50	16,230	4,130	20,360
Phoenix AZ	15,780	29,790	65	70	4,620	9,380	14,000
Salt Lake City UT	9,760	4,300	25	45	1,100	870	1,970
San Antonio TX	17,230	9,660	40	30	3,100	1,300	4,400
Western Cities							
Honolulu HI	8,860	3,110	50	75	1,990	1,050	3,040
Los Angeles CA	183,460	133,630	75	55	61,920	33,070	94,990
Portland OR	13,440	7,080	40	60	2,420	1,910	4,330
Sacramento CA	16,550	12,640	35	55	2,610	3,130	5,730
San Bernardino-Riv CA	24,500	17,870	70	60	7,720	4,830	12,540
San Diego CA	44,680	15,540	50	35	10,050	2,450	12,500
San Fran-Oak CA	68,830	22,860	80	65	24,780	6,690	31,470
San Jose CA	26,810	11,750	60	55	7,240	2,910	10,150
Seattle-Everett WA	33,330	15,620	70	55	10,500	3,870	14,360
Northeastern Avg	43,950	30,900	39	61	9,860	10,040	19,910
Midwestern Avg	26,030	15,900	28	44	4,200	3,850	8,050
Southern Avg	13,380	11,010	36	50	2,490	2,700	5,180
Southwestern Avg	18,240	11,040	43	40	4,400	2,410	6,810
Western Avg	46,720	26,680	59	57	14,360	6,660	21,010
Texas Avg	21,340	8,890	44	32	5,280	1,490	6,770
Total Avg	27,760	17,790	40	49	6,490	4,650	11,140
Maximum Value	183,460	133,630	80	85	61,920	33,870	94,990
Minimum Value	3,140	2,580	10	10	210	170	390

Notes:
[1] Daily vehicle-kilometers of travel.
[2] Represents the percentage of daily vehicle-kilometers of travel on each roadway system during the peak period operating on congestion conditions.
[3] Daily vehicle-kilometers of travel by peak-period vehicle travel and percent of congested daily VKT.

Source: TTI Analysis and Local Transportation Agency References

Table C-18. Recurring and Incident Delay Relationships for 1993

Urban Area	Peak Period Congested Daily VKT[1]			Ratio of Incident[2] Delay to Recurring Delay		Daily Recurring Vehicle[3] Hours of Delay			Daily Incident Vehicle[3] Hours of Delay		
	Freeway (000)	Prin.Art.St. (000)	Freeway and Prin. Art. St. (000)	Freeway	Prin.Art.St.	Freeway	Hours of Delay Prin.Art.St.	Total	Freeway	Prin.Art.St.	Total
Northeastern Cities											
Baltimore MD	3,910	2,900	6,810	2.3	1.1	34,650	23,570	58,220	79,700	25,930	105,630
Boston MA	7,010	4,060	11,070	3.5	1.1	63,500	30,290	93,780	222,240	33,310	255,560
Hartford CT	1,020	960	1,980	2.7	1.1	8,380	6,680	15,060	22,640	7,340	29,980
New York NY	37,380	33,870	71,250	2.5	1.1	316,050	284,050	600,100	790,140	312,450	1,102,590
Philadelphia PA	3,660	11,770	15,430	2.1	1.1	31,570	98,300	129,870	66,290	108,130	174,430
Pittsburgh PA	1,350	5,420	6,770	2.9	1.1	11,870	39,340	51,200	34,410	43,270	77,680
Washington DC	14,710	11,330	26,040	2.2	1.1	138,160	90,030	228,190	303,950	99,030	402,980
Midwestern Cities											
Chicago IL	17,810	16,480	34,290	1.2	1.1	168,840	123,490	292,340	202,610	135,840	338,450
Cincinnati OH	3,260	960	4,220	0.8	1.1	26,840	6,590	33,430	21,470	7,250	28,720
Cleveland OH	3,800	1,350	5,140	0.7	1.1	30,320	9,500	39,820	21,230	10,450	31,670
Columbus OH	2,120	1,270	3,390	0.7	1.1	20,260	9,600	29,850	14,180	10,560	24,740
Detroit MI	10,690	12,240	22,930	2.2	1.1	102,210	100,460	202,660	224,860	110,500	335,360
Indianapolis IN	970	820	1,780	1.5	1.1	6,880	5,350	12,230	10,330	5,880	16,210
Kansas City MO	1,090	1,000	2,080	3.1	1.1	8,300	6,710	15,010	25,720	7,390	33,110
Louisville KY	510	1,520	2,030	1.1	1.1	4,320	11,630	15,950	4,750	12,790	17,540
Milwaukee WI	1,700	1,220	2,920	1.0	1.1	14,970	9,410	24,380	14,970	10,350	25,320
Minn-St. Paul MN	4,350	2,570	6,920	0.9	1.1	37,340	21,020	58,360	33,610	23,120	56,730
Oklahoma City OK	560	1,300	1,860	1.1	1.1	4,030	9,430	13,460	4,430	10,370	14,800
St. Louis MO	3,530	5,520	9,050	1.2	1.1	29,110	38,910	68,020	34,930	42,800	77,730
Southern Cities											
Atlanta GA	10,870	5,650	16,520	1.1	1.1	102,170	45,550	147,720	112,390	50,100	162,490
Charlotte NC	890	1,400	2,290	0.8	1.1	7,020	11,750	18,770	5,610	12,930	18,540
Ft. Lauderdale FL	2,460	2,320	4,780	1.5	1.1	20,300	15,810	36,110	30,450	17,390	47,840
Jacksonville FL	1,520	2,490	4,010	1.5	1.1	11,960	17,520	29,480	17,950	19,270	37,220
Memphis TN	560	1,410	1,970	1.1	1.1	4,200	9,330	13,530	4,620	10,270	14,890
Miami FL	4,300	8,620	12,920	1.5	1.1	39,560	71,590	111,150	59,340	78,740	138,090
Nashville TN	1,010	1,420	2,430	1.1	1.1	7,860	9,550	17,420	8,650	10,510	19,160
New Orleans LA	1,880	1,590	3,480	1.8	1.1	15,720	11,430	27,150	28,300	12,580	40,870
Norfolk VA	1,730	1,420	3,150	2.5	1.1	13,830	11,130	24,970	34,580	12,250	46,820
Orlando FL	1,580	1,130	2,710	1.5	1.1	12,860	9,680	22,530	19,290	10,640	29,930
Tampa FL	570	2,190	2,770	1.5	1.1	5,510	17,390	22,900	8,260	19,130	27,390

Table C-18. Recurring and Incident Delay Relationships for 1993 (continued)

Urban Area	Peak Period Congested Daily VKT[1]			Ratio of Incident[2] Delay to Recurring Delay		Daily Recurring Vehicle[3] Hours of Delay			Daily Incident Vehicle[3] Hours of Delay		
	Freeway (000)	Prin.Art.St. (000)	Freeway and Prin. Art. St. (000)	Freeway	Prin.Art.St.	Freeway	Hours of Delay Prin.Art.St.	Total	Freeway	Prin.Art.St.	Total
Southwestern Cities											
Albuquerque NM	400	1,470	1,860	1.1	1.1	3,370	10,010	13,380	3,700	11,010	14,710
Austin TX	2,560	910	3,460	1.1	1.1	22,250	6,080	28,330	24,470	6,690	31,160
Corpus Christi TX	210	170	390	1.1	1.1	1,430	920	2,350	1,580	1,010	2,580
Dallas TX	9,920	2,640	12,560	1.8	1.1	85,530	17,580	103,110	153,950	19,340	173,300
Denver CO	5,280	4,420	9,700	1.0	1.1	48,800	33,860	82,660	48,800	37,240	86,040
El Paso TX	670	240	910	1.1	1.1	5,140	1,790	6,930	5,660	1,970	7,630
Fort Worth TX	4,270	1,020	5,290	1.8	1.1	36,810	6,810	43,630	66,260	7,490	73,760
Houston TX	16,230	4,130	20,360	1.4	1.1	152,090	30,940	183,030	212,920	34,040	246,960
Phoenix AZ	4,620	9,380	14,000	0.4	1.1	43,140	65,900	109,040	17,260	72,490	89,750
Salt Lake City UT	1,100	870	1,970	0.6	1.1	9,400	5,060	14,460	5,640	5,570	11,210
San Antonio TX	3,100	1,300	4,400	1.1	1.1	28,440	9,150	37,580	31,280	10,060	41,340
Western Cities											
Honolulu HI	1,990	1,050	3,040	1.8	1.1	18,410	8,050	26,460	33,130	8,860	41,990
Los Angeles CA	61,920	33,070	94,990	1.2	1.1	626,810	258,220	885,030	752,170	284,050	1,036,220
Portland OR	2,420	1,910	4,330	2.0	1.1	21,270	14,290	35,570	42,540	15,720	58,270
Sacramento CA	2,610	3,130	5,730	0.6	1.1	20,300	24,860	45,160	12,180	27,340	39,520
San Bernardino-Riv CA	7,720	4,830	12,540	1.2	1.1	74,210	33,520	107,720	89,050	36,870	125,920
San Diego CA	10,050	2,450	12,500	0.6	1.1	81,580	17,850	99,430	48,950	19,640	68,590
San Fran-Oak CA	24,780	6,690	31,470	1.3	1.1	236,930	55,950	292,870	308,000	61,540	369,550
San Jose CA	7,240	2,910	10,150	1.2	1.1	68,450	21,760	90,220	82,140	23,940	106,090
Seattle-Everett WA	10,500	3,870	14,360	1.4	1.1	99,580	29,950	129,530	139,420	32,950	172,360
Northeastern Avg	9,860	10,040	19,910	2.6	1.1	86,310	81,750	168,060	217,050	89,920	306,980
Midwestern Avg	4,200	3,850	8,050	1.3	1.1	37,780	29,340	67,130	51,090	32,280	83,360
Southern Avg	2,490	2,700	5,180	1.4	1.1	21,910	20,980	42,880	29,950	23,070	53,020
Southwestern Avg	4,400	2,410	6,810	1.1	1.1	39,670	17,100	56,770	51,960	18,810	70,770
Western Avg	14,360	6,660	21,010	1.3	1.1	138,610	51,610	190,220	167,510	56,770	224,280
Texas Avg	5,280	1,490	6,770	1.3	1.1	47,380	10,470	57,850	70,870	11,510	82,390
Total Avg	6,490	4,650	11,140	1.5	1.1	59,650	36,150	95,800	90,820	39,770	130,590
Maximum Value	61,920	33,870	94,990	3.5	1.1	626,810	284,050	885,030	790,140	312,450	1102,590
Minimum Value	210	170	390	0.4	1.1	1,430	920	2,350	1,580	1,010	2,580

Notes: [1] Daily vehicle-kilometers of travel. Represents the percentage of Daily Vehicle-Kilometers of travel on each roadway system during the peak period operating in congested conditions.
[2] Percentage of Incident Delay related to Recurring Delay.
[3] Facility delays as calculated by type and urban area.

Source: TTI Analysis and Local Transportation Agency References

An incident will have varying effects on different types of facilities; for the purpose of this study, incident delay for arterial streets is defined as 110 percent of arterial street recurring delay. This incident delay factor was calculated using Equation C-3.

$$\begin{array}{c}\textit{Principal Arterial Street Incident}\\ \textit{Vehicle-Hour Delay}\\ \textit{per Day}\end{array} = \begin{array}{c}\textit{Principal Artrial Street Recurring}\\ \textit{Vehicle-Hour Delay}\\ \textit{per Day}\end{array} \times 1.1 \qquad \text{Eq. C-3}$$

The factor of 1.1 is based on the following assumptions as they relate to delay:

1. Arterial street system designs are more consistent from city to city than freeway design;

2. The side streets, drives, median openings, and other appurtenances associated with arterial streets allow numerous opportunities to remove incidents from the travelled way; and

3. Historical data shows the accident rate on arterial streets to be approximately twice that of freeways, but, as stated in the second assumption, there is a greater opportunity to remove the incident from the roadway.

Table C-18 shows the results of the freeway and principal arterial street recurring and incident delay calculations.

Prior to calculating the congestion costs, two other variables were calculated to simplify the cost equations. These variables are the average vehicular speed and the average fuel economy for the vehicles operating in congested conditions. Equation C-4 defines the average vehicular speed, which is a weighted average of the operating speeds on the facility under consideration.

$$\underset{(kph)}{Avg.\ Speed} = \frac{(Frwy\ speed^{1} x Peak\text{-}Period\ Frwy\ VKT) + (Prin.\ Art.\ Speed^{1} x Peak\text{-}Period Prin Art.Str.\ VKT)}{Total\ Peak\text{-}Period\ VKT} \quad \text{Eq. C-4}$$

[1] Speeds determined by congestion severity (Table C-1).

Congestion Cost

Two cost components can be associated with congestion: delay cost and fuel cost. These costs can be directly related to the vehicle-hours of delay. Table C-18 is a summary of the cost calculations for the component congestion cost per each urbanized area.

The average fuel economy represents the fuel consumption of the vehicles operating in congested conditions. The equation (Equation C-5) is a linear regression applied to a modified version of fuel consumption reported by Raus (19).

$$\underset{(kph)}{Average\ Fuel\ Economy} = 3.74 + 0.11\ \underset{(kph)}{(Average\ Vehicular\ Speed)} \quad \text{Eq. C-5}$$

Delay Cost

The delay cost is the cost of lost time due to congested roadways. Equation C-6 calculates this cost.

$$\underset{Delay\ Cost}{Annual} = \frac{Vehicle\text{-}Hrs.\ of\ Delay}{Day} \times \frac{1.25\ person}{Vehicle} \times \frac{\$10.25}{Hour} \times \frac{250\ Workdays}{Year} \quad \text{Eq. C-6}$$

where: vehicle-hours of delay/day is the combined freeway and principal arterial street representing the city's recurring or incident delay.

This equation is used to separately calculate delay costs resulting from both incident and recurring delays.

Table C-19. Component and Total Congestion Costs by Urban Area for 1992

Urban Area	Annual Cost Due to Congestion ($ millions)					Rank
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total	
Los Angeles CA	3,530	4,130	400	470	8,530	1
New York NY	2,400	4,410	280	510	7,600	2
San Fran-Oak CA	1,180	1,490	140	170	2,980	3
Chicago IL	1,170	1,350	130	150	2,800	4
Washington DC	910	1,610	100	170	2,790	5
Detroit MI	800	1,330	80	130	2,340	6
Houston TX	740	1,000	80	100	1,920	7
Boston MA	380	1,030	40	110	1,560	8
Atlanta GA	590	650	60	60	1,360	9
Seattle WA	520	690	60	80	1,350	10
Philadelphia PA	510	680	50	70	1,310	11
Dallas TX	420	710	40	70	1,240	12
Miami FL	440	540	50	60	1,090	13
San Bernardino-Riv CA	430	500	50	60	1,040	14
Phoenix AZ	360	430	40	50	880	15
San Jose CA	430	360	50	40	880	15
San Diego CA	410	280	50	30	770	17
Denver CO	330	340	40	40	750	18
Baltimore MD	230	420	30	50	730	19
St. Louis MO	270	310	30	30	640	20
Pittsburgh PA	200	310	20	30	560	21
Fort Worth TX	180	300	20	30	530	22
Minn-St. Paul MN	240	230	20	20	510	23
Portland OR	140	230	20	30	420	24
Sacramento CA	180	160	20	20	380	25
Ft. Lauderdale FL	150	190	20	20	380	25
San Antonio TX	150	170	20	20	360	27
Cleveland OH	160	130	20	10	320	28
Norfolk VA	100	190	10	20	320	28
Honolulu HI	110	170	10	20	310	30
Jacksonville FL	120	150	10	20	300	31
New Orleans LA	110	160	10	20	300	31
Cincinnati OH	140	120	10	10	280	33
Austin TX	120	130	10	10	270	34
Columbus OH	120	100	10	10	240	35
Orlando FL	90	120	10	10	230	36
Milwaukee WI	100	100	10	10	220	37
Tampa FL	90	110	10	10	220	37
Kansas City MO	60	130	10	10	210	39
Hartford CT	60	120	10	10	200	40
Nashville TN	70	80	10	10	170	41
Charlotte NC	70	70	10	10	160	42
Louisville KY	60	70	10	10	150	43
Indianapolis IN	50	70	0	10	130	44
Albuquerque NM	50	60	10	10	130	44
Memphis TN	50	60	10	10	130	44
Oklahoma City OK	50	60	10	10	130	44
Salt Lake City UT	60	50	10	0	120	48
El Paso TX	30	30	0	0	60	49
Corpus Christi TX	10	10	0	0	20	50
Northeastern Avg	670	1,230	70	140	2,110	
Midwestern Avg	270	330	30	30	660	
Southern Avg	170	210	20	20	420	
Southwestern Avg	230	290	20	30	570	
Western Avg	760	900	90	100	1,850	
Texas Avg	230	330	20	30	630	
Total Avg	380	520	40	60	1,010	
Maximum Value	3,530	4,410	400	510	8,540	
Minimum Value	10	10	0	0	20	

Source: TTI Analysis and Local Transportation Agency References

Fuel Cost

Fuel cost was also related to vehicle-hours of delay per day and speed by Equation C-7 for passenger vehicles and Equation C-8 for commercial vehicles.

$$\text{Passenger Fuel Cost} = \frac{\frac{\text{Vehicle-Hrs of Delay}}{\text{Day}} \times 95\% \times \text{Avg. Speed} \times \text{Avg. Fuel Cost}}{\text{Avg. Fuel Economy}} \quad \text{Eq. C-7}$$

$$\text{Commercial Fuel Cost} = \frac{\frac{\text{Vehicle-Hrs of Delay}}{\text{Day}} \times 5\% \times \text{Avg. Speed} \times \text{Avg. Fuel Cost}}{\text{Avg. Fuel Economy}} \quad \text{Eq. C-8}$$

where: vehicle-hours of delay is the combined value for freeways and principal arterial streets representing either recurring or incident delay.

These calculations were completed for both incident and recurring delay. Equation C-9 combines the respective portions, i.e., incident and recurring, to determine the yearly fuel cost due to congestion resulting from incident and recurring delay.

$$\text{Average Urbanized Area Fuel Cost} = (\text{Passenger Fuel Cost} + \text{Commercial Fuel Cost}) \times \frac{250\ \text{Days}}{\text{Year}} \quad \text{Eq. C-9}$$

This calculation was done for each study area using the specific area/state fuel cost, peak-period congested VKT, and vehicle-hours of recurring and incident delay per day.

Results of Cost Estimate Calculations

Using the methods and equations discussed in the previous sections, the annual cost for each urbanized area was calculated (Table C-18). Reviewing the component costs of delay and fuel, it is shown that congestion costs associated with delay make up the majority of the annual congestion cost.

Table C-20 illustrates the impacts of the component and total congestion cost in terms of per capita and per registered vehicle.

Table C-21 illustrates the categorical ranking of the urban study areas by annual congestion cost, annual cost per capita, and annual cost per registered vehicle.

Tables C-22 through C-37 present estimates of congestion cost from 1986 to 1993. Previously published estimates presented in this series of reports have been revised for some areas to reflect new information. The data are the best current information on the delay, fuel, and cost values for the years 1986 through 1993. Some of the data missing in 1986 and 1987 was unobtainable because of the various methods of reporting information in the HPMS database.

Table C-20. Estimated Impact of Congestion 1992

Urban Area	Total Congestion Cost	
	Per Registered Vehicle (dollars)	Per Capita (dollars)
Northeastern Cities		
Baltimore MD	640	340
Boston MA	950	540
Hartford CT	310	270
New York NY	1,190	430
Philadelphia PA	440	250
Pittsburgh PA	410	270
Washington DC	1,580	820
Midwestern Cities		
Chicago IL	670	360
Cincinnati OH	260	210
Cleveland OH	190	160
Columbus OH	300	250
Detroit MI	720	520
Indianapolis IN	150	90
Kansas City MO	250	160
Louisville KY	250	140
Milwaukee WI	400	180
Minn-St. Paul MN	300	240
Oklahoma City OK	220	150
St. Louis MO	520	270
Southern Cities		
Atlanta GA	660	520
Charlotte NC	370	300
Ft. Lauderdale FL	330	270
Jacksonville FL	420	340
Memphis TN	170	130
Miami FL	670	510
Southwestern Cities		
Nashville TN	320	290
New Orleans LA	330	270
Norfolk VA	390	340
Orlando FL	250	210
Tampa FL	330	300
Albuquerque NM	230	190
Austin TX	430	400
Corpus Christi TX	90	70
Dallas TX	750	590
Denver CO	480	420
El Paso TX	180	110
Fort Worth TX	480	400
Houston TX	810	630
Phoenix AZ	620	400
Salt Lake City UT	130	110
San Antonio TX	360	270
Western Cities		
Honolulu HI	550	420
Los Angeles CA	1,060	700
Portland OR	560	370
Sacramento CA	250	270
San Bernardino-Riv CA	1,260	770
San Diego CA	540	320
San Fran-Oak CA	930	760
San Jose CA	860	590
Seattle-Everett WA	990	720
Northeastern Avg	790	420
Midwestern Avg	350	230
Southern Avg	390	320
Southwestern Avg	410	330
Western Avg	780	550
Texas Avg	440	350
Total Avg	510	350
Maximum Value	1,580	820
Minimum Value	90	70

Source: TTI Analysis and Local Transportation Agency References

Table C-21. 1992 Rankings of Urban Area by Estimated Impact of Congestion

Urban Area	Total Congestion Cost	Congestion Cost per Capita	Congestion Cost per Registered Vehicle
Northeastern Cities			
Baltimore MD	18	21	15
Boston MA	8	9	6
Hartford CT	41	28	35
New York NY	2	13	3
Philadelphia PA	10	35	23
Pittsburgh PA	21	28	26
Washington DC	5	1	1
Midwestern Cities			
Chicago IL	4	20	12
Cincinnati OH	32	38	38
Cleveland OH	29	42	45
Columbus OH	34	35	36
Detroit MI	6	10	11
Indianapolis IN	47	49	48
Kansas City MO	38	42	39
Louisville KY	43	45	39
Milwaukee WI	35	41	27
Minn-St. Paul MN	22	37	36
Oklahoma City OK	43	44	44
St. Louis MO	20	28	20
Southern Cities			
Atlanta GA	12	10	14
Charlotte NC	42	25	29
Ft. Lauderdale FL	25	28	31
Jacksonville FL	32	21	25
Memphis TN	43	46	47
Miami FL	14	12	12
Nashville TN	40	27	34
New Orleans LA	29	28	31
Norfolk VA	26	21	28
Orlando FL	38	38	39
Tampa FL	35	25	31
Southwestern Cities			
Albuquerque NM	46	40	43
Austin TX	35	16	24
Corpus Christi TX	50	50	50
Dallas TX	10	7	10
Denver CO	19	14	21
El Paso TX	49	47	46
Fort Worth TX	23	16	21
Houston TX	7	6	9
Phoenix AZ	16	16	16
Salt Lake City UT	47	47	49
San Antonio TX	27	28	30
Western Cities			
Honolulu HI	29	14	18
Los Angeles CA	1	5	4
Portland OR	24	19	17
Sacramento CA	27	28	39
San Bernardino-Riv CA	13	2	2
San Diego CA	17	24	19
San Fran-Oak CA	3	3	7
San Jose CA	15	7	8
Seattle-Everett WA	9	4	5

Source: TTI Analysis and Local Transportation Agency References

Table C-22. Component and Total Congestion Costs by Urban Area for 1986

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	110	180	-	-	-
Boston MA	240	640	-	-	-
Hartford CT	20	40	-	-	-
New York NY	1,280	2,370	-	-	-
Philadelphia PA	330	420	-	-	-
Pittsburgh PA	110	170	-	-	-
Washington DC	480	820	-	-	-
Midwestern Cities					
Chicago IL	680	780	-	-	-
Cincinnati OH	40	40	-	-	-
Cleveland OH	50	40	-	-	-
Columbus OH	50	40	-	-	-
Detroit MI	380	600	-	-	-
Indianapolis IN	10	20	0	0	30
Kansas City MO	20	40	0	0	70
Louisville KY	30	30	0	0	60
Milwaukee WI	60	60	10	10	130
Minn-St. Paul MN	110	110	10	10	240
Oklahoma City OK	30	30	0	0	70
St. Louis MO	160	180	70	80	500
Southern Cities					
Atlanta GA	290	320	30	30	680
Charlotte NC	30	30	-	-	-
Ft. Lauderdale FL	70	90	10	10	180
Jacksonville FL	50	70	10	10	130
Memphis TN	20	20	0	0	50
Miami FL	210	260	20	30	530
Nashville TN	40	50	0	10	100
New Orleans LA	80	110	10	10	210
Norfolk VA	60	130	-	-	-
Orlando FL	40	60	10	10	110
Tampa FL	50	60	10	10	120
Southwestern Cities					
Albuquerque NM	20	20	0	0	50
Austin TX	60	70	10	10	150
Corpus Christi TX	0	0	0	0	10
Dallas TX	290	510	30	60	890
Denver CO	160	170	20	20	370
El Paso TX	10	10	0	0	30
Fort Worth TX	110	180	10	20	320
Houston TX	490	650	50	70	1,260
Phoenix AZ	220	200	30	20	470
Salt Lake City UT	20	20	0	0	40
San Antonio TX	90	100	10	10	210
Western Cities					
Honolulu HI	50	90	10	10	160
Los Angeles CA	2,210	2,600	260	310	5,380
Portland OR	60	90	10	10	170
Sacramento CA	70	60	10	10	160
San Bernardino-Riv CA	220	260	30	30	540
San Diego CA	180	120	20	20	340
San Fran-Oak CA	730	930	90	110	1,860
San Jose CA	220	260	30	30	550
Seattle-Everett WA	230	310	30	40	600
Northeastern Avg	370	660	-	-	-
Midwestern Avg	130	160	10	20	160
Southern Avg	90	110	10	10	230
Southwestern Avg	130	180	10	20	340
Western Avg	440	520	50	60	1,080
Texas Avg	150	220	20	20	410
Total Avg	210	290	20	30	470
Maximum Value	2,210	2,600	260	310	5,380
Minimum Value	0	0	0	0	10

Notes: - Denotes data not available.

Source: TTI Analysis and Local Transportation Agency References

Table C-23. Estimated Impact of Congestion in 1986

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	-	-	0.88
Boston MA	-	-	1.04
Hartford CT	-	-	0.85
New York NY	-	-	1.06
Philadelphia PA	-	-	1.06
Pittsburgh PA	-	-	0.79
Washington DC	-	-	1.27
Midwestern Cities			
Chicago IL	-	-	1.15
Cincinnati OH	-	-	0.84
Cleveland OH	-	-	0.86
Columbus OH	-	-	0.75
Detroit MI	-	-	1.05
Indianapolis IN	50	40	0.81
Kansas City MO	80	60	0.68
Louisville KY	100	80	0.80
Milwaukee WI	140	100	0.90
Minn-St. Paul MN	160	130	0.89
Oklahoma City OK	120	90	0.76
St. Louis MO	330	260	0.93
Southern Cities			
Atlanta GA	520	400	1.09
Charlotte NC	-	-	0.78
Ft. Lauderdale FL	180	150	0.85
Jacksonville FL	270	200	0.95
Memphis TN	80	60	0.80
Miami FL	370	300	1.14
Nashville TN	240	190	0.86
New Orleans LA	270	200	1.09
Norfolk VA	-	-	0.90
Orlando FL	200	160	0.76
Tampa FL	260	200	0.96
Southwestern Cities			
Albuquerque NM	140	110	0.96
Austin TX	400	320	0.94
Corpus Christi TX	50	40	0.71
Dallas TX	610	470	1.04
Denver CO	310	250	0.97
El Paso TX	80	60	0.75
Fort Worth TX	380	290	0.87
Houston TX	600	450	1.21
Phoenix AZ	360	270	1.20
Salt Lake City UT	60	50	0.68
San Antonio TX	280	200	0.88
Western Cities			
Honolulu HI	320	270	1.03
Los Angeles CA	650	500	1.42
Portland OR	200	160	0.97
Sacramento CA	210	160	0.95
San Bernardino-Riv CA	750	550	1.15
San Diego CA	220	170	1.00
San Fran-Oak CA	660	540	1.24
San Jose CA	550	410	0.97
Seattle-Everett WA	450	390	1.09
Northeastern Avg	-	-	0.99
Midwestern Avg	140	110	0.87
Southern Avg	260	210	0.93
Southwestern Avg	300	230	0.93
Western Avg	450	350	1.09
Texas Avg	340	260	0.91
Total Avg	300	230	0.95
Maximum Value	750	550	1.42
Minimum Value	50	40	0.68

Notes: - Denotes data not available.

Source: TTI Analysis and Local Transportation Agency References

Table C-24. Component and Total Congestion Costs by Urban Area for 1987

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	120	200	10	20	350
Boston MA	240	620	30	70	950
Hartford CT	30	40	0	10	80
New York NY	1,400	2,590	160	290	4,430
Philadelphia PA	360	460	40	50	910
Pittsburgh PA	120	190	10	20	350
Washington DC	540	900	60	110	1,620
Midwestern Cities					
Chicago IL	680	790	80	90	1,640
Cincinnati OH	50	50	10	10	110
Cleveland OH	60	50	10	10	130
Columbus OH	60	50	10	10	120
Detroit MI	400	630	50	70	1,140
Indianapolis IN	10	20	0	0	40
Kansas City MO	20	50	0	0	80
Louisville KY	30	30	0	0	70
Milwaukee WI	60	70	10	10	150
Minn-St. Paul MN	150	140	20	20	330
Oklahoma City OK	30	30	0	0	60
St. Louis MO	170	200	20	20	410
Southern Cities					
Atlanta GA	330	360	40	40	780
Charlotte NC	40	40	0	0	80
Ft. Lauderdale FL	80	100	10	10	200
Jacksonville FL	60	80	10	10	160
Memphis TN	20	30	0	0	60
Miami FL	240	290	30	30	580
Nashville TN	50	50	10	10	120
New Orleans LA	80	120	10	10	230
Norfolk VA	70	150	10	20	240
Orlando FL	50	60	10	10	120
Tampa FL	60	70	10	10	140
Southwestern Cities					
Albuquerque NM	20	30	0	0	60
Austin TX	70	80	10	10	170
Corpus Christi TX	0	10	0	0	10
Dallas TX	280	470	30	60	840
Denver CO	170	170	20	20	380
El Paso TX	10	10	0	0	30
Fort Worth TX	110	180	10	20	320
Houston TX	480	650	60	80	1,260
Phoenix AZ	230	210	30	30	500
Salt Lake City UT	20	20	0	0	40
San Antonio TX	90	100	10	10	220
Western Cities					
Honolulu HI	50	90	10	10	160
Los Angeles CA	2,370	2,780	290	340	5,780
Portland OR	70	120	10	10	210
Sacramento CA	90	70	10	10	180
San Bernardino-Riv CA	240	280	30	30	580
San Diego CA	240	160	30	20	450
San Fran-Oak CA	860	1,090	100	130	2,180
San Jose CA	260	300	30	40	630
Seattle-Everett WA	290	380	30	50	750
Northeastern Avg	400	720	40	80	1,240
Midwestern Avg	140	170	20	20	360
Southern Avg	100	120	10	10	250
Southwestern Avg	140	180	20	20	350
Western Avg	500	590	60	70	1,210
Texas Avg	150	210	20	30	410
Total Avg	230	310	30	40	610
Maximum Value	2,370	2,780	290	340	5,780
Minimum Value	0	10	0	0	10

Source: TTI Analysis and Local Transportation Agency References

Table C-25. Estimated Impact of Congestion in 1987

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	240	190	0.91
Boston MA	410	330	1.04
Hartford CT	180	130	0.87
New York NY	350	280	1.06
Philadelphia PA	280	220	1.06
Pittsburgh PA	230	190	0.79
Washington DC	660	540	1.29
Midwestern Cities			
Chicago IL	300	230	1.15
Cincinnati OH	120	100	0.87
Cleveland OH	100	70	0.89
Columbus OH	180	140	0.78
Detroit MI	400	290	1.04
Indianapolis IN	50	40	0.85
Kansas City MO	90	70	0.71
Louisville KY	120	90	0.86
Milwaukee WI	160	120	0.95
Minn-St. Paul MN	220	170	0.89
Oklahoma City OK	120	90	0.76
St. Louis MO	280	210	0.96
Southern Cities			
Atlanta GA	560	440	1.11
Charlotte NC	250	190	0.79
Ft. Lauderdale FL	210	170	0.90
Jacksonville FL	320	240	0.94
Memphis TN	90	70	0.84
Miami FL	410	330	1.14
Nashville TN	270	220	0.89
New Orleans LA	290	220	1.14
Norfolk VA	350	280	0.93
Orlando FL	200	160	0.77
Tampa FL	270	210	1.02
Southwestern Cities			
Albuquerque NM	150	120	0.96
Austin TX	440	350	1.00
Corpus Christi TX	50	40	0.72
Dallas TX	570	440	1.02
Denver CO	310	250	0.95
El Paso TX	90	60	0.71
Fort Worth TX	370	280	0.87
Houston TX	590	450	1.19
Phoenix AZ	370	280	1.18
Salt Lake City UT	70	60	0.70
San Antonio TX	280	210	0.86
Western Cities			
Honolulu HI	330	270	1.05
Los Angeles CA	680	530	1.47
Portland OR	250	200	0.99
Sacramento CA	230	180	1.00
San Bernardino-Riv CA	770	570	1.14
San Diego CA	280	220	1.08
San Fran-Oak CA	760	620	1.31
San Jose CA	610	460	0.99
Seattle-Everett WA	550	470	1.14
Northeastern Avg	340	270	1.00
Midwestern Avg	180	140	0.89
Southern Avg	290	230	0.95
Southwestern Avg	300	230	0.92
Western Avg	500	390	1.13
Texas Avg	340	260	0.91
Total Avg	310	240	0.97
Maximum Value	770	620	1.47
Minimum Value	50	40	0.70

Source: TTI Analysis and Local Transportation References

Table C-26. Component and Total Congestion Costs by Urban Area for 1988

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	130	220	20	30	390
Boston MA	310	850	40	100	1,290
Hartford CT	30	70	0	10	110
New York NY	1,580	2,900	180	340	5,010
Philadelphia PA	380	490	40	60	970
Pittsburgh PA	150	210	20	20	400
Washington DC	580	970	70	120	1,740
Midwestern Cities					
Chicago IL	710	820	90	100	1,710
Cincinnati OH	70	60	10	10	140
Cleveland OH	80	60	10	10	160
Columbus OH	60	50	10	10	130
Detroit MI	450	740	50	90	1,330
Indianapolis IN	20	30	0	0	60
Kansas City MO	30	60	0	10	100
Louisville KY	30	30	0	0	70
Milwaukee WI	70	70	10	10	160
Minn-St. Paul MN	160	150	20	20	350
Oklahoma City OK	30	40	0	0	80
St. Louis MO	180	200	20	20	420
Southern Cities					
Atlanta GA	340	380	40	40	800
Charlotte NC	40	40	0	10	90
Ft. Lauderdale FL	90	110	10	10	220
Jacksonville FL	70	80	10	10	170
Memphis TN	30	30	0	0	70
Miami FL	290	360	40	40	730
Nashville TN	60	70	10	10	150
New Orleans LA	90	130	10	20	250
Norfolk VA	80	160	10	20	260
Orlando FL	50	60	10	10	130
Tampa FL	70	80	10	10	170
Southwestern Cities					
Albuquerque NM	30	30	0	0	60
Austin TX	70	80	10	10	170
Corpus Christi TX	0	0	0	0	10
Dallas TX	300	520	40	60	930
Denver CO	180	190	20	20	420
El Paso TX	10	20	0	0	30
Fort Worth TX	110	190	10	20	340
Houston TX	520	700	60	90	1,360
Phoenix AZ	270	250	40	30	600
Salt Lake City UT	20	20	0	0	50
San Antonio TX	100	110	10	10	230
Western Cities					
Honolulu HI	60	100	10	10	190
Los Angeles CA	2,600	3,040	330	380	6,350
Portland OR	80	130	10	10	230
Sacramento CA	100	90	10	10	210
San Bernardino-Riv CA	260	310	30	40	640
San Diego CA	310	210	40	30	590
San Fran-Oak CA	910	1,160	120	150	2,330
San Jose CA	280	320	30	40	680
Seattle-Everett WA	330	440	40	60	870
Northeastern Avg	450	820	50	100	1,420
Midwestern Avg	160	190	20	20	390
Southern Avg	110	140	10	20	270
Southwestern Avg	150	190	20	20	380
Western Avg	550	640	70	80	1,340
Texas Avg	160	230	20	30	440
Total Avg	260	350	30	40	680
Maximum Value	2,600	3,040	330	380	6,350
Minimum Value	0	0	0	0	10

Source: TTI Analysis and Local Transportation Agency References

Table C-27. Estimated Impact of Congestion in 1988

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	260	200	0.92
Boston MA	540	440	1.12
Hartford CT	250	190	0.90
New York NY	390	310	1.10
Philadelphia PA	300	240	1.07
Pittsburgh PA	270	220	0.81
Washington DC	700	570	1.30
Midwestern Cities			
Chicago IL	310	230	1.18
Cincinnati OH	160	130	0.88
Cleveland OH	120	90	0.97
Columbus OH	190	150	0.79
Detroit MI	460	340	1.07
Indianapolis IN	90	70	0.85
Kansas City MO	110	90	0.72
Louisville KY	110	90	0.87
Milwaukee WI	170	130	0.94
Minn-St. Paul MN	230	180	0.90
Oklahoma City OK	150	110	0.78
St. Louis MO	280	220	0.98
Southern Cities			
Atlanta GA	540	420	1.14
Charlotte NC	280	220	0.80
Ft. Lauderdale FL	220	180	0.90
Jacksonville FL	310	240	0.95
Memphis TN	100	80	0.86
Miami FL	500	400	1.18
Nashville TN	350	280	0.94
New Orleans LA	320	240	1.13
Norfolk VA	370	290	0.94
Orlando FL	200	160	0.78
Tampa FL	310	250	1.03
Southwestern Cities			
Albuquerque NM	170	130	0.96
Austin TX	430	340	0.96
Corpus Christi TX	50	40	0.70
Dallas TX	610	470	1.02
Denver CO	340	270	0.99
El Paso TX	90	70	0.74
Fort Worth TX	390	300	0.87
Houston TX	630	480	1.15
Phoenix AZ	430	330	1.04
Salt Lake City UT	80	60	0.72
San Antonio TX	270	200	0.86
Western Cities			
Honolulu HI	360	290	1.07
Los Angeles CA	730	570	1.52
Portland OR	290	230	1.04
Sacramento CA	270	210	1.03
San Bernardino-Riv CA	840	620	1.18
San Diego CA	340	270	1.13
San Fran-Oak CA	790	650	1.33
San Jose CA	660	490	1.00
Seattle-Everett WA	630	530	1.17
Northeastern Avg	390	310	1.03
Midwestern Avg	200	150	0.91
Southern Avg	320	250	0.97
Southwestern Avg	320	240	0.91
Western Avg	540	430	1.16
Texas Avg	350	270	0.90
Total Avg	340	270	0.99
Maximum Value	840	650	1.52
Minimum Value	50	40	0.70

Source: TTI Analysis and Local Transportation Agency References

Table C-28. Component and Total Congestion Costs by Urban Area for 1989

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	150	260	20	30	460
Boston MA	320	890	40	110	1,360
Hartford CT	40	70	10	10	130
New York NY	1,810	3,410	230	430	5,880
Philadelphia PA	390	520	50	60	1,020
Pittsburgh PA	160	230	20	30	430
Washington DC	660	1,120	80	140	2,000
Midwestern Cities					
Chicago IL	790	910	100	120	1,910
Cincinnati OH	80	70	10	10	160
Cleveland OH	100	80	10	10	210
Columbus OH	70	60	10	10	150
Detroit MI	500	820	60	100	1,490
Indianapolis IN	20	30	0	0	60
Kansas City MO	30	60	0	10	100
Louisville KY	30	40	0	0	80
Milwaukee WI	70	80	10	10	170
Minn-St. Paul MN	170	160	20	20	380
Oklahoma City OK	40	40	0	0	80
St. Louis MO	220	250	30	30	530
Southern Cities					
Atlanta GA	380	410	50	50	890
Charlotte NC	50	50	10	10	110
Ft. Lauderdale FL	100	120	10	20	250
Jacksonville FL	80	100	10	10	210
Memphis TN	30	30	0	0	70
Miami FL	330	410	40	50	840
Nashville TN	70	70	10	10	160
New Orleans LA	90	140	10	20	260
Norfolk VA	80	170	10	20	280
Orlando FL	50	70	10	10	140
Tampa FL	70	80	10	10	170
Southwestern Cities					
Albuquerque NM	40	40	0	0	90
Austin TX	80	80	10	10	180
Corpus Christi TX	0	0	0	0	10
Dallas TX	320	540	40	70	970
Denver CO	200	210	30	30	470
El Paso TX	10	20	0	0	40
Fort Worth TX	120	200	10	20	360
Houston TX	560	750	70	90	1,470
Phoenix AZ	300	270	40	30	640
Salt Lake City UT	30	20	0	0	60
San Antonio TX	100	110	10	10	240
Western Cities					
Honolulu HI	70	110	10	20	210
Los Angeles CA	2,850	3,330	380	440	7,000
Portland OR	90	150	10	20	270
Sacramento CA	120	110	20	10	260
San Bernardino-Riv CA	280	330	40	40	700
San Diego CA	350	230	50	30	670
San Fran-Oak CA	990	1,260	130	170	2,550
San Jose CA	300	350	40	50	740
Seattle-Everett WA	380	510	50	60	1,000
Northeastern Avg	500	930	60	120	1,610
Midwestern Avg	180	220	20	30	440
Southern Avg	120	150	20	20	310
Southwestern Avg	160	200	20	30	410
Western Avg	600	710	80	90	1,490
Texas Avg	170	240	20	30	470
Total Avg	280	390	40	50	760
Maximum Value	2,850	3,410	380	440	7,000
Minimum Value	0	0	0	0	10

Source: TTI Analysis and Local Transportation Agency References

Table C-29. Estimated Impact of Congestion in 1989

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	310	240	0.98
Boston MA	560	460	1.09
Hartford CT	280	220	0.89
New York NY	450	360	1.12
Philadelphia PA	310	240	1.05
Pittsburgh PA	280	230	0.82
Washington DC	790	650	1.33
Midwestern Cities			
Chicago IL	340	260	1.21
Cincinnati OH	180	140	0.94
Cleveland OH	160	120	0.96
Columbus OH	220	180	0.82
Detroit MI	520	380	1.09
Indianapolis IN	90	70	0.86
Kansas City MO	110	90	0.72
Louisville KY	120	90	0.86
Milwaukee WI	190	140	0.97
Minn-St. Paul MN	240	190	0.92
Oklahoma City OK	150	110	0.78
St. Louis MO	350	270	0.96
Southern Cities			
Atlanta GA	570	440	1.14
Charlotte NC	320	240	0.82
Ft. Lauderdale FL	240	200	0.92
Jacksonville FL	370	290	0.93
Memphis TN	110	90	0.90
Miami FL	570	460	1.25
Nashville TN	360	280	0.90
New Orleans LA	330	250	1.13
Norfolk VA	390	310	0.95
Orlando FL	210	170	0.77
Tampa FL	310	250	1.03
Southwestern Cities			
Albuquerque NM	220	170	0.98
Austin TX	440	350	0.96
Corpus Christi TX	50	40	0.70
Dallas TX	640	490	1.02
Denver CO	370	300	1.01
El Paso TX	90	70	0.74
Fort Worth TX	410	310	0.87
Houston TX	670	510	1.13
Phoenix AZ	450	340	1.03
Salt Lake City UT	90	70	0.81
San Antonio TX	280	210	0.87
Western Cities			
Honolulu HI	380	320	1.07
Los Angeles CA	800	620	1.54
Portland OR	330	260	1.07
Sacramento CA	320	240	1.01
San Bernardino-Riv CA	870	630	1.17
San Diego CA	380	300	1.18
San Fran-Oak CA	860	710	1.36
San Jose CA	710	530	1.03
Seattle-Everett WA	700	590	1.20
Northeastern Avg	430	340	1.04
Midwestern Avg	220	170	0.92
Southern Avg	340	270	0.98
Southwestern Avg	340	260	0.92
Western Avg	590	470	1.18
Texas Avg	370	280	0.90
Total Avg	370	290	1.00
Maximum Value	870	710	1.54
Minimum Value	50	40	0.70

Source: TTI Analysis and Local Transportation Agency References

Table C-30. Component and Total Congestion Costs by Urban Area for 1990

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	170	300	20	40	530
Boston MA	340	920	40	120	1,420
Hartford CT	40	80	10	10	140
New York NY	1,950	3,660	270	500	6,370
Philadelphia PA	430	570	50	70	1,120
Pittsburgh PA	170	260	20	30	480
Washington DC	730	1,240	100	170	2,230
Midwestern Cities					
Chicago IL	910	1,050	130	140	2,230
Cincinnati OH	90	70	10	10	180
Cleveland OH	110	90	20	10	240
Columbus OH	100	80	10	10	200
Detroit MI	580	950	70	120	1,710
Indianapolis IN	30	40	0	0	70
Kansas City MO	40	70	0	10	110
Louisville KY	40	40	0	0	80
Milwaukee WI	80	90	10	10	190
Minn-St. Paul MN	190	190	20	20	430
Oklahoma City OK	40	40	0	10	90
St. Louis MO	220	250	30	30	520
Southern Cities					
Atlanta GA	420	460	50	60	980
Charlotte NC	60	60	10	10	130
Ft. Lauderdale FL	110	150	10	20	300
Jacksonville FL	90	110	10	10	230
Memphis TN	40	40	0	0	80
Miami FL	370	460	50	60	940
Nashville TN	70	80	10	10	170
New Orleans LA	100	150	10	20	280
Norfolk VA	90	190	10	20	310
Orlando FL	60	80	10	10	160
Tampa FL	80	90	10	10	190
Southwestern Cities					
Albuquerque NM	40	40	0	10	90
Austin TX	90	90	10	10	200
Corpus Christi TX	0	10	0	0	10
Dallas TX	370	620	50	80	1,110
Denver CO	240	250	30	30	570
El Paso TX	20	20	0	0	40
Fort Worth TX	140	230	20	30	410
Houston TX	610	820	80	100	1,620
Phoenix AZ	330	290	40	40	700
Salt Lake City UT	30	30	0	0	60
San Antonio TX	110	120	10	20	260
Western Cities					
Honolulu HI	80	120	10	20	230
Los Angeles CA	3,110	3,640	420	490	7,660
Portland OR	100	160	10	20	300
Sacramento CA	130	120	20	20	290
San Bernardino-Riv CA	340	400	50	50	850
San Diego CA	380	250	50	30	720
San Fran-Oak CA	1,070	1,350	140	180	2,740
San Jose CA	320	380	40	50	790
Seattle-Everett WA	420	560	60	80	1,110
Northeastern Avg	550	1,000	70	130	1,760
Midwestern Avg	200	250	30	30	510
Southern Avg	140	170	20	20	340
Southwestern Avg	180	230	20	30	460
Western Avg	660	780	90	110	1,630
Texas Avg	190	270	20	30	520
Total Avg	310	430	40	60	840
Maximum Value	3,110	3,660	420	500	7,660
Minimum Value	0	10	0	0	10

Source: TTI Analysis and Local Transportation Agency References

Table C-31. Estimated Impact of Congestion in 1990

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	340	270	1.01
Boston MA	580	480	1.06
Hartford CT	310	230	0.89
New York NY	480	380	1.14
Philadelphia PA	320	250	1.05
Pittsburgh PA	320	260	0.82
Washington DC	870	720	1.34
Midwestern Cities			
Chicago IL	390	300	1.25
Cincinnati OH	210	160	0.96
Cleveland OH	170	130	0.94
Columbus OH	300	230	0.89
Detroit MI	580	430	1.13
Indianapolis IN	100	80	0.84
Kansas City MO	130	100	0.74
Louisville KY	130	100	0.86
Milwaukee WI	210	160	0.99
Minn-St. Paul MN	270	210	0.95
Oklahoma City OK	160	120	0.79
St. Louis MO	340	270	0.95
Southern Cities			
Atlanta GA	590	470	1.14
Charlotte NC	360	280	0.86
Ft. Lauderdale FL	280	230	0.94
Jacksonville FL	420	320	0.93
Memphis TN	130	100	0.89
Miami FL	640	510	1.27
Nashville TN	370	300	0.89
New Orleans LA	350	260	1.12
Norfolk VA	430	340	0.96
Orlando FL	230	180	0.77
Tampa FL	340	280	1.05
Southwestern Cities			
Albuquerque NM	240	180	0.98
Austin TX	470	370	0.94
Corpus Christi TX	60	40	0.72
Dallas TX	720	560	1.05
Denver CO	450	360	1.03
El Paso TX	100	70	0.74
Fort Worth TX	450	340	0.90
Houston TX	740	560	1.12
Phoenix AZ	490	370	1.05
Salt Lake City UT	100	80	0.85
San Antonio TX	300	220	0.88
Western Cities			
Honolulu HI	420	350	1.09
Los Angeles CA	860	670	1.55
Portland OR	360	290	1.08
Sacramento CA	340	260	1.02
San Bernardino-Riv CA	990	720	1.21
San Diego CA	390	310	1.22
San Fran-Oak CA	910	750	1.36
San Jose CA	740	560	1.05
Seattle-Everett WA	750	640	1.20
Northeastern Avg	460	370	1.04
Midwestern Avg	250	190	0.94
Southern Avg	380	300	0.98
Southwestern Avg	370	290	0.93
Western Avg	640	510	1.20
Texas Avg	410	310	0.91
Total Avg	400	320	1.01
Maximum Value	990	750	1.55
Minimum Value	60	40	0.72

Source: TTI Analysis and Local Transportation Agency References

Table C-32. Component and Total Congestion Costs by Urban Area for 1991

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	180	310	20	40	550
Boston MA	350	980	40	120	1,490
Hartford CT	40	80	10	10	140
New York NY	2,020	3,770	260	480	6,520
Philadelphia PA	450	600	50	70	1,170
Pittsburgh PA	170	260	20	30	490
Washington DC	770	1,320	100	170	2,360
Midwestern Cities					
Chicago IL	980	1,140	130	150	2,390
Cincinnati OH	100	90	10	10	210
Cleveland OH	120	100	10	10	240
Columbus OH	100	80	10	10	210
Detroit MI	630	1,040	80	120	1,870
Indianapolis IN	30	40	0	0	80
Kansas City MO	40	70	0	10	120
Louisville KY	40	40	0	0	90
Milwaukee WI	90	90	10	10	200
Minn-St. Paul MN	210	200	30	20	460
Oklahoma City OK	40	50	0	10	100
St. Louis MO	230	260	20	30	540
Southern Cities					
Atlanta GA	440	480	50	60	1,020
Charlotte NC	60	60	10	10	140
Ft. Lauderdale FL	120	160	10	20	310
Jacksonville FL	90	120	10	10	240
Memphis TN	40	50	10	10	100
Miami FL	390	470	50	60	960
Nashville TN	70	80	10	10	170
New Orleans LA	100	150	10	20	290
Norfolk VA	90	190	10	20	320
Orlando FL	60	90	10	10	170
Tampa FL	90	100	10	10	210
Southwestern Cities					
Albuquerque NM	40	40	0	10	90
Austin TX	90	100	10	10	210
Corpus Christi TX	10	10	0	0	20
Dallas TX	390	660	50	80	1,170
Denver CO	270	280	30	40	620
El Paso TX	20	20	0	0	40
Fort Worth TX	150	250	20	30	440
Houston TX	650	880	80	100	1,710
Phoenix AZ	360	310	40	40	750
Salt Lake City UT	40	30	10	0	80
San Antonio TX	120	130	10	20	280
Western Cities					
Honolulu HI	80	130	10	20	240
Los Angeles CA	3,230	3,780	410	480	7,900
Portland OR	110	170	10	20	310
Sacramento CA	140	120	20	20	300
San Bernardino-Riv CA	380	440	50	60	920
San Diego CA	390	260	50	30	740
San Fran-Oak CA	1,090	1,370	140	170	2,770
San Jose CA	340	400	40	50	840
Seattle-Everett WA	450	590	60	70	1,170
Northeastern Avg	570	1,050	70	130	1,820
Midwestern Avg	220	270	30	30	540
Southern Avg	140	180	20	20	360
Southwestern Avg	190	250	20	30	490
Western Avg	690	810	90	100	1,690
Texas Avg	200	290	20	30	550
Total Avg	330	450	40	60	880
Maximum Value	3230	3,780	410	480	7,900
Minimum Value	10	10	0	0	20

Source: TTI Analysis and Local Transportation Agency References

Table C-33. Estimated Impact of Congestion in 1991

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	350	270	1.02
Boston MA	610	500	1.06
Hartford CT	310	240	0.89
New York NY	490	390	1.14
Philadelphia PA	320	250	1.05
Pittsburgh PA	320	260	0.82
Washington DC	870	720	1.33
Midwestern Cities			
Chicago IL	410	320	1.27
Cincinnati OH	220	170	0.99
Cleveland OH	180	140	0.95
Columbus OH	300	230	0.91
Detroit MI	640	470	1.16
Indianapolis IN	100	80	0.84
Kansas City MO	130	100	0.75
Louisville KY	140	110	0.88
Milwaukee WI	220	170	1.00
Minn-St. Paul MN	280	220	0.96
Oklahoma City OK	170	130	0.81
St. Louis MO	360	280	0.95
Southern Cities			
Atlanta GA	610	480	1.16
Charlotte NC	390	310	0.89
Ft. Lauderdale FL	290	240	0.95
Jacksonville FL	410	320	0.95
Memphis TN	150	120	0.91
Miami FL	650	510	1.28
Nashville TN	370	300	0.90
New Orleans LA	350	260	1.12
Norfolk VA	420	330	0.93
Orlando FL	230	190	0.78
Tampa FL	380	300	1.05
Southwestern Cities			
Albuquerque NM	220	180	0.96
Austin TX	470	370	0.94
Corpus Christi TX	70	50	0.72
Dallas TX	720	560	1.06
Denver CO	490	390	1.03
El Paso TX	100	70	0.75
Fort Worth TX	490	370	0.92
Houston TX	780	590	1.11
Phoenix AZ	520	390	1.08
Salt Lake City UT	120	100	0.88
San Antonio TX	310	230	0.89
Western Cities			
Honolulu HI	440	370	1.10
Los Angeles CA	860	670	1.56
Portland OR	370	300	1.08
Sacramento CA	330	250	1.04
San Bernardino-Riv CA	990	720	1.22
San Diego CA	400	320	1.22
San Fran-Oak CA	910	740	1.34
San Jose CA	730	560	1.08
Seattle-Everett WA	750	640	1.20
Northeastern Avg	470	380	1.04
Midwestern Avg	260	200	0.96
Southern Avg	390	300	0.99
Southwestern Avg	390	300	0.94
Western Avg	640	510	1.20
Texas Avg	420	320	0.91
Total Avg	420	330	1.02
Maximum Value	990	740	1.56
Minimum Value	70	50	0.72

Source: TTI Analysis and Local Transportation Agency References

Table C-34. Component and Total Congestion Costs by Urban Area for 1992

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	210	390	30	50	680
Boston MA	370	1,030	40	120	1,560
Hartford CT	50	90	10	10	160
New York NY	2,250	4,130	280	510	7,170
Philadelphia PA	480	650	60	80	1,260
Pittsburgh PA	180	280	20	30	520
Washington DC	870	1,520	110	190	2,680
Midwestern Cities					
Chicago IL	1,120	1,290	140	160	2,720
Cincinnati OH	120	100	10	10	250
Cleveland OH	140	120	20	10	290
Columbus OH	120	100	10	10	240
Detroit MI	710	1,150	80	130	2,080
Indianapolis IN	30	40	0	10	90
Kansas City MO	50	120	10	10	190
Louisville KY	50	60	10	10	120
Milwaukee WI	90	100	10	10	220
Minn-St. Paul MN	230	230	30	30	510
Oklahoma City OK	50	50	10	10	110
St. Louis MO	230	260	20	30	550
Southern Cities					
Atlanta GA	500	550	60	60	1,160
Charlotte NC	70	70	10	10	150
Ft. Lauderdale FL	130	180	20	20	350
Jacksonville FL	100	130	10	20	260
Memphis TN	50	50	10	10	110
Miami FL	400	490	50	60	990
Nashville TN	70	80	10	10	170
New Orleans LA	100	160	10	20	290
Norfolk VA	100	190	10	20	330
Orlando FL	70	100	10	10	190
Tampa FL	90	110	10	10	220
Southwestern Cities					
Albuquerque NM	40	50	10	10	100
Austin TX	90	100	10	10	220
Corpus Christi TX	10	10	0	0	20
Dallas TX	400	680	50	80	1,210
Denver CO	290	300	40	40	670
El Paso TX	30	30	0	0	60
Fort Worth TX	150	260	20	30	460
Houston TX	680	920	80	110	1,790
Phoenix AZ	400	340	50	40	820
Salt Lake City UT	50	40	10	0	90
San Antonio TX	130	150	20	20	310
Western Cities					
Honolulu HI	100	150	10	20	280
Los Angeles CA	3,380	3,960	420	490	8,250
Portland OR	130	210	20	30	380
Sacramento CA	150	130	20	20	320
San Bernardino-Riv CA	410	480	50	60	990
San Diego CA	410	280	50	40	780
San Fran-Oak CA	1,110	1,410	140	180	2,840
San Jose CA	360	420	40	50	880
Seattle-Everett WA	500	660	60	80	1,300
Northeastern Avg	630	1,160	80	140	2,010
Midwestern Avg	250	300	30	40	610
Southern Avg	150	190	20	20	380
Southwestern Avg	210	260	20	30	520
Western Avg	730	860	90	110	1,780
Texas Avg	210	310	30	40	580
Total Avg	360	490	40	60	950
Maximum Value	3,380	4,130	420	510	8,250
Minimum Value	10	10	0	0	20

Source: TTI Analysis and Local Transportation Agency References

Table C-35. Estimated Impact of Congestion 1992

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	420	330	1.04
Boston MA	640	530	1.07
Hartford CT	350	260	0.91
New York NY	530	420	1.14
Philadelphia PA	320	250	1.05
Pittsburgh PA	340	280	0.81
Washington DC	980	820	1.36
Midwestern Cities			
Chicago IL	470	360	1.28
Cincinnati OH	260	210	1.01
Cleveland OH	210	160	0.95
Columbus OH	320	250	0.93
Detroit MI	700	520	1.19
Indianapolis IN	120	90	0.85
Kansas City MO	200	160	0.77
Louisville KY	180	140	0.90
Milwaukee WI	230	180	1.00
Minn-St. Paul MN	300	240	0.99
Oklahoma City OK	200	150	0.83
St. Louis MO	360	280	0.95
Southern Cities			
Atlanta GA	650	510	1.17
Charlotte NC	380	310	0.89
Ft. Lauderdale FL	320	270	0.96
Jacksonville FL	450	350	0.97
Memphis TN	170	130	0.92
Miami FL	650	510	1.30
Nashville TN	360	290	0.92
New Orleans LA	350	260	1.10
Norfolk VA	420	340	0.92
Orlando FL	260	210	0.80
Tampa FL	390	310	1.07
Southwestern Cities			
Albuquerque NM	250	190	0.95
Austin TX	490	390	0.95
Corpus Christi TX	100	70	0.74
Dallas TX	740	580	1.07
Denver CO	520	420	1.05
El Paso TX	150	110	0.76
Fort Worth TX	510	390	0.94
Houston TX	810	620	1.12
Phoenix AZ	540	410	1.08
Salt Lake City UT	140	110	0.90
San Antonio TX	360	260	0.90
Western Cities			
Honolulu HI	500	420	1.10
Los Angeles CA	890	700	1.54
Portland OR	450	360	1.10
Sacramento CA	350	270	1.04
San Bernardino-Riv CA	1,060	760	1.22
San Diego CA	400	320	1.22
San Fran-Oak CA	910	750	1.33
San Jose CA	760	580	1.07
Seattle-Everett WA	830	710	1.22
Northeastern Avg	510	410	1.05
Midwestern Avg	300	230	0.97
Southern Avg	400	320	1.00
Southwestern Avg	420	320	0.95
Western Avg	680	540	1.20
Texas Avg	450	350	0.93
Total Avg	450	350	1.03
Maximum Value	1,060	820	1.54
Minimum Value	100	70	0.74

Source: TTI Analysis and Local Transportation Agency References

Table C-36. Component and Total Congestion Costs by Urban Area for 1993

Urban Area	Annual Cost Due to Congestion ($ millions)				
	Recurring Delay	Incident Delay	Recurring Fuel	Incident Fuel	Total
Northeastern Cities					
Baltimore MD	230	420	30	50	730
Boston MA	380	1,030	40	110	1,560
Hartford CT	60	120	10	10	200
New York NY	2,400	4,410	280	510	7,600
Philadelphia PA	510	680	50	70	1,310
Pittsburgh PA	200	310	20	30	560
Washington DC	910	1,610	100	170	2,790
Midwestern Cities					
Chicago IL	1,170	1,350	130	150	2,800
Cincinnati OH	140	120	10	10	280
Cleveland OH	160	130	20	10	320
Columbus OH	120	100	10	10	240
Detroit MI	800	1,330	80	130	2,340
Indianapolis IN	50	70	0	10	130
Kansas City MO	60	130	10	10	210
Louisville KY	60	70	10	10	150
Milwaukee WI	100	100	10	10	220
Minn-St. Paul MN	240	230	20	20	510
Oklahoma City OK	50	60	10	10	130
St. Louis MO	270	310	30	30	640
Southern Cities					
Atlanta GA	590	650	60	60	1,360
Charlotte NC	70	70	10	10	160
Ft. Lauderdale FL	150	190	20	20	380
Jacksonville FL	120	150	10	20	300
Memphis TN	50	60	10	10	130
Miami FL	440	540	50	60	1,090
Nashville TN	70	80	10	10	170
New Orleans LA	110	160	10	20	300
Norfolk VA	100	190	10	20	320
Orlando FL	90	120	10	10	230
Tampa FL	90	110	10	10	220
Southwestern Cities					
Albuquerque NM	50	60	10	10	130
Austin TX	120	130	10	10	270
Corpus Christi TX	10	10	0	0	20
Dallas TX	420	710	40	70	1,240
Denver CO	330	340	40	40	750
El Paso TX	30	30	0	0	60
Fort Worth TX	180	300	20	30	530
Houston TX	740	1000	80	100	1,920
Phoenix AZ	430	360	50	40	880
Salt Lake City UT	60	50	10	0	120
San Antonio TX	150	170	20	20	360
Western Cities					
Honolulu HI	110	170	10	20	310
Los Angeles CA	3,530	4,130	400	470	8,530
Portland OR	140	230	20	30	420
Sacramento CA	180	160	20	20	380
San Bernardino-Riv CA	430	500	50	60	1,040
San Diego CA	410	280	50	30	770
San Fran-Oak CA	1,180	1,490	140	170	2,980
San Jose CA	360	430	40	50	880
Seattle-Everett WA	520	690	60	80	1,350
Northeastern Avg	670	1,230	70	140	2,110
Midwestern Avg	270	330	30	30	660
Southern Avg	170	210	20	20	420
Southwestern Avg	230	290	20	30	570
Western Avg	760	900	90	100	1,850
Texas Avg	230	330	20	30	630
Total Avg	380	520	40	60	1,010
Maximum Value	3,530	4,410	400	510	8,540
Minimum Value	10	10	0	0	20

Source: TTI Analysis and Local Transportation Agency References

Table C-37. Estimated Impact of Congestion 1993

Urban Area	Congestion Cost		Roadway Congestion Index
	Per Eligible Driver (dollars)	Per Capita (dollars)	
Northeastern Cities			
Baltimore MD	440	350	1.04
Boston MA	630	520	1.07
Hartford CT	430	330	0.93
New York NY	560	450	1.15
Philadelphia PA	320	250	1.04
Pittsburgh PA	360	290	0.82
Washington DC	980	820	1.41
Midwestern Cities			
Chicago IL	470	370	1.26
Cincinnati OH	290	220	1.03
Cleveland OH	240	180	0.98
Columbus OH	310	250	0.93
Detroit MI	790	590	1.23
Indianapolis IN	170	130	0.89
Kansas City MO	210	160	0.78
Louisville KY	220	180	0.93
Milwaukee WI	240	180	1.00
Minn-St. Paul MN	300	240	1.02
Oklahoma City OK	200	150	0.86
St. Louis MO	410	320	0.96
Southern Cities			
Atlanta GA	740	590	1.16
Charlotte NC	400	320	0.92
Ft. Lauderdale FL	350	290	0.98
Jacksonville FL	500	380	0.96
Memphis TN	180	140	0.93
Miami FL	710	560	1.32
Nashville TN	340	270	0.93
New Orleans LA	360	270	1.09
Norfolk VA	410	330	0.92
Orlando FL	310	250	0.82
Tampa FL	370	290	1.06
Southwestern Cities			
Albuquerque NM	300	230	0.96
Austin TX	590	470	0.95
Corpus Christi TX	110	80	0.75
Dallas TX	760	600	1.07
Denver CO	580	460	1.07
El Paso TX	160	120	0.77
Fort Worth TX	580	440	0.95
Houston TX	860	660	1.13
Phoenix AZ	560	420	1.08
Salt Lake City UT	170	130	0.92
San Antonio TX	400	290	0.91
Western Cities			
Honolulu HI	540	450	1.13
Los Angeles CA	920	710	1.54
Portland OR	480	390	1.11
Sacramento CA	410	310	1.04
San Bernardino-Riv CA	1,090	790	1.21
San Diego CA	380	300	1.21
San Fran-Oak CA	950	780	1.33
San Jose CA	750	580	1.05
Seattle-Everett WA	840	720	1.23
Northeastern Avg	530	430	1.07
Midwestern Avg	320	250	0.99
Southern Avg	420	340	1.01
Southwestern Avg	460	350	0.96
Western Avg	710	560	1.21
Texas Avg	490	380	0.93
Total Avg	470	370	1.04
Maximum Value	1,090	820	1.54
Minimum Value	110	80	0.75

Source: TTI Analysis and Local Transportation Agency References

APPENDIX D

FREEWAY AND PRINCIPAL ARTERIAL STREET TRAVEL AND SYSTEM LENGTH STATISTICS 1982 TO 1993

Table D-1. Summary of Normalized Freeway Travel and Distance Statistics for 1993

Urban Area	Normalized by Population Density							
	VKT per Person	Rank	VKT per Sq Km	Rank	Lane-km per 1000 Persons	Rank	Lane-km per Sq Km	Rank
Northeastern Cities								
Baltimore MD	12.05	32	22.09	24	0.92	34	1.69	25
Boston MA	11.15	36	18.72	32	0.79	38	1.31	38
Hartford CT	27.81	7	29.35	6	2.41	8	2.55	3
New York NY	4.16	50	13.10	46	0.30	50	0.94	45
Philadelphia PA	4.64	49	10.06	50	0.39	47	0.84	50
Pittsburgh PA	9.72	42	12.75	47	1.20	24	1.57	32
Washington DC	10.20	39	22.09	24	0.57	44	1.24	40
Midwestern Cities								
Chicago IL	6.80	46	13.96	42	0.43	46	0.88	48
Cincinnati OH	21.97	12	26.65	14	1.64	14	2.00	14
Cleveland OH	13.49	27	21.54	26	1.07	28	1.71	24
Columbus OH	16.93	20	25.77	15	1.43	19	2.18	10
Detroit MI	9.96	41	19.10	31	0.62	42	1.18	42
Indianapolis IN	17.92	17	24.01	20	1.57	15	2.10	11
Kansas City MO	25.91	8	29.89	4	2.65	4	3.07	1
Louisville KY	16.94	19	22.11	22	1.49	16	1.95	15
Milwaukee WI	11.88	33	16.50	39	0.91	35	1.27	39
Minn-St. Paul MN	22.29	11	24.50	19	1.72	12	1.87	18
Oklahoma City OK	28.11	6	24.93	17	2.69	3	2.38	5
St. Louis MO	15.81	23	25.37	16	1.39	21	2.23	8
Southern Cities								
Atlanta GA	40.90	2	33.50	1	2.72	2	2.24	7
Charlotte NC	16.52	21	17.61	34	1.48	17	1.58	30
Ft. Lauderdale FL	9.23	43	16.94	37	0.73	39	1.36	36
Jacksonville FL	22.99	10	20.18	29	1.83	11	1.61	28
Memphis TN	12.07	31	15.07	41	1.06	29	1.33	37
Miami FL	5.51	48	13.24	45	0.36	49	0.86	49
Nashville TN	46.23	1	30.21	3	4.16	1	2.73	2
New Orleans LA	6.49	47	12.19	49	0.48	45	0.90	46
Norfolk VA	21.5	13	15.88	40	2.07	9	1.52	33
Orlando FL	12.89	30	17.52	35	1.28	23	1.73	23
Tampa FL	13.69	26	13.82	43	1.10	27	1.11	44
Southwestern Cities								
Albuquerque NM	10.58	37	13.39	44	0.92	33	1.17	43
Austin TX	30.48	5	29.17	7	2.52	6	2.40	4
Corpus Christi TX	17.88	18	17.41	36	1.92	10	1.88	17
Dallas TX	34.57	3	30.85	2	2.47	7	2.20	9
Denver CO	19.61	14	21.31	27	1.45	18	1.60	29
El Paso TX	10.45	38	16.81	38	1.05	30	1.68	26
Fort Worth TX	31.91	4	28.04	13	2.59	5	2.29	6
Houston TX	25.64	9	28.28	11	1.71	13	1.90	16
Phoenix AZ	10.10	40	12.27	48	0.73	40	0.89	47
Salt Lake City UT	16.02	22	17.93	33	1.41	20	1.58	31
San Antonio TX	15.46	24	23.19	21	1.36	22	2.04	13
Western Cities								
Honolulu HI	8.67	44	20.65	28	0.62	43	1.48	34
Los Angeles CA	7.42	45	24.70	18	0.36	48	1.19	41
Portland OR	13.13	29	20.03	30	0.95	32	1.44	35
Sacramento CA	11.51	34	22.10	23	0.90	36	1.73	22
San Bernardino-Riv CA	18.62	15	29.75	5	1.15	25	1.83	19
San Diego CA	13.29	28	28.41	10	0.84	37	1.78	20
San Fran-Oak CA	11.24	35	28.91	8	0.64	41	1.65	27
San Jose CA	13.88	25	28.28	11	1.02	31	2.07	12
Seattle-Everett WA	18.05	16	28.59	9	1.13	26	1.78	21
Northeastern Avg	11.39		18.31		0.94		1.45	
Midwestern Avg	17.33		22.86		1.47		1.90	
Southern Avg	18.91		18.74		1.57		1.54	
Southwestern Avg	20.24		21.70		1.65		1.78	
Western Avg	12.87		25.71		0.85		1.66	
Texas Avg	23.77		24.82		1.95		2.06	
Total Avg	16.69		21.57		1.34		1.69	
Maximum Value	46.23		33.50		4.16		3.07	
Minimum Value	4.16		10.06		0.30		0.84	

Source: TTI Analysis and Local Transportation Agency References

Table D-2. Summary of Normalized Principal Arterial Street Travel and Mileage Statistics for 1993

Urban Area	Normalized by Population Density							
	VKT per Person	Rank	VKT per Sq Km	Rank	Lane-km per 1000 Persons	Rank	Lane-km per Sq Km	Rank
Northeastern Cities								
Baltimore MD	6.70	38	12.28	28	1.14	37	2.09	32
Boston MA	7.26	34	12.19	29	1.50	27	2.52	19
Hartford CT	15.00	11	15.83	15	2.60	11	2.73	14
New York NY	2.66	50	8.38	48	0.37	50	1.17	49
Philadelphia PA	4.98	46	10.79	37	0.75	47	1.64	44
Pittsburgh PA	11.95	16	15.68	16	1.94	21	2.54	18
Washington DC	6.47	39	14.02	21	0.83	45	1.79	37
Midwestern Cities								
Chicago IL	5.82	42	11.93	31	0.85	43	1.74	39
Cincinnati OH	7.52	33	9.12	45	1.41	30	1.71	40
Cleveland OH	5.58	43	8.92	46	1.04	40	1.65	42
Columbus OH	6.08	41	9.25	44	1.11	39	1.69	41
Detroit MI	8.78	27	16.84	10	1.46	28	2.78	13
Indianapolis IN	9.07	25	12.14	30	1.86	22	2.49	22
Kansas City MO	9.50	21	10.96	36	1.95	20	2.25	27
Louisville KY	8.47	30	11.05	35	1.41	31	1.84	36
Milwaukee WI	8.48	29	11.79	32	1.70	24	2.36	25
Minn-St. Paul MN	7.92	32	8.69	47	1.34	33	1.46	47
Oklahoma City OK	16.43	6	14.58	19	2.92	6	2.59	17
St. Louis MO	10.29	20	16.53	11	1.57	26	2.51	21
Southern Cities								
Atlanta GA	16.35	8	13.40	22	2.72	10	2.24	29
Charlotte NC	15.21	10	16.22	14	2.79	7	2.97	12
Ft. Lauderdale FL	6.94	36	12.75	26	1.33	34	2.43	24
Jacksonville FL	23.97	2	21.03	6	5.02	2	4.40	1
Memphis TN	13.02	14	16.28	13	2.45	15	3.04	9
Miami FL	9.47	22	22.75	3	1.26	35	3.02	10
Nashville TN	36.96	1	24.16	1	6.42	1	4.18	3
New Orleans LA	5.48	44	10.31	39	0.87	42	1.64	43
Norfolk VA	17.64	4	13.03	24	2.74	9	2.03	33
Orlando FL	10.76	19	14.64	18	2.30	17	3.12	8
Tampa FL	16.15	9	16.31	12	2.49	14	2.52	20
Southwestern Cities								
Albuquerque NM	17.37	5	21.99	4	3.19	5	4.03	5
Austin TX	11.88	17	11.37	33	2.27	19	2.19	31
Corpus Christi TX	14.68	12	14.29	20	3.40	4	3.30	7
Dallas TX	12.63	15	11.27	34	2.50	13	2.22	30
Denver CO	16.42	7	17.86	8	2.76	8	2.99	11
El Paso TX	9.43	23	15.17	17	2.43	16	3.91	6
Fort Worth TX	11.43	18	10.07	41	2.30	18	2.01	34
Houston TX	9.13	24	10.08	40	1.76	23	1.94	35
Phoenix AZ	19.09	3	23.14	2	3.46	3	4.19	2
Salt Lake City UT	7.05	35	7.91	49	1.16	36	1.29	48
San Antonio TX	8.67	28	13.00	25	1.64	25	2.45	23
Western Cities								
Honolulu HI	3.05	49	7.24	50	0.39	49	0.92	50
Los Angeles CA	5.41	45	17.99	7	0.82	46	2.72	15
Portland OR	6.91	37	10.55	38	1.04	41	1.58	46
Sacramento CA	8.79	26	16.87	9	1.40	32	2.69	16
San Bernardino-Riv CA	13.58	13	21.69	5	2.59	12	4.15	4
San Diego CA	4.62	47	9.88	42	0.84	44	1.78	38
San Fran-Oak CA	3.74	48	9.60	43	0.61	48	1.59	45
San Jose CA	6.09	40	12.40	27	1.14	38	2.35	26
Seattle-Everett WA	8.45	31	13.40	22	1.42	29	2.24	28
Northeastern Avg	7.86		12.74		1.30		2.07	
Midwestern Avg	8.66		11.82		1.55		2.09	
Southern Avg	15.63		16.44		2.76		2.87	
Southwestern Avg	12.53		14.20		2.44		2.77	
Western Avg	6.74		13.29		1.14		2.22	
Texas Avg	11.12		12.18		2.33		2.57	
Total Avg	10.59		13.75		1.90		2.43	
Maximum Value	36.96		24.16		6.42		4.40	
Minimum Value	2.66		7.24		0.37		0.92	

Source: TTI Analysis

Table D-3. Summary of 1982 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	16,490	1,590	5.0	10,400	0.84
Boston MA	25,610	2,270	5.5	11,280	0.90
Hartford CT	6,960	720	5.0	9,600	0.76
New York NY	101,700	8,440	5.2	12,060	1.01
Philadelphia PA	19,920	2,010	5.0	9,900	1.00
Pittsburgh PA	8,890	1,250	4.1	7,120	0.78
Washington DC	25,900	2,000	4.9	12,970	1.12
Midwestern Cities					
Chicago IL	40,980	3,290	5.4	12,450	1.02
Cincinnati OH	13,660	1,210	5.2	11,310	0.86
Cleveland OH	16,100	1,550	4.6	10,420	0.80
Columbus OH	9,710	1,140	5.6	8,550	0.68
Detroit MI	32,520	2,380	5.7	13,650	1.06
Indianapolis IN	8,470	1,080	5.1	7,850	0.67
Kansas City MO	14,330	1,830	4.0	7,840	0.62
Louisville KY	6,300	690	4.3	9,100	0.78
Milwaukee WI	9,020	870	5.3	10,370	0.83
Minn-St. Paul MN	18,030	1,900	4.4	9,490	0.76
Oklahoma City OK	9,380	1,070	4.9	8,760	0.72
St. Louis MO	19,380	1,950	5.3	9,950	0.83
Southern Cities					
Atlanta GA	25,380	2,200	5.7	11,550	0.91
Charlotte NC	2,840	400	4.0	7,060	0.71
Ft. Lauderdale FL	8,600	840	5.2	10,270	0.87
Jacksonville FL	6,200	550	4.0	11,320	0.91
Memphis TN	4,750	480	5.1	9,830	0.83
Miami FL	9,580	830	5.2	11,550	1.05
Nashville TN	5,230	560	4.3	9,290	0.77
New Orleans LA	6,280	520	5.6	12,000	0.98
Norfolk VA	6,230	660	4.2	9,440	0.79
Orlando FL	6,960	760	4.3	9,190	0.72
Tampa FL	3,190	310	4.7	10,420	0.94
Southwestern Cities					
Albuquerque NM	2,470	310	4.7	8,080	0.78
Austin TX	4,560	430	5.2	10,680	0.84
Corpus Christi TX	2,090	260	5.2	8,130	0.67
Dallas TX	27,160	2,500	5.3	10,880	0.84
Denver CO	13,360	1,280	5.1	10,440	0.88
El Paso TX	4,120	520	4.9	7,880	0.63
Fort Worth TX	13,890	1,460	5.0	9,530	0.76
Houston TX	33,940	2,210	5.9	15,330	1.17
Phoenix AZ	4,590	340	4.8	13,570	1.15
Salt Lake City UT	4,620	640	5.5	7,180	0.63
San Antonio TX	12,240	1,220	4.9	10,000	0.77
Western Cities					
Honolulu HI	5,960	520	5.0	11,380	0.92
Los Angeles CA	121,540	7,330	8.1	16,590	1.22
Portland OR	7,630	710	4.9	10,770	0.87
Sacramento CA	8,530	1,010	6.8	8,410	0.80
San Bernardino-Riv CA	18,870	1,300	6.7	14,470	1.11
San Diego CA	24,270	2,450	7.3	9,920	0.78
San Fran-Oak CA	46,470	3,540	6.7	13,120	1.01
San Jose CA	19,420	1,740	6.2	11,170	0.86
Seattle-Everett WA	19,750	1,620	5.7	12,210	0.95
Northeastern Avg	29,350	2,610	5.0	10,480	0.92
Midwestern Avg	16,490	1,580	5.0	9,980	0.80
Southern Avg	7,750	740	4.8	10,180	0.86
Southwestern Avg	11,190	1,020	5.1	10,150	0.83
Western Avg	30,270	2,250	6.4	12,010	0.95
Texas Avg	14,000	1,230	5.2	10,350	0.81
Total Avg	17,680	1,530	5.2	10,490	0.86
Maximum Value	121,540	8,440	8.1	16,590	1.22
Minimum Value	2,090	260	4.0	7,060	0.62

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-4. Summary of 1982 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	12,040	2,420	3.8	4,990	0.84
Boston MA	20,540	4,150	2.3	4,940	0.90
Hartford CT	3,780	870	3.4	4,350	0.76
New York NY	71,380	10,790	3.4	6,620	1.01
Philadelphia PA	30,590	4,350	2.8	7,040	1.00
Pittsburgh PA	14,260	2,460	2.9	5,810	0.78
Washington DC	21,400	2,820	3.4	7,590	1.12
Midwestern Cities					
Chicago IL	33,670	5,590	3.4	6,030	1.02
Cincinnati OH	4,860	1,250	3.3	3,900	0.86
Cleveland OH	7,240	1,770	2.9	4,090	0.80
Columbus OH	3,680	900	3.2	4,080	0.68
Detroit MI	31,120	5,720	4.3	5,450	1.06
Indianapolis IN	6,070	1,330	3.6	4,570	0.67
Kansas City MO	6,130	1,630	3.4	3,750	0.62
Louisville KY	4,230	790	3.7	5,360	0.78
Milwaukee WI	6,910	1,500	3.0	4,610	0.83
Minn-St. Paul MN	6,920	1,470	3.2	4,730	0.76
Oklahoma City OK	4,430	930	3.0	4,780	0.72
St. Louis MO	14,420	2,700	3.0	5,330	0.83
Southern Cities					
Atlanta GA	10,530	1,960	3.4	5,360	0.91
Charlotte NC	3,780	720	3.0	5,210	0.71
Ft. Lauderdale FL	8,790	1,640	4.2	5,350	0.87
Jacksonville FL	8,240	1,650	3.5	5,000	0.91
Memphis TN	5,310	1,080	4.1	4,930	0.83
Miami FL	19,110	3,020	4.2	6,330	1.05
Nashville TN	5,720	1,270	2.9	4,490	0.77
New Orleans LA	5,310	910	4.0	5,840	0.98
Norfolk VA	5,260	1,070	3.3	4,920	0.79
Orlando FL	5,740	1,470	3.7	3,900	0.72
Tampa FL	5,140	880	3.8	5,850	0.94
Southwestern Cities					
Albuquerque NM	4,600	920	3.5	5,020	0.78
Austin TX	2,570	550	4.0	4,690	0.84
Corpus Christi TX	2,010	500	3.6	4,030	0.67
Dallas TX	10,370	2,500	4.6	4,140	0.84
Denver CO	14,750	2,810	3.6	5,250	0.88
El Paso TX	4,190	1,220	3.9	3,420	0.63
Fort Worth TX	5,890	1,260	3.9	4,660	0.76
Houston TX	15,660	2,870	3.8	5,450	1.17
Phoenix AZ	24,040	3,990	3.3	6,020	1.15
Salt Lake City UT	2,340	450	3.1	5,200	0.63
San Antonio TX	5,680	1,510	3.2	3,750	0.77
Western Cities					
Honolulu HI	2,000	320	3.5	6,200	0.92
Los Angeles CA	92,000	17,650	3.9	5,210	1.22
Portland OR	4,470	830	3.1	5,390	0.87
Sacramento CA	8,040	1,340	3.9	6,020	0.80
San Bernardino-Riv CA	12,360	2,290	4.0	5,410	1.11
San Diego CA	9,870	2,300	3.3	4,290	0.78
San Fran-Oak CA	15,590	2,950	3.7	5,280	1.01
San Jose CA	8,440	1,900	3.9	4,440	0.86
Seattle-Everett WA	11,000	2,160	3.2	5,100	0.95
Northeastern Avg	24,850	3,980	3.1	5,910	0.92
Midwestern Avg	10,810	2,130	3.3	4,720	0.80
Southern Avg	7,540	1,430	3.6	5,200	0.86
Southwestern Avg	8,370	1,690	3.7	4,690	0.83
Western Avg	18,200	3,530	3.6	5,260	0.95
Texas Avg	6,620	1,490	3.9	4,310	0.81
Total Avg	12,850	2,390	3.5	5,080	0.86
Maximum Value	92,000	17,650	4.6	7,590	1.22
Minimum Value	2,000	320	2.3	3,420	0.62

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-5. Summary of 1983 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	16,990	1,650	5.2	10,290	0.84
Boston MA	27,070	2,280	5.5	11,880	0.93
Hartford CT	7,760	810	5.0	9,640	0.79
New York NY	103,430	8,560	5.3	12,090	1.02
Philadelphia PA	21,650	2,040	5.0	10,590	1.03
Pittsburgh PA	9,850	1,370	4.2	7,200	0.76
Washington DC	26,000	2,000	5.0	13,020	1.11
Midwestern Cities					
Chicago IL	41,600	3,310	5.5	12,570	1.02
Cincinnati OH	13,660	1,270	5.2	10,740	0.83
Cleveland OH	16,450	1,550	4.6	10,650	0.82
Columbus OH	10,400	1,160	5.6	8,970	0.71
Detroit MI	31,640	2,380	5.7	13,280	1.03
Indianapolis IN	9,230	1,090	5.1	8,490	0.70
Kansas City MO	14,470	1,870	4.0	7,750	0.62
Louisville KY	7,140	720	4.4	9,860	0.82
Milwaukee WI	9,340	870	5.3	10,740	0.84
Minn-St. Paul MN	19,590	1,900	4.5	10,310	0.81
Oklahoma City OK	9,560	1,090	4.9	8,800	0.72
St. Louis MO	20,990	2,000	5.3	10,510	0.87
Southern Cities					
Atlanta GA	27,380	2,270	6.0	12,060	0.95
Charlotte NC	3,060	410	4.0	7,450	0.76
Ft. Lauderdale FL	8,630	850	5.2	10,210	0.86
Jacksonville FL	6,490	580	4.0	11,190	0.92
Memphis TN	4,830	520	5.1	9,230	0.80
Miami FL	10,090	830	5.2	12,170	1.09
Nashville TN	5,310	560	4.4	9,430	0.79
New Orleans LA	6,440	530	5.6	12,120	1.00
Norfolk VA	6,430	680	4.3	9,510	0.79
Orlando FL	7,260	760	4.3	9,490	0.75
Tampa FL	3,450	310	4.7	11,290	1.01
Southwestern Cities					
Albuquerque NM	2,600	310	4.7	8,500	0.83
Austin TX	5,100	450	5.4	11,320	0.88
Corpus Christi TX	2,210	270	5.2	8,300	0.69
Dallas TX	29,620	2,540	5.3	11,650	0.89
Denver CO	13,590	1,280	5.1	10,620	0.89
El Paso TX	4,330	540	4.9	8,030	0.64
Fort Worth TX	14,860	1,510	5.2	9,870	0.79
Houston TX	36,310	2,270	6.0	16,000	1.21
Phoenix AZ	4,690	370	4.9	12,650	1.13
Salt Lake City UT	4,790	680	5.5	7,080	0.63
San Antonio TX	12,820	1,250	4.9	10,280	0.79
Western Cities					
Honolulu HI	6,030	520	5.0	11,520	0.94
Los Angeles CA	127,740	7,450	8.1	17,140	1.27
Portland OR	8,650	770	4.9	11,200	0.90
Sacramento CA	9,340	1,010	6.8	9,210	0.84
San Bernardino-Riv CA	19,080	1,310	6.7	14,540	1.12
San Diego CA	26,520	2,500	7.3	10,630	0.83
San Fran-Oak CA	48,300	3,560	6.7	13,570	1.05
San Jose CA	20,050	1,760	6.2	11,370	0.88
Seattle-Everett WA	21,080	1,670	5.7	12,650	0.99
Northeastern Avg	30,390	2,670	5.0	10,670	0.93
Midwestern Avg	17,010	1,600	5.0	10,220	0.82
Southern Avg	8,120	750	4.8	10,380	0.88
Southwestern Avg	11,900	1,040	5.2	10,390	0.85
Western Avg	31,870	2,280	6.4	12,430	0.98
Texas Avg	15,040	1,260	5.3	10,780	0.84
Total Avg	18,480	1,560	5.3	10,750	0.88
Maximum Value	127,740	8,560	8.1	17,140	1.27
Minimum Value	2,210	270	4.0	7,080	0.62

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-6. Summary of 1983 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	12,530	2,440	3.8	5,140	0.84
Boston MA	20,910	4,190	2.3	5,000	0.93
Hartford CT	4,530	890	3.4	5,070	0.79
New York NY	74,140	10,950	3.4	6,770	1.02
Philadelphia PA	31,430	4,440	2.8	7,070	1.03
Pittsburgh PA	14,390	2,550	3.0	5,640	0.76
Washington DC	21,410	2,930	3.5	7,310	1.11
Midwestern Cities					
Chicago IL	34,780	5,780	3.4	6,020	1.02
Cincinnati OH	5,100	1,250	3.3	4,080	0.83
Cleveland OH	7,290	1,770	2.9	4,110	0.82
Columbus OH	3,980	920	3.2	4,330	0.71
Detroit MI	30,450	5,750	4.3	5,300	1.03
Indianapolis IN	5,990	1,340	3.6	4,480	0.70
Kansas City MO	6,210	1,630	3.4	3,800	0.62
Louisville KY	4,380	800	3.7	5,490	0.82
Milwaukee WI	6,890	1,510	3.0	4,550	0.84
Minn-St. Paul MN	7,160	1,480	3.2	4,840	0.81
Oklahoma City OK	4,670	970	3.0	4,790	0.72
St. Louis MO	14,950	2,700	3.0	5,530	0.87
Southern Cities					
Atlanta GA	11,330	2,080	3.4	5,460	0.95
Charlotte NC	4,120	740	3.0	5,570	0.76
Ft. Lauderdale FL	8,690	1,670	4.2	5,190	0.86
Jacksonville FL	8,890	1,740	3.5	5,110	0.92
Memphis TN	5,470	1,090	4.1	5,000	0.80
Miami FL	19,800	3,060	4.2	6,470	1.09
Nashville TN	6,110	1,300	3.0	4,690	0.79
New Orleans LA	5,510	910	4.0	6,060	1.00
Norfolk VA	5,320	1,080	3.3	4,930	0.79
Orlando FL	5,960	1,500	3.7	3,980	0.75
Tampa FL	5,420	880	3.8	6,170	1.01
Southwestern Cities					
Albuquerque NM	4,960	930	3.5	5,360	0.83
Austin TX	2,750	580	4.0	4,750	0.88
Corpus Christi TX	2,090	510	3.6	4,130	0.69
Dallas TX	11,330	2,570	4.6	4,410	0.89
Denver CO	15,130	2,870	3.6	5,270	0.89
El Paso TX	4,360	1,260	3.9	3,470	0.64
Fort Worth TX	6,190	1,290	3.9	4,810	0.79
Houston TX	16,660	2,970	3.8	5,610	1.21
Phoenix AZ	24,090	4,010	3.4	6,010	1.13
Salt Lake City UT	2,460	470	3.2	5,260	0.63
San Antonio TX	5,930	1,550	3.2	3,820	0.79
Western Cities					
Honolulu HI	2,090	320	3.5	6,500	0.94
Los Angeles CA	96,930	17,870	3.9	5,420	1.27
Portland OR	4,480	830	3.1	5,410	0.90
Sacramento CA	8,370	1,370	3.9	6,120	0.84
San Bernardino-Riv CA	13,300	2,350	4.0	5,660	1.12
San Diego CA	10,450	2,330	3.3	4,480	0.83
San Fran-Oak CA	16,460	2,980	3.7	5,530	1.05
San Jose CA	8,710	1,940	3.9	4,490	0.88
Seattle-Everett WA	11,790	2,200	3.2	5,360	0.99
Northeastern Avg	25,620	4,060	3.2	6,000	0.93
Midwestern Avg	10,990	2,160	3.3	4,780	0.82
Southern Avg	7,880	1,460	3.7	5,330	0.88
Southwestern Avg	8,720	1,730	3.7	4,810	0.85
Western Avg	19,180	3,580	3.6	5,440	0.98
Texas Avg	7,040	1,530	3.9	4,430	0.84
Total Avg	13,330	2,430	3.5	5,200	0.88
Maximum Value	96,930	17,870	4.6	7,310	1.27
Minimum Value	2,090	320	2.3	3,470	0.62

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-7. Summary of 1984 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	17,520	1,710	5.4	10,220	0.85
Boston MA	27,840	2,290	5.5	12,140	0.95
Hartford CT	8,590	830	5.1	10,360	0.86
New York NY	105,160	9,060	5.5	11,600	0.99
Philadelphia PA	21,950	2,040	5.0	10,740	1.04
Pittsburgh PA	10,400	1,390	4.2	7,470	0.76
Washington DC	29,080	2,210	5.2	13,170	1.11
Midwestern Cities					
Chicago IL	43,090	3,340	5.5	12,900	1.05
Cincinnati OH	13,930	1,300	5.3	10,690	0.82
Cleveland OH	16,760	1,550	4.6	10,840	0.83
Columbus OH	10,550	1,180	5.6	8,970	0.71
Detroit MI	33,420	2,400	5.7	13,930	1.07
Indianapolis IN	9,800	1,090	5.1	8,960	0.75
Kansas City MO	15,100	2,010	4.1	7,500	0.60
Louisville KY	7,410	760	4.4	9,790	0.82
Milwaukee WI	9,470	880	5.3	10,790	0.87
Minn-St. Paul MN	20,930	1,980	4.5	10,570	0.84
Oklahoma City OK	9,760	1,090	5.0	8,910	0.75
St. Louis MO	23,200	2,210	5.4	10,520	0.88
Southern Cities					
Atlanta GA	29,150	2,370	6.0	12,270	0.97
Charlotte NC	3,220	430	4.0	7,550	0.76
Ft. Lauderdale FL	8,760	850	5.3	10,260	0.86
Jacksonville FL	7,170	590	4.0	12,210	0.96
Memphis TN	4,850	550	5.1	8,870	0.79
Miami FL	10,420	850	5.3	12,320	1.10
Nashville TN	5,870	600	4.4	9,720	0.83
New Orleans LA	6,680	530	5.6	12,580	1.05
Norfolk VA	6,720	690	4.3	9,710	0.81
Orlando FL	7,490	790	4.4	9,490	0.73
Tampa FL	4,090	350	4.7	11,550	1.03
Southwestern Cities					
Albuquerque NM	2,750	310	4.7	9,000	0.89
Austin TX	5,800	530	5.4	10,910	0.86
Corpus Christi TX	2,190	270	5.2	8,240	0.69
Dallas TX	32,080	2,610	5.7	12,300	0.94
Denver CO	14,070	1,290	5.1	10,930	0.93
El Paso TX	4,510	560	5.0	8,120	0.65
Fort Worth TX	15,590	1,550	5.2	10,040	0.80
Houston TX	39,250	2,380	6.0	16,470	1.25
Phoenix AZ	5,070	450	5.0	11,250	1.10
Salt Lake City UT	4,860	680	5.5	7,190	0.65
San Antonio TX	13,600	1,260	4.9	10,760	0.82
Western Cities					
Honolulu HI	6,220	530	5.0	11,710	0.95
Los Angeles CA	134,250	7,530	8.2	17,820	1.32
Portland OR	8,970	820	4.9	10,920	0.88
Sacramento CA	10,430	1,030	6.9	10,130	0.88
San Bernardino-Riv CA	19,510	1,320	6.8	14,780	1.13
San Diego CA	29,750	2,540	7.3	11,730	0.91
San Fran-Oak CA	51,870	3,560	6.8	14,580	1.12
San Jose CA	21,320	1,800	6.3	11,820	0.91
Seattle-Everett WA	22,400	1,710	5.8	13,070	1.02
Northeastern Avg	31,510	2,790	5.1	10,810	0.94
Midwestern Avg	17,780	1,650	5.0	10,360	0.83
Southern Avg	8,580	780	4.8	10,590	0.90
Southwestern Avg	12,710	1,080	5.2	10,470	0.87
Western Avg	33,860	2,320	6.4	12,950	1.01
Texas Avg	16,150	1,310	5.3	10,980	0.86
Total Avg	19,460	1,610	5.3	10,970	0.90
Maximum Value	134,250	9,060	8.2	17,820	1.32
Minimum Value	2,190	270	4.0	7,190	0.60

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-8. Summary of 1984 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	13,330	2,480	3.8	5,380	0.85
Boston MA	21,170	4,200	2.3	5,040	0.95
Hartford CT	5,020	900	3.5	5,570	0.86
New York NY	74,690	10,950	3.4	6,820	0.99
Philadelphia PA	31,890	4,510	2.8	7,070	1.04
Pittsburgh PA	14,620	2,670	3.0	5,470	0.76
Washington DC	22,350	3,120	3.8	7,150	1.11
Midwestern Cities					
Chicago IL	36,320	5,950	3.5	6,110	1.05
Cincinnati OH	5,190	1,250	3.3	4,160	0.82
Cleveland OH	7,320	1,770	2.9	4,130	0.83
Columbus OH	4,030	940	3.2	4,280	0.71
Detroit MI	30,790	5,800	4.3	5,310	1.07
Indianapolis IN	6,540	1,340	3.7	4,860	0.75
Kansas City MO	6,300	1,640	3.5	3,830	0.60
Louisville KY	4,420	800	3.7	5,550	0.82
Milwaukee WI	7,490	1,510	3.0	4,950	0.87
Minn-St. Paul MN	7,490	1,500	3.2	5,000	0.84
Oklahoma City OK	5,360	1,010	3.0	5,290	0.75
St. Louis MO	15,690	2,750	3.1	5,700	0.88
Southern Cities					
Atlanta GA	12,010	2,150	3.4	5,590	0.97
Charlotte NC	4,200	760	3.0	5,550	0.76
Ft. Lauderdale FL	8,710	1,690	4.3	5,150	0.86
Jacksonville FL	8,920	1,770	3.5	5,040	0.96
Memphis TN	5,660	1,110	4.1	5,090	0.79
Miami FL	20,130	3,100	4.3	6,490	1.10
Nashville TN	6,910	1,370	3.1	5,050	0.83
New Orleans LA	5,810	910	4.1	6,390	1.05
Norfolk VA	5,470	1,090	3.3	5,040	0.81
Orlando FL	5,700	1,560	3.7	3,650	0.73
Tampa FL	5,880	920	3.7	6,410	1.03
Southwestern Cities					
Albuquerque NM	5,430	940	3.5	5,760	0.89
Austin TX	2,940	610	4.0	4,800	0.86
Corpus Christi TX	2,170	520	3.6	4,220	0.69
Dallas TX	12,300	2,660	4.6	4,630	0.94
Denver CO	16,270	2,870	3.7	5,660	0.93
El Paso TX	4,540	1,290	3.9	3,530	0.65
Fort Worth TX	6,460	1,330	3.9	4,870	0.80
Houston TX	17,480	3,090	3.8	5,660	1.25
Phoenix AZ	24,640	4,030	3.4	6,120	1.10
Salt Lake City UT	2,700	480	3.3	5,580	0.65
San Antonio TX	6,310	1,580	3.2	4,000	0.82
Western Cities					
Honolulu HI	2,130	320	3.5	6,600	0.95
Los Angeles CA	102,120	18,110	4.0	5,640	1.32
Portland OR	4,500	830	3.2	5,430	0.88
Sacramento CA	8,730	1,450	4.0	6,020	0.88
San Bernardino-Riv CA	13,930	2,530	4.0	5,510	1.13
San Diego CA	11,410	2,380	3.4	4,790	0.91
San Fran-Oak CA	17,370	3,060	3.8	5,680	1.12
San Jose CA	9,270	1,990	3.9	4,660	0.91
Seattle-Everett WA	12,540	2,270	3.3	5,520	1.02
Northeastern Avg	26,150	4,120	3.2	6,070	0.94
Midwestern Avg	11,410	2,190	3.4	4,930	0.83
Southern Avg	8,130	1,490	3.7	5,410	0.90
Southwestern Avg	9,200	1,760	3.7	4,980	0.87
Western Avg	20,220	3,660	3.7	5,540	1.01
Texas Avg	7,460	1,580	3.9	4,530	0.86
Total Avg	13,850	2,480	3.6	5,320	0.90
Maximum Value	102,120	18,110	4.6	7,150	1.32
Minimum Value	2,130	320	2.3	3,530	0.60

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-9. Summary of 1985 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	19,590	1,930	5.4	10,140	0.84
Boston MA	29,300	2,330	5.6	12,550	0.98
Hartford CT	8,610	840	5.2	10,280	0.85
New York NY	106,350	9,080	5.5	11,710	1.00
Philadelphia PA	22,230	2,070	5.0	10,740	1.04
Pittsburgh PA	10,710	1,420	4.2	7,560	0.78
Washington DC	32,010	2,240	5.2	14,310	1.19
Midwestern Cities					
Chicago IL	46,160	3,430	5.5	13,460	1.08
Cincinnati OH	14,240	1,320	5.3	10,790	0.83
Cleveland OH	16,190	1,550	4.6	10,470	0.81
Columbus OH	10,730	1,210	5.7	8,890	0.71
Detroit MI	34,540	2,500	5.7	13,840	1.06
Indianapolis IN	10,110	1,110	5.1	9,100	0.76
Kansas City MO	16,410	2,030	4.1	8,090	0.65
Louisville KY	7,570	770	4.4	9,790	0.82
Milwaukee WI	9,760	890	5.3	11,030	0.88
Minn-St. Paul MN	22,030	2,040	4.6	10,780	0.85
Oklahoma City OK	9,940	1,100	5.0	9,010	0.75
St. Louis MO	23,850	2,280	5.4	10,470	0.89
Southern Cities					
Atlanta GA	31,280	2,440	6.0	12,830	1.02
Charlotte NC	3,440	430	4.1	7,910	0.77
Ft. Lauderdale FL	8,970	870	5.3	10,310	0.85
Jacksonville FL	7,330	600	4.0	12,300	0.96
Memphis TN	4,910	590	5.2	8,360	0.75
Miami FL	11,450	870	5.3	13,170	1.13
Nashville TN	6,300	680	4.5	9,210	0.81
New Orleans LA	6,890	530	5.6	12,970	1.07
Norfolk VA	7,200	710	4.3	10,160	0.84
Orlando FL	8,420	850	4.4	9,960	0.76
Tampa FL	4,580	420	4.9	10,940	1.00
Southwestern Cities					
Albuquerque NM	2,930	310	4.7	9,330	0.93
Austin TX	6,760	580	5.3	11,670	0.91
Corpus Christi TX	2,250	270	5.2	8,480	0.71
Dallas TX	33,970	2,640	5.7	12,870	0.98
Denver CO	14,570	1,290	5.1	11,310	0.96
El Paso TX	5,020	560	5.0	9,040	0.70
Fort Worth TX	16,210	1,570	5.6	10,330	0.82
Houston TX	38,830	2,380	6.0	16,290	1.23
Phoenix AZ	5,680	470	5.1	12,170	1.13
Salt Lake City UT	5,180	680	5.6	7,670	0.68
San Antonio TX	14,620	1,290	5.0	11,350	0.87
Western Cities					
Honolulu HI	6,420	530	5.0	12,090	0.96
Los Angeles CA	141,100	7,650	8.2	18,450	1.36
Portland OR	9,540	830	4.9	11,500	0.93
Sacramento CA	11,110	1,030	6.9	10,780	0.92
San Bernardino-Riv CA	19,720	1,340	6.8	14,670	1.12
San Diego CA	31,640	2,570	7.4	12,320	0.95
San Fran-Oak CA	55,810	3,650	6.8	15,270	1.17
San Jose CA	22,430	1,820	6.4	12,330	0.95
Seattle-Everett WA	23,910	1,770	5.8	13,500	1.05
Northeastern Avg	32,690	2,840	5.2	11,040	0.95
Midwestern Avg	18,460	1,690	5.1	10,480	0.84
Southern Avg	9,160	820	4.9	10,740	0.91
Southwestern Avg	13,280	1,090	5.3	10,960	0.90
Western Avg	35,740	2,360	6.5	13,440	1.05
Texas Avg	16,810	1,330	5.4	11,430	0.89
Total Avg	20,380	1,650	5.3	11,250	0.92
Maximum Value	141,100	9,080	8.2	18,450	1.36
Minimum Value	2,250	270	4.0	7,560	0.65

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-10. Summary of 1985 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	13,880	2,600	3.8	5,340	0.84
Boston MA	21,710	4,220	2.3	5,150	0.98
Hartford CT	5,100	920	3.5	5,560	0.85
New York NY	75,190	10,950	3.4	6,870	1.00
Philadelphia PA	32,850	4,670	2.8	7,040	1.04
Pittsburgh PA	15,210	2,660	3.0	5,720	0.78
Washington DC	23,880	3,200	3.9	7,450	1.19
Midwestern Cities					
Chicago IL	36,820	5,990	3.6	6,150	1.08
Cincinnati OH	5,300	1,260	3.3	4,220	0.83
Cleveland OH	7,460	1,770	2.9	4,210	0.81
Columbus OH	4,070	950	3.2	4,290	0.71
Detroit MI	30,970	5,860	4.4	5,280	1.06
Indianapolis IN	6,600	1,340	3.7	4,910	0.76
Kansas City MO	6,840	1,660	3.5	4,130	0.65
Louisville KY	4,440	810	3.7	5,510	0.82
Milwaukee WI	7,760	1,550	3.1	5,020	0.88
Minn-St. Paul MN	7,870	1,510	3.4	5,200	0.85
Oklahoma City OK	5,390	1,040	3.0	5,190	0.75
St. Louis MO	16,520	2,790	3.1	5,930	0.89
Southern Cities					
Atlanta GA	13,470	2,170	3.4	6,200	1.02
Charlotte NC	4,340	790	3.0	5,500	0.77
Ft. Lauderdale FL	8,690	1,710	4.3	5,090	0.85
Jacksonville FL	8,960	1,800	3.6	4,990	0.96
Memphis TN	5,670	1,160	4.2	4,890	0.75
Miami FL	20,450	3,160	4.3	6,480	1.13
Nashville TN	7,380	1,420	3.1	5,210	0.81
New Orleans LA	5,970	920	4.1	6,510	1.07
Norfolk VA	5,650	1,090	3.4	5,200	0.84
Orlando FL	5,850	1,610	3.7	3,640	0.76
Tampa FL	6,180	960	3.8	6,450	1.00
Southwestern Cities					
Albuquerque NM	5,800	970	3.5	6,000	0.93
Austin TX	3,220	640	4.0	5,000	0.91
Corpus Christi TX	2,210	520	3.8	4,280	0.71
Dallas TX	12,800	2,700	4.6	4,750	0.98
Denver CO	16,860	2,870	3.7	5,870	0.96
El Paso TX	4,640	1,290	4.0	3,600	0.70
Fort Worth TX	6,670	1,350	3.9	4,930	0.82
Houston TX	17,470	3,110	3.9	5,620	1.23
Phoenix AZ	25,290	4,060	3.4	6,230	1.13
Salt Lake City UT	2,890	530	3.4	5,440	0.68
San Antonio TX	6,900	1,640	3.3	4,200	0.87
Western Cities					
Honolulu HI	2,000	330	3.6	6,070	0.96
Los Angeles CA	107,600	18,350	4.0	5,860	1.36
Portland OR	4,770	840	3.3	5,700	0.93
Sacramento CA	9,100	1,510	4.0	6,010	0.92
San Bernardino-Riv CA	14,100	2,540	4.0	5,540	1.12
San Diego CA	12,080	2,420	3.4	5,000	0.95
San Fran-Oak CA	18,320	3,120	3.8	5,870	1.17
San Jose CA	9,750	2,000	4.0	4,860	0.95
Seattle-Everett WA	12,980	2,320	3.3	5,600	1.05
Northeastern Avg	26,830	4,170	3.2	6,160	0.95
Midwestern Avg	11,670	2,210	3.4	5,000	0.84
Southern Avg	8,420	1,520	3.7	5,470	0.91
Southwestern Avg	9,520	1,790	3.8	5,080	0.90
Western Avg	21,190	3,720	3.7	5,610	1.05
Texas Avg	7,700	1,610	3.9	4,630	0.89
Total Avg	14,320	2,510	3.6	5,400	0.92
Maximum Value	107,600	18,350	4.6	7,450	1.36
Minimum Value	2,000	330	2.3	3,600	0.65

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-11. Summary of 1986 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	20,950	1,960	5.4	10,710	0.88
Boston MA	32,300	2,370	5.7	13,650	1.04
Hartford CT	8,920	860	5.3	10,360	0.85
New York NY	115,270	9,100	5.5	12,670	1.06
Philadelphia PA	22,740	2,090	5.0	10,870	1.06
Pittsburgh PA	11,110	1,470	4.2	7,580	0.79
Washington DC	36,070	2,320	5.2	15,520	1.27
Midwestern Cities					
Chicago IL	49,820	3,510	5.6	14,190	1.15
Cincinnati OH	14,350	1,320	5.3	10,870	0.84
Cleveland OH	17,240	1,550	4.6	11,150	0.86
Columbus OH	11,770	1,230	5.7	9,560	0.75
Detroit MI	34,890	2,540	5.8	13,720	1.05
Indianapolis IN	11,130	1,110	5.1	10,010	0.81
Kansas City MO	17,560	2,040	4.2	8,620	0.68
Louisville KY	7,700	810	4.4	9,570	0.80
Milwaukee WI	10,170	890	5.3	11,480	0.90
Minn-St. Paul MN	23,440	2,080	4.7	11,290	0.89
Oklahoma City OK	10,110	1,110	5.0	9,100	0.76
St. Louis MO	25,150	2,290	5.5	11,000	0.93
Southern Cities					
Atlanta GA	34,660	2,540	6.0	13,630	1.09
Charlotte NC	3,590	440	4.1	8,110	0.78
Ft. Lauderdale FL	9,180	890	5.3	10,270	0.85
Jacksonville FL	7,520	630	4.1	11,970	0.95
Memphis TN	5,330	590	5.2	9,070	0.80
Miami FL	11,710	870	5.3	13,470	1.14
Nashville TN	6,840	680	4.6	10,000	0.86
New Orleans LA	6,960	530	5.7	13,110	1.09
Norfolk VA	7,980	720	4.5	11,130	0.90
Orlando FL	8,560	850	4.6	10,030	0.76
Tampa FL	4,730	430	4.9	10,890	0.96
Southwestern Cities					
Albuquerque NM	3,110	310	4.7	9,900	0.96
Austin TX	7,250	610	5.5	11,840	0.94
Corpus Christi TX	2,290	270	5.2	8,350	0.71
Dallas TX	36,350	2,660	5.8	13,680	1.04
Denver CO	14,960	1,310	5.2	11,400	0.97
El Paso TX	5,510	560	5.1	9,910	0.75
Fort Worth TX	17,310	1,570	5.6	11,030	0.87
Houston TX	38,830	2,430	6.1	15,970	1.21
Phoenix AZ	7,440	500	5.2	14,900	1.20
Salt Lake City UT	5,550	720	5.6	7,750	0.68
San Antonio TX	14,890	1,300	5.1	11,420	0.88
Western Cities					
Honolulu HI	6,770	530	5.2	12,740	1.03
Los Angeles CA	148,300	7,730	8.2	19,190	1.42
Portland OR	10,180	850	5.0	12,050	0.97
Sacramento CA	11,910	1,050	6.9	11,380	0.95
San Bernardino-Riv CA	20,400	1,350	6.9	15,080	1.15
San Diego CA	33,840	2,620	7.4	12,940	1.00
San Fran-Oak CA	59,450	3,680	6.8	16,160	1.24
San Jose CA	22,960	1,830	6.5	12,560	0.97
Seattle-Everett WA	24,960	1,790	5.8	13,960	1.09
Northeastern Avg	35,340	2,880	5.2	11,620	0.99
Midwestern Avg	19,440	1,710	5.1	10,880	0.87
Southern Avg	9,730	840	4.9	11,060	0.93
Southwestern Avg	13,950	1,110	5.4	11,470	0.93
Western Avg	37,640	2,380	6.5	14,010	1.09
Texas Avg	17,490	1,340	5.5	11,740	0.91
Total Avg	21,600	1,670	5.4	11,720	0.95
Maximum Value	148,300	9,100	8.2	19,190	1.42
Minimum Value	2,290	270	4.1	7,580	0.68

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-12. Summary of 1986 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	14,380	2,640	3.8	5,450	0.88
Boston MA	21,590	4,240	2.3	5,090	1.04
Hartford CT	5,180	940	3.5	5,500	0.85
New York NY	76,400	10,980	3.4	6,960	1.06
Philadelphia PA	34,490	4,750	2.8	7,260	1.06
Pittsburgh PA	15,790	2,700	3.0	5,840	0.79
Washington DC	25,600	3,300	4.1	7,760	1.27
Midwestern Cities					
Chicago IL	40,220	6,010	3.6	6,700	1.15
Cincinnati OH	5,220	1,260	3.3	4,150	0.84
Cleveland OH	7,620	1,770	2.9	4,300	0.86
Columbus OH	4,190	950	3.2	4,410	0.75
Detroit MI	31,310	5,960	4.4	5,260	1.05
Indianapolis IN	6,600	1,350	3.7	4,880	0.81
Kansas City MO	6,900	1,670	3.5	4,140	0.68
Louisville KY	4,400	810	3.7	5,470	0.80
Milwaukee WI	7,570	1,560	3.3	4,850	0.90
Minn-St. Paul MN	8,210	1,530	3.4	5,370	0.89
Oklahoma City OK	5,440	1,040	3.1	5,240	0.76
St. Louis MO	17,330	2,790	3.2	6,220	0.93
Southern Cities					
Atlanta GA	14,580	2,200	3.4	6,630	1.09
Charlotte NC	4,440	810	3.0	5,520	0.78
Ft. Lauderdale FL	8,660	1,710	4.3	5,050	0.85
Jacksonville FL	9,050	1,810	3.6	5,000	0.95
Memphis TN	6,050	1,180	4.2	5,120	0.80
Miami FL	20,610	3,180	4.3	6,480	1.14
Nashville TN	7,740	1,450	3.1	5,340	0.86
New Orleans LA	6,180	930	4.1	6,620	1.09
Norfolk VA	5,840	1,120	3.5	5,220	0.90
Orlando FL	5,920	1,650	3.7	3,590	0.76
Tampa FL	5,880	970	3.8	6,080	0.96
Southwestern Cities					
Albuquerque NM	6,040	990	3.5	6,100	0.96
Austin TX	3,530	660	4.2	5,340	0.94
Corpus Christi TX	2,250	520	3.8	4,380	0.71
Dallas TX	13,250	2,700	4.7	4,900	1.04
Denver CO	17,190	2,890	3.7	5,950	0.97
El Paso TX	4,690	1,300	4.1	3,620	0.75
Fort Worth TX	6,840	1,370	3.9	5,000	0.87
Houston TX	17,400	3,150	4.1	5,530	1.21
Phoenix AZ	25,500	4,090	3.5	6,240	1.20
Salt Lake City UT	2,940	540	3.4	5,450	0.68
San Antonio TX	7,380	1,660	3.4	4,450	0.88
Western Cities					
Honolulu HI	2,320	340	3.6	6,860	1.03
Los Angeles CA	113,360	18,690	4.0	6,060	1.42
Portland OR	5,060	850	3.3	5,980	0.97
Sacramento CA	9,470	1,560	4.0	6,070	0.95
San Bernardino-Riv CA	14,280	2,540	4.0	5,610	1.15
San Diego CA	12,640	2,460	3.4	5,130	1.00
San Fran-Oak CA	19,320	3,180	3.8	6,080	1.24
San Jose CA	9,970	2,010	4.1	4,950	0.97
Seattle-Everett WA	13,400	2,330	3.3	5,740	1.09
Northeastern Avg	27,630	4,220	3.3	6,260	0.99
Midwestern Avg	12,080	2,220	3.4	5,080	0.87
Southern Avg	8,630	1,550	3.7	5,510	0.93
Southwestern Avg	9,730	1,810	3.8	5,180	0.93
Western Avg	22,200	3,770	3.7	5,830	1.09
Texas Avg	7,910	1,620	4.0	4,750	0.91
Total Avg	14,800	2,540	3.6	5,500	0.95
Maximum Value	113,360	18,690	4.7	7,760	1.42
Minimum Value	2,250	340	2.3	3,590	0.68

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-13. Summary of 1987 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	22,110	1,960	5.4	11,300	0.91
Boston MA	32,530	2,400	5.8	13,560	1.04
Hartford CT	9,440	890	5.4	10,660	0.87
New York NY	118,520	9,320	5.5	12,710	1.06
Philadelphia PA	24,350	2,150	5.1	11,330	1.06
Pittsburgh PA	11,580	1,510	4.2	7,690	0.79
Washington DC	36,890	2,370	5.2	15,590	1.29
Midwestern Cities					
Chicago IL	49,820	3,520	5.6	14,160	1.15
Cincinnati OH	15,390	1,360	5.3	11,310	0.87
Cleveland OH	18,010	1,550	4.6	11,650	0.89
Columbus OH	12,380	1,250	5.7	9,920	0.78
Detroit MI	35,100	2,590	5.8	13,540	1.04
Indianapolis IN	12,300	1,140	5.1	10,760	0.85
Kansas City MO	19,190	2,140	4.3	8,960	0.71
Louisville KY	8,660	840	4.4	10,350	0.86
Milwaukee WI	10,980	890	5.3	12,400	0.95
Minn-St. Paul MN	25,150	2,240	4.8	11,240	0.89
Oklahoma City OK	10,190	1,130	5.0	9,040	0.76
St. Louis MO	26,230	2,300	5.5	11,390	0.96
Southern Cities					
Atlanta GA	36,970	2,640	6.1	14,000	1.11
Charlotte NC	3,710	450	4.1	8,230	0.79
Ft. Lauderdale FL	9,980	900	5.4	11,070	0.90
Jacksonville FL	7,680	640	4.5	11,930	0.94
Memphis TN	6,010	610	5.3	9,820	0.84
Miami FL	11,950	890	5.4	13,370	1.14
Nashville TN	7,250	690	4.6	10,470	0.89
New Orleans LA	7,490	530	5.7	14,090	1.14
Norfolk VA	8,320	720	4.5	11,480	0.93
Orlando FL	8,920	880	4.7	10,170	0.77
Tampa FL	5,310	450	4.9	11,790	1.02
Southwestern Cities					
Albuquerque NM	3,260	320	5.0	10,130	0.96
Austin TX	8,290	640	5.5	12,880	1.00
Corpus Christi TX	2,420	290	5.3	8,330	0.72
Dallas TX	35,580	2,670	5.8	13,310	1.02
Denver CO	15,380	1,380	5.2	11,170	0.95
El Paso TX	5,150	560	5.2	9,140	0.71
Fort Worth TX	17,710	1,590	5.7	11,110	0.87
Houston TX	41,540	2,640	6.2	15,730	1.19
Phoenix AZ	7,370	550	5.3	13,470	1.18
Salt Lake City UT	6,130	760	5.6	8,110	0.70
San Antonio TX	14,490	1,310	5.1	11,040	0.86
Western Cities					
Honolulu HI	6,980	530	5.2	13,140	1.05
Los Angeles CA	155,990	7860	8.2	19,850	1.47
Portland OR	10,790	870	5.0	12,410	0.99
Sacramento CA	12,970	1,060	6.9	12,200	1.00
San Bernardino-Riv CA	20,690	1,380	6.9	15,030	1.14
San Diego CA	37,280	2,640	7.4	14,120	1.08
San Fran-Oak CA	63,720	3,710	6.8	17,170	1.31
San Jose CA	23,490	1,840	6.5	12,800	0.99
Seattle-Everett WA	26,730	1,840	5.8	14,560	1.14
Northeastern Avg	36,490	2,940	5.2	11,840	1.00
Midwestern Avg	20,280	1,740	5.1	11,230	0.89
Southern Avg	10,330	860	5.0	11,490	0.95
Southwestern Avg	14,300	1,160	5.4	11,310	0.92
Western Avg	39,850	2,410	6.5	14,590	1.13
Texas Avg	17,880	1,390	5.5	11,650	0.91
Total Avg	22,570	1,710	5.4	11,990	0.97
Maximum Value	155,990	9,320	8.2	19,850	1.47
Minimum Value	2,420	290	4.1	7,690	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-14. Summary of 1987 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	14,520	2,700	3.9	5,370	0.91
Boston MA	22,060	4,310	2.3	5,110	1.04
Hartford CT	5,160	940	3.5	5,480	0.87
New York NY	78,070	11,110	3.4	7,030	1.06
Philadelphia PA	36,310	5,180	2.9	7,000	1.06
Pittsburgh PA	15,950	2,740	3.1	5,830	0.79
Washington DC	27,430	3,380	4.1	8,110	1.29
Midwestern Cities					
Chicago IL	40,190	6,020	3.6	6,680	1.15
Cincinnati OH	5,340	1,270	3.3	4,200	0.87
Cleveland OH	7,790	1,770	2.9	4,400	0.89
Columbus OH	4,290	960	3.2	4,480	0.78
Detroit MI	31,470	6,040	4.4	5,210	1.04
Indianapolis IN	6,600	1,360	3.7	4,850	0.85
Kansas City MO	7,000	1,670	3.5	4,180	0.71
Louisville KY	4,790	810	3.7	5,890	0.86
Milwaukee WI	7,470	1,580	3.3	4,730	0.95
Minn-St. Paul MN	8,370	1,550	3.4	5,420	0.89
Oklahoma City OK	5,580	1,050	3.1	5,290	0.76
St. Louis MO	18,060	2,810	3.2	6,430	0.96
Southern Cities					
Atlanta GA	15,050	2,250	3.4	6,700	1.11
Charlotte NC	4,570	820	3.0	5,570	0.79
Ft. Lauderdale FL	8,860	1,720	4.3	5,140	0.90
Jacksonville FL	9,060	1,840	3.6	4,940	0.94
Memphis TN	6,330	1,220	4.3	5,210	0.84
Miami FL	20,930	3,220	4.3	6,500	1.14
Nashville TN	7,910	1,460	3.1	5,430	0.89
New Orleans LA	6,530	1,000	4.2	6,540	1.14
Norfolk VA	6,210	1,130	3.5	5,510	0.93
Orlando FL	5,950	1,660	3.7	3,590	0.77
Tampa FL	6,250	980	3.8	6,360	1.02
Southwestern Cities					
Albuquerque NM	6,280	1,050	3.5	6,000	0.96
Austin TX	3,460	670	4.2	5,180	1.00
Corpus Christi TX	2,400	520	3.8	4,660	0.72
Dallas TX	13,200	2,720	4.7	4,850	1.02
Denver CO	17,070	2,950	3.8	5,790	0.95
El Paso TX	4,830	1,300	4.2	3,730	0.71
Fort Worth TX	6,840	1,380	3.9	4,940	0.87
Houston TX	16,910	3,170	4.2	5,330	1.19
Phoenix AZ	26,520	4,130	3.6	6,420	1.18
Salt Lake City UT	3,000	560	3.5	5,410	0.70
San Antonio TX	7,730	1,690	3.4	4,570	0.86
Western Cities					
Honolulu HI	2,340	350	3.7	6,770	1.05
Los Angeles CA	118,830	18,970	4.0	6,270	1.47
Portland OR	5,150	850	3.3	6,040	0.99
Sacramento CA	9,880	1,610	4.0	6,140	1.00
San Bernardino-Riv CA	14,330	2,610	4.0	5,490	1.14
San Diego CA	13,170	2,510	3.4	5,240	1.08
San Fran-Oak CA	20,400	3,230	3.9	6,320	1.31
San Jose CA	10,210	2,030	4.1	5,030	0.99
Seattle-Everett WA	14,410	2,370	3.3	6,070	1.14
Northeastern Avg	28,500	4,340	3.3	6,280	1.00
Midwestern Avg	12,250	2,240	3.4	5,150	0.89
Southern Avg	8,880	1,570	3.7	5,590	0.95
Southwestern Avg	9,840	1,830	3.9	5,170	0.92
Western Avg	23,190	3,840	3.7	5,930	1.13
Texas Avg	7,910	1,640	4.1	4,750	0.91
Total Avg	15,220	2,580	3.6	5,550	0.97
Maximum Value	118,830	18,970	4.7	8,110	1.47
Minimum Value	2,340	350	2.3	3,590	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-15. Summary of 1988 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	22,410	1,960	5.4	11,410	0.92
Boston MA	36,570	2,430	5.9	15,040	1.12
Hartford CT	9,760	890	5.5	11,020	0.90
New York NY	125,590	9,350	5.5	13,430	1.10
Philadelphia PA	26,850	2,250	5.2	11,910	1.07
Pittsburgh PA	11,880	1,530	4.3	7,770	0.81
Washington DC	38,000	2,400	5.2	15,850	1.30
Midwestern Cities					
Chicago IL	51,460	3,550	5.6	14,500	1.18
Cincinnati OH	15,700	1,360	5.3	11,540	0.88
Cleveland OH	20,400	1,590	4.6	12,800	0.97
Columbus OH	12,630	1,260	5.7	9,990	0.79
Detroit MI	37,060	2,640	5.8	14,040	1.07
Indianapolis IN	12,470	1,160	5.3	10,760	0.85
Kansas City MO	19,670	2,170	4.4	9,090	0.72
Louisville KY	9,720	910	4.4	10,690	0.87
Milwaukee WI	11,490	940	5.6	12,200	0.94
Minn-St. Paul MN	26,440	2,310	4.9	11,440	0.90
Oklahoma City OK	10,660	1,140	5.0	9,390	0.78
St. Louis MO	27,990	2,390	5.5	11,710	0.98
Southern Cities					
Atlanta GA	38,540	2,660	6.1	14,510	1.14
Charlotte NC	3,890	450	4.1	8,630	0.80
Ft. Lauderdale FL	10,380	930	5.4	11,120	0.90
Jacksonville FL	8,290	680	4.5	12,260	0.95
Memphis TN	6,360	610	5.4	10,390	0.86
Miami FL	12,690	930	5.4	13,710	1.18
Nashville TN	7,710	710	4.6	10,890	0.94
New Orleans LA	7,660	550	5.7	14,000	1.13
Norfolk VA	8,420	730	4.5	11,490	0.94
Orlando FL	9,310	890	4.8	10,420	0.78
Tampa FL	5,540	470	4.9	11,860	1.03
Southwestern Cities					
Albuquerque NM	3,580	330	5.0	10,850	0.96
Austin TX	8,400	680	5.6	12,430	0.96
Corpus Christi TX	2,430	300	5.3	8,160	0.70
Dallas TX	36,030	2,700	5.9	13,360	1.02
Denver CO	16,890	1,380	5.2	12,200	0.99
El Paso TX	5,350	560	5.2	9,490	0.74
Fort Worth TX	17,950	1,610	5.7	11,150	0.87
Houston TX	43,630	2,880	6.2	15,140	1.15
Phoenix AZ	9,420	840	5.6	11,250	1.04
Salt Lake City UT	6,560	770	5.6	8,490	0.72
San Antonio TX	14,570	1,320	5.2	11,040	0.86
Western Cities					
Honolulu HI	7,100	530	5.2	13,360	1.07
Los Angeles CA	164,450	7,990	8.2	20,590	1.52
Portland OR	11,430	870	5.0	13,150	1.04
Sacramento CA	13,560	1,090	6.9	12,470	1.03
San Bernardino-Riv CA	21,820	1,400	7.0	15,570	1.18
San Diego CA	40,310	2,730	7.4	14,770	1.13
San Fran-Oak CA	64,990	3,740	6.8	17,360	1.33
San Jose CA	24,080	1,850	6.6	13,000	1.00
Seattle-Everett WA	27,680	1,840	5.8	15,080	1.17
Northeastern Avg	38,720	2,970	5.3	12,350	1.03
Midwestern Avg	21,310	1,790	5.2	11,510	0.91
Southern Avg	10,800	870	5.0	11,750	0.97
Southwestern Avg	14,980	1,220	5.5	11,230	0.91
Western Avg	41,710	2,450	6.5	15,040	1.16
Texas Avg	18,340	1,440	5.6	11,540	0.90
Total Avg	23,720	1,740	5.5	12,260	0.99
Maximum Value	164,450	9,350	8.2	20,590	1.52
Minimum Value	2,430	300	4.1	7,770	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-16. Summary of 1988 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	14,750	2,740	4.0	5,390	0.92
Boston MA	20,700	4,330	2.3	4,780	1.12
Hartford CT	5,510	940	3.5	5,850	0.90
New York NY	80,030	11,450	3.4	6,990	1.10
Philadelphia PA	35,610	5,200	3.0	6,850	1.07
Pittsburgh PA	17,110	2,840	3.1	6,020	0.81
Washington DC	27,660	3,460	4.1	7,990	1.30
Midwestern Cities					
Chicago IL	41,960	6,050	3.6	6,940	1.18
Cincinnati OH	5,530	1,280	3.3	4,320	0.88
Cleveland OH	8,070	1,790	2.9	4,510	0.97
Columbus OH	4,450	970	3.2	4,610	0.79
Detroit MI	31,670	6,150	4.4	5,150	1.07
Indianapolis IN	6,620	1,370	3.7	4,840	0.85
Kansas City MO	7,070	1,680	3.5	4,200	0.72
Louisville KY	4,600	820	3.7	5,610	0.87
Milwaukee WI	7,610	1,590	3.4	4,770	0.94
Minn-St. Paul MN	8,530	1,560	3.4	5,460	0.90
Oklahoma City OK	5,550	1,050	3.1	5,260	0.78
St. Louis MO	18,470	2,810	3.2	6,570	0.98
Southern Cities					
Atlanta GA	15,750	2,400	3.5	6,570	1.14
Charlotte NC	4,580	840	3.0	5,470	0.80
Ft. Lauderdale FL	8,920	1,750	4.3	5,080	0.90
Jacksonville FL	9,120	1,870	3.7	4,880	0 95
Memphis TN	6,520	1,300	4.3	5,030	0.86
Miami FL	22,120	3,250	4.3	6,800	1.18
Nashville TN	8,670	1,470	3.2	5,890	0.94
New Orleans LA	6,540	1,000	4.2	6,550	1.13
Norfolk VA	6,380	1,140	3.5	5,580	0.94
Orlando FL	5,960	1,690	3.7	3,520	0.78
Tampa FL	6,540	1,010	3.8	6,500	1.03
Southwestern Cities					
Albuquerque NM	6,440	1,130	3.5	5,710	0.96
Austin TX	3,320	680	4.2	4,920	0.96
Corpus Christi TX	2,320	520	3.8	4,430	0.70
Dallas TX	13,120	2,730	4.8	4,810	1.02
Denver CO	16,820	2,950	3.8	5,690	0.99
El Paso TX	5,010	1,300	4.2	3,860	0.74
Fort Worth TX	6,760	1,390	4.0	4,860	0.87
Houston TX	16,410	3,190	4.2	5,150	1.15
Phoenix AZ	26,850	4,480	4.0	6,000	1.04
Salt Lake City UT	3,080	560	3.5	5,460	0.72
San Antonio TX	8,030	1,720	3.5	4,660	0.86
Western Cities					
Honolulu HI	2,460	350	3.7	7,090	1.07
Los Angeles CA	125,970	19,320	4.0	6,520	1.52
Portland OR	5,280	870	3.3	6,070	1.04
Sacramento CA	10,710	1,690	4.0	6,340	1.03
San Bernardino-Riv CA	14,730	2,700	4.0	5,450	1.18
San Diego CA	14,240	2,610	3.4	5,460	1.13
San Fran-Oak CA	21,800	3,320	3.9	6,560	1.33
San Jose CA	10,470	2,040	4.1	5,120	1.00
Seattle-Everett WA	14,190	2,370	3.4	5,980	1.17
Northeastern Avg	28,770	4,420	3.3	6,270	1.03
Midwestern Avg	12,510	2,260	3.5	5,190	0.91
Southern Avg	9,190	1,610	3.8	5,630	0.97
Southwestern Avg	9,830	1,880	4.0	5,050	0.91
Western Avg	24,430	3,920	3.8	6,060	1.16
Texas Avg	7,850	1,650	4.1	4,670	0.90
Total Avg	15,610	2,630	3.7	5,560	0.99
Maximum Value	125,970	19,320	4.8	7,990	1.52
Minimum Value	2,320	350	2.3	3,520	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-17. Summary of 1989 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	24,440	1,980	5.4	12,340	0.98
Boston MA	35,540	2,440	5.9	14,570	1.09
Hartford CT	9,950	930	5.5	10,660	0.89
New York NY	130,270	9,440	5.6	13,800	1.12
Philadelphia PA	29,420	2,420	5.1	12,140	1.05
Pittsburgh PA	12,480	1,580	4.3	7,910	0.82
Washington DC	40,280	2,450	5.3	16,460	1.33
Midwestern Cities					
Chicago IL	55,450	3,700	5.7	14,970	1.21
Cincinnati OH	17,530	1,430	5.5	12,240	0.94
Cleveland OH	21,270	1,710	4.7	12,460	0.96
Columbus OH	13,040	1,270	5.8	10,250	0.82
Detroit MI	39,530	2,720	5.8	14,530	1.09
Indianapolis IN	12,700	1,160	5.3	10,960	0.86
Kansas City MO	19,920	2,180	4.3	9,130	0.72
Louisville KY	9,890	940	4.6	10,500	0.86
Milwaukee WI	12,100	950	5.6	12,740	0.97
Minn-St. Paul MN	27,140	2,330	4.9	11,630	0.92
Oklahoma City OK	11,000	1,160	5.1	9,490	0.78
St. Louis MO	30,140	2,710	5.5	11,110	0.96
Southern Cities					
Atlanta GA	39,600	2,700	6.1	14,640	1.14
Charlotte NC	4,410	470	4.2	9,290	0.82
Ft. Lauderdale FL	11,000	950	5.4	11,580	0.92
Jacksonville FL	8,370	710	4.5	11,820	0.93
Memphis TN	6,850	610	5.4	11,200	0.90
Miami FL	13,440	930	5.4	14,400	1.25
Nashville TN	7,910	770	4.6	10,230	0.90
New Orleans LA	7,820	560	5.8	13,890	1.13
Norfolk VA	8,590	740	4.6	11,600	0.95
Orlando FL	9,370	930	4.9	10,120	0.77
Tampa FL	5,520	470	4.9	11,630	1.03
Southwestern Cities					
Albuquerque NM	3,720	350	5.0	10,740	0.98
Austin TX	8,530	680	5.6	12,470	0.96
Corpus Christi TX	2,450	300	5.3	8,220	0.70
Dallas TX	36,460	2,720	5.9	13,400	1.02
Denver CO	17,280	1,380	5.2	12,480	1.01
El Paso TX	5,310	560	5.2	9,430	0.74
Fort Worth TX	18,160	1,630	5.7	11,110	0.87
Houston TX	44,500	2,990	6.2	14,860	1.13
Phoenix AZ	11,350	970	5.6	11,650	1.03
Salt Lake City UT	8,180	820	5.6	9,960	0.81
San Antonio TX	14,770	1,330	5.2	11,120	0.87
Western Cities					
Honolulu HI	7,290	550	5.2	13,310	1.07
Los Angeles CA	171,750	8,240	8.2	20,840	1.54
Portland OR	12,030	890	5.0	13,580	1.07
Sacramento CA	14,250	1,180	6.9	12,120	1.01
San Bernardino-Riv CA	21,930	1,420	7.0	15,480	1.17
San Diego CA	43,080	2,770	7.4	15,560	1.18
San Fran-Oak CA	67,570	3,780	6.8	17,860	1.36
San Jose CA	25,020	1,870	6.6	13,400	1.03
Seattle-Everett WA	29,300	1,870	5.9	15,690	1.20
Northeastern Avg	40,340	3,030	5.3	12,550	1.04
Midwestern Avg	22,470	1,860	5.2	11,670	0.92
Southern Avg	11,170	900	5.1	11,850	0.98
Southwestern Avg	15,520	1,250	5.5	11,400	0.92
Western Avg	43,580	2,510	6.6	15,310	1.18
Texas Avg	18,600	1,460	5.6	11,520	0.90
Total Avg	24,760	1,790	5.5	12,430	1.00
Maximum Value	171,750	9,440	8.2	20,840	1.54
Minimum Value	2,450	300	4.2	7,910	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-18. Summary of 1989 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	15,010	2,700	4.0	5,570	0.98
Boston MA	20,370	4,360	2.3	4,680	1.09
Hartford CT	5,860	1,000	3.7	5,870	0.89
New York NY	81,840	11,830	3.4	6,920	1.12
Philadelphia PA	34,040	5,220	3.0	6,510	1.05
Pittsburgh PA	17,330	2,850	3.1	6,080	0.82
Washington DC	27,840	3,540	4.0	7,860	1.33
Midwestern Cities					
Chicago IL	45,050	6,520	3.8	6,910	1.21
Cincinnati OH	5,830	1,280	3.3	4,550	0.94
Cleveland OH	8,510	1,800	3.0	4,740	0.96
Columbus OH	4,890	970	3.3	5,070	0.82
Detroit MI	31,910	6,250	4.4	5,110	1.09
Indianapolis IN	6,640	1,370	3.7	4,850	0.86
Kansas City MO	7,040	1,680	3.5	4,180	0.72
Louisville KY	4,650	820	3.7	5,670	0.86
Milwaukee WI	7,510	1,610	3.3	4,670	0.97
Minn-St. Paul MN	8,680	1,590	3.3	5,470	0.92
Oklahoma City OK	5,770	1,090	3.2	5,270	0.78
St. Louis MO	19,660	2,890	3.2	6,800	0.96
Southern Cities					
Atlanta GA	15,630	2,510	3.6	6,220	1.14
Charlotte NC	4,600	850	3.0	5,390	0.82
Ft. Lauderdale FL	9,020	1,770	4.3	5,100	0.92
Jacksonville FL	9,250	1,920	3.7	4,830	0.93
Memphis TN	6,630	1,310	4.3	5,060	0.90
Miami FL	23,840	3,280	4.3	7,280	1.25
Nashville TN	8,690	1,510	3.3	5,780	0.90
New Orleans LA	6,540	1,000	4.2	6,560	1.13
Norfolk VA	6,570	1,170	3.5	5,630	0.95
Orlando FL	6,160	1,710	3.7	3,610	0.77
Tampa FL	6,730	1,010	3.8	6,630	1.03
Southwestern Cities					
Albuquerque NM	6,760	1,130	3.5	6,000	0.98
Austin TX	3,300	680	4.2	4,820	0.96
Corpus Christi TX	2,330	530	3.8	4,390	0.70
Dallas TX	13,250	2,730	4.8	4,860	1.02
Denver CO	17,070	2,960	3.9	5,760	1.01
El Paso TX	5,110	1,340	4.2	3,830	0.74
Fort Worth TX	6,790	1,390	4.0	4,880	0.87
Houston TX	16,740	3,240	4.3	5,170	1.13
Phoenix AZ	26,800	4,590	4.0	5,840	1.03
Salt Lake City UT	3,140	570	3.5	5,490	0.81
San Antonio TX	8,340	1,740	3.5	4,800	0.87
Western Cities					
Honolulu HI	2,500	350	3.8	7,070	1.07
Los Angeles CA	128,490	19,610	4.0	6,550	1.54
Portland OR	5,430	890	3.3	6,070	1.07
Sacramento CA	10,960	1,740	4.0	6,310	1.01
San Bernardino-Riv CA	15,090	2,780	4.2	5,430	1.17
San Diego CA	14,380	2,690	3.4	5,350	1.18
San Fran-Oak CA	22,070	3,450	3.9	6,410	1.36
San Jose CA	10,880	2,070	4.2	5,260	1.03
Seattle-Everett WA	14,590	2,460	3.4	5,940	1.20
Northeastern Avg	28,900	4,500	3.4	6,210	1.04
Midwestern Avg	13,010	2,320	3.5	5,270	0.92
Southern Avg	9,420	1,640	3.8	5,640	0.98
Southwestern Avg	9,970	1,900	4.0	5,080	0.92
Western Avg	24,930	4,000	3.8	6,040	1.18
Texas Avg	7,980	1,660	4.1	4,680	0.90
Total Avg	15,920	2,690	3.7	5,580	1.00
Maximum Value	128,490	19,610	4.8	7,860	1.54
Minimum Value	2,330	350	2.3	3,610	0.70

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-19. Summary of 1990 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	25,440	2,010	5.4	12,640	1.01
Boston MA	34,790	2,450	5.9	14,220	1.06
Hartford CT	10,020	930	5.5	10,730	0.89
New York NY	133,500	9,500	5.6	14,050	1.14
Philadelphia PA	29,500	2,430	5.1	12,140	1.05
Pittsburgh PA	13,190	1,610	4.3	8,200	0.82
Washington DC	40,790	2,460	5.3	16,610	1.34
Midwestern Cities					
Chicago IL	61,230	3,900	5.7	15,680	1.25
Cincinnati OH	18,320	1,460	5.7	12,570	0.96
Cleveland OH	22,060	1,850	4.7	11,910	0.94
Columbus OH	14,490	1,290	5.8	11,250	0.89
Detroit MI	41,930	2,800	5.8	14,970	1.13
Indianapolis IN	12,960	1,220	5.3	10,590	0.84
Kansas City MO	20,210	2,190	4.4	9,230	0.74
Louisville KY	9,970	950	4.6	10,500	0.86
Milwaukee WI	12,380	960	5.6	12,920	0.99
Minn-St. Paul MN	28,640	2,380	4.9	12,020	0.95
Oklahoma City OK	11,170	1,160	5.1	9,630	0.79
St. Louis MO	29,790	2,720	5.5	10,950	0.95
Southern Cities					
Atlanta GA	40,190	2,750	6.1	14,600	1.14
Charlotte NC	4,650	480	4.2	9,630	0.86
Ft. Lauderdale FL	11,440	970	5.4	11,840	0.94
Jacksonville FL	8,660	720	4.6	11,960	0.93
Memphis TN	6,990	630	5.4	11,130	0.89
Miami FL	13,800	970	5.4	14,170	1.27
Nashville TN	8,050	790	4.6	10,200	0.89
New Orleans LA	8,000	580	5.8	13,810	1.12
Norfolk VA	8,770	750	4.6	11,720	0.96
Orlando FL	9,580	950	4.9	10,080	0.77
Tampa FL	5,840	480	4.9	12,100	1.05
Southwestern Cities					
Albuquerque NM	3,860	350	5.0	10,910	0.98
Austin TX	8,760	720	5.6	12,090	0.94
Corpus Christi TX	2,510	300	5.4	8,430	0.72
Dallas TX	38,120	2,750	5.9	13,850	1.05
Denver CO	18,140	1,420	5.2	12,730	1.03
El Paso TX	5,360	560	5.2	9,510	0.74
Fort Worth TX	19,060	1,640	5.8	11,610	0.90
Houston TX	45,450	3,090	6.3	14,700	1.12
Phoenix AZ	12,830	1,010	5.6	12,750	1.05
Salt Lake City UT	8,580	820	5.6	10,450	0.85
San Antonio TX	14,940	1,330	5.3	11,250	0.88
Western Cities					
Honolulu HI	7,440	550	5.2	13,590	1.09
Los Angeles CA	177,660	8,420	8.2	21,100	1.55
Portland OR	12,030	890	5.1	13,460	1.08
Sacramento CA	14,910	1,210	6.9	12,350	1.02
San Bernardino-Riv CA	23,470	1,440	7.1	16,290	1.21
San Diego CA	44,580	2,780	7.4	16,050	1.22
San Fran-Oak CA	68,570	3,850	6.8	17,820	1.36
San Jose CA	25,410	1,870	6.6	13,600	1.05
Seattle-Everett WA	30,460	1,950	6.0	15,640	1.20
Northeastern Avg	41,030	3,060	5.3	12,660	1.04
Midwestern Avg	23,600	1,910	5.3	11,850	0.94
Southern Avg	11,450	920	5.1	11,930	0.98
Southwestern Avg	16,150	1,270	5.5	11,660	0.93
Western Avg	44,950	2,550	6.6	15,540	1.20
Texas Avg	19,170	1,490	5.6	11,630	0.91
Total Avg	25,570	1,830	5.5	12,600	1.01
Maximum Value	177,660	9,500	8.2	21,100	1.55
Minimum Value	2,510	300	4.2	8,200	0.72

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-20. Summary of 1990 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	15,860	2,670	4.1	5,930	1.01
Boston MA	20,190	4,440	2.3	4,540	1.06
Hartford CT	6,040	1,020	3.7	5,910	0.89
New York NY	83,810	12,170	3.4	6,890	1.14
Philadelphia PA	34,440	5,230	3.1	6,580	1.05
Pittsburgh PA	17,570	2,930	3.2	5,990	0.82
Washington DC	28,750	3,620	4.0	7,940	1.34
Midwestern Cities					
Chicago IL	47,410	6,860	3.7	6,910	1.25
Cincinnati OH	5,910	1,320	3.3	4,480	0.96
Cleveland OH	9,640	1,800	3.0	5,350	0.94
Columbus OH	5,120	980	3.3	5,210	0.89
Detroit MI	33,610	6,280	4.4	5,350	1.13
Indianapolis IN	6,730	1,420	3.7	4,750	0.84
Kansas City MO	7,740	1,710	3.5	4,540	0.74
Louisville KY	4,740	840	3.6	5,660	0.86
Milwaukee WI	7,700	1,620	3.4	4,760	0.99
Minn-St. Paul MN	9,080	1,610	3.3	5,640	0.95
Oklahoma City OK	5,770	1,090	3.2	5,270	0.79
St. Louis MO	19,660	2,900	3.2	6,780	0.95
Southern Cities					
Atlanta GA	15,750	2,530	3.7	6,230	1.14
Charlotte NC	4,970	860	3.0	5,770	0.86
Ft. Lauderdale FL	9,340	1,800	4.3	5,200	0.94
Jacksonville FL	9,350	1,930	3.7	4,840	0.93
Memphis TN	6,820	1,380	4.3	4,950	0.89
Miami FL	25,450	3,340	4.3	7,620	1.27
Nashville TN	8,760	1,510	3.3	5,790	0.89
New Orleans LA	6,600	1,010	4.2	6,560	1.12
Norfolk VA	6,850	1,180	3.5	5,790	0.96
Orlando FL	6,600	1,720	3.7	3,830	0.77
Tampa FL	7,020	1,060	3.8	6,610	1.05
Southwestern Cities					
Albuquerque NM	6,920	1,160	3.7	5,970	0.98
Austin TX	3,360	690	4.2	4,860	0.94
Corpus Christi TX	2,450	540	3.9	4,540	0.72
Dallas TX	13,380	2,750	4.8	4,860	1.05
Denver CO	17,550	2,980	3.9	5,890	1.03
El Paso TX	5,150	1,340	4.2	3,830	0.74
Fort Worth TX	6,830	1,400	4.1	4,870	0.90
Houston TX	17,440	3,430	4.3	5,080	1.12
Phoenix AZ	28,350	5,020	4.1	5,640	1.05
Salt Lake City UT	3,280	570	3.6	5,730	0.85
San Antonio TX	8,440	1,750	3.5	4,810	0.88
Western Cities					
Honolulu HI	2,530	360	3.8	6,980	1.09
Los Angeles CA	129,400	19,970	4.0	6,480	1.55
Portland OR	5,970	910	3.3	6,570	1.08
Sacramento CA	11,260	1,770	4.0	6,360	1.02
San Bernardino-Riv CA	16,340	3,120	4.2	5,230	1.21
San Diego CA	15,040	2,750	3.4	5,460	1.22
San Fran-Oak CA	22,530	3,620	3.9	6,220	1.36
San Jose CA	10,910	2,080	4.2	5,230	1.05
Seattle-Everett WA	14,700	2,540	3.4	5,800	1.20
Northeastern Avg	29,520	4,590	3.4	6,250	1.04
Midwestern Avg	13,590	2,370	3.5	5,390	0.94
Southern Avg	9,770	1,670	3.8	5,740	0.98
Southwestern Avg	10,290	1,970	4.0	5,100	0.93
Western Avg	25,410	4,130	3.8	6,040	1.20
Texas Avg	8,150	1,700	4.1	4,690	0.91
Total Avg	16,380	2,750	3.7	5,640	1.01
Maximum Value	129,400	19,970	4.8	7,940	1.55
Minimum Value	2,450	360	2.3	3,830	0.72

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-21. Summary of 1991 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	26,150	2,040	5.4	12,790	1.02
Boston MA	34,900	2,450	5.9	14,260	1.06
Hartford CT	10,050	930	5.5	10,760	0.89
New York NY	133,150	9,530	5.6	13,970	1.14
Philadelphia PA	30,670	2,530	5.1	12,130	1.05
Pittsburgh PA	13,280	1,630	4.3	8,130	0.82
Washington DC	41,470	2,530	5.3	16,400	1.33
Midwestern Cities					
Chicago IL	62,760	3,920	5.7	16,010	1.27
Cincinnati OH	18,680	1,470	5.7	12,750	0.99
Cleveland OH	22,490	1,870	4.8	12,040	0.95
Columbus OH	14,890	1,300	5.8	11,490	0.91
Detroit MI	44,110	2,870	5.9	15,390	1.16
Indianapolis IN	13,120	1,230	5.3	10,650	0.84
Kansas City MO	20,790	2,190	4.4	9,500	0.75
Louisville KY	10,060	950	4.6	10,590	0.88
Milwaukee WI	12,570	970	5.6	13,020	1.00
Minn-St. Paul MN	29,320	2,410	4.9	12,180	0.96
Oklahoma City OK	11,470	1,170	5.2	9,830	0.81
St. Louis MO	30,110	2,730	5.6	11,030	0.95
Southern Cities					
Atlanta GA	41,460	2,780	6.2	14,930	1.16
Charlotte NC	4,830	480	4.2	10,000	0.89
Ft. Lauderdale FL	11,480	970	5.4	11,880	0.95
Jacksonville FL	8,810	720	4.6	12,160	0.95
Memphis TN	7,570	660	5.4	11,460	0.91
Miami FL	14,140	990	5.4	14,280	1.28
Nashville TN	8,390	810	4.6	10,320	0.90
New Orleans LA	8,110	590	5.8	13,810	1.12
Norfolk VA	8,960	810	4.6	11,130	0.93
Orlando FL	9,730	970	4.9	10,080	0.78
Tampa FL	5,880	490	4.9	11,970	1.05
Southwestern Cities					
Albuquerque NM	3,990	360	5.0	11,020	0.96
Austin TX	8,860	730	5.6	12,090	0.94
Corpus Christi TX	2,580	300	5.5	8,630	0.72
Dallas TX	38,480	2,760	5.9	13,940	1.06
Denver CO	18,390	1,440	5.2	12,770	1.03
El Paso TX	5,460	570	5.3	9,550	0.75
Fort Worth TX	19,800	1,660	5.9	11,940	0.92
Houston TX	47,500	3,240	6.3	14,640	1.11
Phoenix AZ	14,570	1,070	5.6	13,610	1.08
Salt Lake City UT	8,990	830	5.6	10,840	0.88
San Antonio TX	15,090	1,340	5.3	11,300	0.89
Western Cities					
Honolulu HI	7,570	550	5.2	13,820	1.10
Los Angeles CA	177,550	8,410	8.2	21,110	1.56
Portland OR	12,110	900	5.1	13,430	1.08
Sacramento CA	15,520	1,220	6.9	12,680	1.04
San Bernardino-Riv CA	24,100	1,460	7.2	16,540	1.22
San Diego CA	44,600	2,780	7.5	16,060	1.22
San Fran-Oak CA	67,620	3,850	6.8	17,570	1.34
San Jose CA	26,600	1,890	6.6	14,060	1.08
Seattle-Everett WA	30,590	1,960	5.9	15,570	1.20
Northeastern Avg	41,380	3,090	5.3	12,640	1.04
Midwestern Avg	24,200	1,920	5.3	12,040	0.96
Southern Avg	11,760	930	5.1	12,000	0.99
Southwestern Avg	16,700	1,300	5.6	11,850	0.94
Western Avg	45,140	2,560	6.6	15,650	1.20
Texas Avg	19,680	1,510	5.7	11,730	0.91
Total Avg	25,990	1,850	5.5	12,720	1.02
Maximum Value	177,550	9,530	8.2	21,110	1.56
Minimum Value	2,580	300	4.2	8,130	0.72

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-22. Summary of 1991 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	15,900	2,690	4.1	5,910	1.02
Boston MA	20,130	4,440	2.3	4,530	1.06
Hartford CT	6,120	1,050	3.8	5,850	0.89
New York NY	85,360	12,270	3.4	6,960	1.14
Philadelphia PA	34,810	5,250	3.1	6,630	1.05
Pittsburgh PA	17,830	2,990	3.2	5,970	0.82
Washington DC	29,380	3,700	4.0	7,930	1.33
Midwestern Cities					
Chicago IL	50,770	7,180	3.7	7,070	1.27
Cincinnati OH	6,920	1,330	3.3	5,210	0.99
Cleveland OH	9,740	1,810	3.0	5,380	0.95
Columbus OH	5,490	1,000	3.4	5,500	0.91
Detroit MI	35,710	6,480	4.4	5,510	1.16
Indianapolis IN	6,760	1,420	3.7	4,770	0.84
Kansas City MO	7,790	1,720	3.5	4,520	0.75
Louisville KY	5,020	840	3.6	6,000	0.88
Milwaukee WI	7,940	1,630	3.4	4,880	1.00
Minn-St. Paul MN	9,660	1,670	3.4	5,770	0.96
Oklahoma City OK	6,070	1,110	3.2	5,460	0.81
St. Louis MO	19,880	2,950	3.4	6,750	0.95
Southern Cities					
Atlanta GA	15,920	2,540	3.7	6,280	1.16
Charlotte NC	5,140	870	3.0	5,910	0.89
Ft. Lauderdale FL	9,660	1,810	4.3	5,330	0.95
Jacksonville FL	9,500	1,950	3.7	4,880	0.95
Memphis TN	7,250	1,460	4.3	4,970	0.91
Miami FL	25,760	3,350	4.3	7,690	1.28
Nashville TN	8,790	1,530	3.4	5,750	0.90
New Orleans LA	6,660	1,020	4.2	6,510	1.12
Norfolk VA	7,130	1,210	3.5	5,910	0.93
Orlando FL	7,080	1,740	3.7	4,070	0.78
Tampa FL	7,080	1,080	3.8	6,570	1.05
Southwestern Cities					
Albuquerque NM	6,840	1,210	3.8	5,670	0.96
Austin TX	3,460	700	4.2	4,940	0.94
Corpus Christi TX	2,490	560	4.0	4,410	0.72
Dallas TX	13,520	2,770	4.8	4,880	1.06
Denver CO	17,390	2,980	3.9	5,840	1.03
El Paso TX	5,270	1,350	4.2	3,900	0.75
Fort Worth TX	6,840	1,420	4.1	4,830	0.92
Houston TX	17,550	3,500	4.3	5,010	1.11
Phoenix AZ	29,000	5,180	4.1	5,590	1.08
Salt Lake City UT	3,670	620	3.6	5,920	0.88
San Antonio TX	8,770	1,800	3.6	4,890	0.89
Western Cities					
Honolulu HI	2,610	370	3.8	7,040	1.10
Los Angeles CA	131,550	19,960	4.0	6,590	1.56
Portland OR	6,170	940	3.3	6,550	1.08
Sacramento CA	11,270	1,800	4.1	6,280	1.04
San Bernardino-Riv CA	17,150	3,360	4.2	5,110	1.22
San Diego CA	15,300	2,790	3.5	5,490	1.22
San Fran-Oak CA	22,590	3,700	4.0	6,100	1.34
San Jose CA	10,990	2,090	4.2	5,250	1.08
Seattle-Everett WA	15,810	2,580	3.4	6,140	1.20
Northeastern Avg	29,930	4,630	3.4	6,250	1.04
Midwestern Avg	14,310	2,430	3.5	5,570	0.96
Southern Avg	10,000	1,690	3.8	5,810	0.99
Southwestern Avg	10,440	2,010	4.1	5,080	0.94
Western Avg	25,940	4,180	3.8	6,060	1.20
Texas Avg	8,270	1,730	4.2	4,700	0.91
Total Avg	16,790	2,790	3.7	5,700	1.02
Maximum Value	131,550	19,960	4.8	7,930	1.56
Minimum Value	2,490	370	2.3	3,900	0.72

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-23. Summary of 1992 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	28,340	2,170	5.5	13,040	1.04
Boston MA	35,250	2,440	5.9	14,450	1.07
Hartford CT	10,870	970	5.6	11,160	0.91
New York NY	134,440	9,740	5.7	13,800	1.14
Philadelphia PA	31,220	2,600	5.1	12,010	1.05
Pittsburgh PA	14,710	1,800	4.3	8,160	0.81
Washington DC	44,190	2,610	5.4	16,940	1.36
Midwestern Cities					
Chicago IL	63,110	3,930	5.7	16,070	1.28
Cincinnati OH	19,180	1,470	5.7	13,020	1.01
Cleveland OH	22,800	1,900	4.8	12,000	0.95
Columbus OH	15,230	1,300	5.8	11,680	0.93
Detroit MI	46,050	2,930	5.9	15,710	1.19
Indianapolis IN	13,390	1,240	5.3	10,800	0.85
Kansas City MO	22,060	2,270	4.4	9,720	0.77
Louisville KY	10,510	970	4.6	10,790	0.90
Milwaukee WI	12,610	970	5.6	13,060	1.00
Minn-St. Paul MN	30,590	2,430	4.9	12,580	0.99
Oklahoma City OK	11,750	1,170	5.2	10,070	0.83
St. Louis MO	30,480	2,740	5.7	11,140	0.95
Southern Cities					
Atlanta GA	42,670	2,820	6.3	15,140	1.17
Charlotte NC	5,150	490	4.2	10,490	0.89
Ft. Lauderdale FL	12,480	1,050	5.4	11,920	0.96
Jacksonville FL	9,270	730	4.6	12,650	0.97
Memphis TN	8,100	710	5.4	11,430	0.92
Miami FL	15,090	1,010	5.4	14,990	1.30
Nashville TN	9,660	890	4.7	10,910	0.92
New Orleans LA	8,130	600	5.8	13,470	1.10
Norfolk VA	9,450	900	4.7	10,480	0.92
Orlando FL	9,740	970	4.9	10,080	0.80
Tampa FL	6,120	500	5.0	12,260	1.07
Southwestern Cities					
Albuquerque NM	4,030	370	5.0	10,870	0.95
Austin TX	9,100	740	5.6	12,280	0.95
Corpus Christi TX	2,700	300	5.5	8,910	0.74
Dallas TX	39,450	2,820	5.9	14,000	1.07
Denver CO	20,130	1,550	5.2	13,020	1.05
El Paso TX	5,640	570	5.3	9,860	0.76
Fort Worth TX	20,610	1,690	5.9	12,190	0.94
Houston TX	49,110	3,340	6.3	14,700	1.12
Phoenix AZ	15,700	1,130	5.7	13,930	1.08
Salt Lake City UT	9,300	850	5.7	11,000	0.90
San Antonio TX	16,000	1,420	5.4	11,290	0.90
Western Cities					
Honolulu HI	8,190	600	5.3	13,570	1.10
Los Angeles CA	180,240	8,690	8.2	20,750	1.54
Portland OR	12,830	930	5.2	13,860	1.10
Sacramento CA	16,290	1,290	7.0	12,640	1.04
San Bernardino-Riv CA	24,330	1,470	7.2	16,600	1.22
San Diego CA	44,760	2,800	7.6	15,980	1.22
San Fran-Oak CA	68,100	3,910	6.8	17,410	1.33
San Jose CA	26,730	1,930	6.7	13,840	1.07
Seattle-Everett WA	32,640	2,040	6.0	15,960	1.22
Northeastern Avg	42,710	3,190	5.4	12,790	1.05
Midwestern Avg	24,810	1,940	5.3	12,220	0.97
Southern Avg	12,350	970	5.1	12,170	1.00
Southwestern Avg	17,430	1,340	5.6	12,000	0.95
Western Avg	46,010	2,630	6.7	15,620	1.20
Texas Avg	20,370	1,550	5.7	11,890	0.93
Total Avg	26,770	1,890	5.6	12,850	1.03
Maximum Value	180,240	9,740	8.2	20,750	1.54
Minimum Value	2,700	300	4.2	8,160	0.74

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-24. Summary of 1992 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	15,940	2,690	4.1	5,930	1.04
Boston MA	20,920	4,590	2.4	4,560	1.07
Hartford CT	6,180	1,050	3.8	5,860	0.91
New York NY	89,070	12,280	3.4	7,260	1.14
Philadelphia PA	34,860	5,250	3.3	6,640	1.05
Pittsburgh PA	17,870	2,990	3.2	5,980	0.81
Washington DC	29,790	3,740	4.0	7,970	1.36
Midwestern Cities					
Chicago IL	52,810	7,490	3.8	7,050	1.28
Cincinnati OH	7,250	1,330	3.3	5,450	1.01
Cleveland OH	10,140	1,840	3.0	5,530	0.95
Columbus OH	5,760	1,020	3.5	5,630	0.93
Detroit MI	39,450	6,870	4.4	5,740	1.19
Indianapolis IN	6,840	1,420	3.7	4,800	0.85
Kansas City MO	7,870	1,750	3.6	4,490	0.77
Louisville KY	5,350	850	3.6	6,330	0.90
Milwaukee WI	8,370	1,710	3.4	4,910	1.00
Minn-St. Paul MN	10,950	1,850	3.4	5,910	0.99
Oklahoma City OK	6,390	1,160	3.3	5,510	0.83
St. Louis MO	20,090	3,050	3.6	6,590	0.95
Southern Cities					
Atlanta GA	16,100	2,610	3.8	6,170	1.17
Charlotte NC	5,150	930	3.2	5,520	0.89
Ft. Lauderdale FL	10,220	1,850	4.4	5,520	0.96
Jacksonville FL	9,890	2,060	3.8	4,800	0.97
Memphis TN	8,070	1,580	4.5	5,110	0.92
Miami FL	27,050	3,590	4.4	7,530	1.30
Nashville TN	8,860	1,550	3.5	5,730	0.92
New Orleans LA	6,760	1,050	4.2	6,410	1.10
Norfolk VA	7,690	1,210	3.5	6,370	0.92
Orlando FL	7,810	1,750	3.7	4,450	0.80
Tampa FL	7,490	1,130	3.8	6,640	1.07
Southwestern Cities					
Albuquerque NM	6,920	1,240	3.9	5,580	0.95
Austin TX	3,540	720	4.2	4,940	0.95
Corpus Christi TX	2,630	600	4.1	4,370	0.74
Dallas TX	13,770	2,820	4.8	4,890	1.07
Denver CO	17,710	2,990	3.9	5,910	1.05
El Paso TX	5,350	1,380	4.2	3,890	0.76
Fort Worth TX	6,990	1,450	4.2	4,820	0.94
Houston TX	17,940	3,510	4.5	5,110	1.12
Phoenix AZ	29,150	5,330	4.2	5,470	1.08
Salt Lake City UT	4,150	680	3.8	6,060	0.90
San Antonio TX	9,560	1,810	3.6	5,280	0.90
Western Cities					
Honolulu HI	2,810	380	3.8	7,430	1.10
Los Angeles CA	132,830	20,130	4.1	6,600	1.54
Portland OR	6,300	970	3.4	6,460	1.10
Sacramento CA	12,450	2,000	4.2	6,240	1.04
San Bernardino-Riv CA	17,310	3,380	4.2	5,120	1.22
San Diego CA	15,620	2,790	3.5	5,590	1.22
San Fran-Oak CA	22,830	3,740	4.0	6,110	1.33
San Jose CA	11,910	2,220	4.2	5,360	1.07
Seattle-Everett WA	15,780	2,620	3.5	6,030	1.22
Northeastern Avg	30,660	4,650	3.5	6,310	1.05
Midwestern Avg	15,110	2,530	3.6	5,660	0.97
Southern Avg	10,460	1,760	3.9	5,840	1.00
Southwestern Avg	10,700	2,050	4.1	5,120	0.95
Western Avg	26,430	4,250	3.9	6,100	1.20
Texas Avg	8,540	1,750	4.2	4,760	0.93
Total Avg	17,330	2,860	3.8	5,750	1.03
Maximum Value	132,830	20,130	4.8	7,970	1.54
Minimum Value	2,630	380	2.4	3,890	0.74

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-25. Summary of 1993 Relative Mobility Values for Freeways and Expressways

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	28,980	2,210	5.5	13,140	1.04
Boston MA	34,620	2,430	5.9	14,240	1.07
Hartford CT	11,310	980	5.6	11,520	0.93
New York NY	138,460	9,900	5.7	13,980	1.15
Philadelphia PA	32,520	2,720	5.1	11,950	1.04
Pittsburgh PA	15,050	1,850	4.3	8,130	0.82
Washington DC	46,690	2,620	5.4	17,790	1.41
Midwestern Cities					
Chicago IL	65,950	4,160	5.7	15,850	1.26
Cincinnati OH	20,710	1,550	5.7	13,330	1.03
Cleveland OH	24,100	1,920	4.9	12,580	0.98
Columbus OH	15,700	1,330	5.9	11,820	0.93
Detroit MI	47,500	2,940	6.0	16,160	1.23
Indianapolis IN	14,330	1,260	5.5	11,410	0.89
Kansas City MO	24,150	2,480	4.6	9,740	0.78
Louisville KY	11,270	990	4.6	11,380	0.93
Milwaukee WI	12,620	970	5.6	12,960	1.00
Minn-St. Paul MN	32,200	2,470	5.0	13,030	1.02
Oklahoma City OK	12,400	1,180	5.2	10,480	0.86
St. Louis MO	31,400	2,770	5.7	11,340	0.96
Southern Cities					
Atlanta GA	48,300	3,220	6.4	15,000	1.16
Charlotte NC	5,640	510	4.3	11,110	0.92
Ft. Lauderdale FL	13,690	1,090	5.5	12,500	0.98
Jacksonville FL	9,660	770	4.8	12,500	0.96
Memphis TN	8,290	730	5.4	11,320	0.93
Miami FL	15,920	1,030	5.5	15,450	1.32
Nashville TN	11,270	1,010	4.9	11,110	0.93
New Orleans LA	8,370	620	5.8	13,510	1.09
Norfolk VA	9,620	930	4.7	10,390	0.92
Orlando FL	10,020	990	5.0	10,120	0.82
Tampa FL	6,360	520	5.0	12,340	1.06
Southwestern Cities					
Albuquerque NM	4,410	390	5.1	11,420	0.96
Austin TX	10,340	850	5.6	12,110	0.95
Corpus Christi TX	3,140	340	5.5	9,290	0.75
Dallas TX	40,090	2,870	6.0	13,990	1.07
Denver CO	21,330	1,590	5.3	13,380	1.07
El Paso TX	5,960	600	5.3	10,000	0.77
Fort Worth TX	21,090	1,720	5.9	12,240	0.95
Houston TX	51,520	3,460	6.4	14,880	1.13
Phoenix AZ	15,780	1,140	5.8	13,800	1.08
Salt Lake City UT	9,760	860	5.7	11,330	0.92
San Antonio TX	17,230	1,510	5.4	11,380	0.91
Western Cities					
Honolulu HI	8,860	640	5.3	13,920	1.13
Los Angeles CA	183,460	8,810	8.2	20,810	1.54
Portland OR	13,440	970	5.2	13,920	1.11
Sacramento CA	16,550	1,300	7.0	12,770	1.04
San Bernardino-Riv CA	24,500	1,510	7.2	16,280	1.21
San Diego CA	44,680	2,810	7.6	15,900	1.21
San Fran-Oak CA	68,830	3,920	6.8	17,560	1.33
San Jose CA	26,810	1,960	6.7	13,650	1.05
Seattle-Everett WA	33,330	2,070	6.0	16,110	1.23
Northeastern Avg	43,950	3,250	5.4	12,960	1.07
Midwestern Avg	26,030	2,000	5.4	12,510	0.99
Southern Avg	13,380	1,040	5.2	12,310	1.01
Southwestern Avg	18,240	1,390	5.6	12,170	0.96
Western Avg	46,720	2,660	6.7	15,660	1.21
Texas Avg	21,340	1,620	5.7	11,990	0.93
Total Avg	27,760	1,950	5.6	13,020	1.04
Maximum Value	183,460	9,900	8.2	20,810	1.54
Minimum Value	3,140	340	4.3	8,130	0.75

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

Table D-26. Summary of 1993 Relative Mobility Values for Principal Arterial Streets

Urban Area	DVKT[1] (1000)	Lane-km	Average No. Lanes	DVKT/[2] Lane-km	Congestion Index
Northeastern Cities					
Baltimore MD	16,100	2,740	4.1	5,880	1.04
Boston MA	22,540	4,650	2.5	4,840	1.07
Hartford CT	6,100	1,050	3.8	5,790	0.93
New York NY	88,550	12,400	3.4	7,140	1.15
Philadelphia PA	34,870	5,300	3.3	6,580	1.04
Pittsburgh PA	18,520	2,990	3.2	6,180	0.82
Washington DC	29,620	3,780	4.0	7,830	1.41
Midwestern Cities					
Chicago IL	56,350	8,210	3.9	6,860	1.26
Cincinnati OH	7,080	1,330	3.5	5,330	1.03
Cleveland OH	9,980	1,840	3.0	5,410	0.98
Columbus OH	5,640	1,030	3.5	5,470	0.93
Detroit MI	41,860	6,920	4.5	6,050	1.23
Indianapolis IN	7,250	1,480	3.8	4,890	0.89
Kansas City MO	8,860	1,810	3.6	4,890	0.78
Louisville KY	5,640	930	3.7	6,030	0.93
Milwaukee WI	9,020	1,800	3.4	5,000	1.00
Minn-St. Paul MN	11,430	1,930	3.5	5,920	1.02
Oklahoma City OK	7,250	1,290	3.4	5,630	0.86
St. Louis MO	20,450	3,100	3.6	6,600	0.96
Southern Cities					
Atlanta GA	19,320	3,220	3.8	6,000	1.16
Charlotte NC	5,190	950	3.3	5,470	0.92
Ft. Lauderdale FL	10,300	1,960	4.5	5,250	0.98
Jacksonville FL	10,060	2,110	3.9	4,770	0.96
Memphis TN	8,950	1,670	4.6	5,350	0.93
Miami FL	27,370	3,630	4.6	7,540	1.32
Nashville TN	9,020	1,560	3.5	5,770	0.93
New Orleans LA	7,080	1,130	4.2	6,290	1.09
Norfolk VA	7,890	1,220	3.5	6,450	0.92
Orlando FL	8,370	1,790	3.8	4,680	0.82
Tampa FL	7,500	1,160	3.8	6,470	1.06
Southwestern Cities					
Albuquerque NM	7,250	1,330	4.0	5,450	0.96
Austin TX	4,030	770	4.2	5,210	0.95
Corpus Christi TX	2,580	600	4.1	4,320	0.75
Dallas TX	14,650	2,880	4.9	5,080	1.07
Denver CO	17,870	2,990	3.9	5,970	1.07
El Paso TX	5,380	1,380	4.3	3,880	0.77
Fort Worth TX	7,570	1,510	4.2	5,000	0.95
Houston TX	18,350	3,540	4.5	5,180	1.13
Phoenix AZ	29,790	5,390	4.3	5,520	1.08
Salt Lake City UT	4,300	700	4.0	6,140	0.92
San Antonio TX	9,660	1,820	3.6	5,310	0.91
Western Cities					
Honolulu HI	3,110	390	3.8	7,880	1.13
Los Angeles CA	133,630	20,210	4.1	6,610	1.54
Portland OR	7,080	1,060	3.5	6,670	1.11
Sacramento CA	12,640	2,010	4.2	6,280	1.04
San Bernardino-Riv CA	17,870	3,410	4.2	5,240	1.21
San Diego CA	15,540	2,790	3.5	5,560	1.21
San Fran-Oak CA	22,860	3,780	4.0	6,040	1.33
San Jose CA	11,750	2,220	4.2	5,290	1.05
Seattle-Everett WA	15,620	2,620	3.5	5,970	1.23
Northeastern Avg	30,900	4,700	3.5	6,320	1.07
Midwestern Avg	15,900	2,640	3.6	5,670	0.99
Southern Avg	11,010	1,860	4.0	5,820	1.01
Southwestern Avg	11,040	2,080	4.2	5,190	0.96
Western Avg	26,680	4,280	3.9	6,170	1.21
Texas Avg	8,890	1,790	4.3	4,860	0.93
Total Avg	17,790	2,930	3.8	5,780	1.04
Maximum Value	133,630	20,210	4.9	7,880	1.54
Minimum Value	2,580	390	2.5	3,880	0.75

Notes: [1] Daily vehicle-kilometers of travel.
[2] Daily vehicle-kilometer of travel per lane-kilometer of roadway.

Source: TTI Analysis and Local Transportation Agency References

APPENDIX E

URBAN AREA
MOBILITY AND CONGESTION STATISTICS

Table E-1. Mobility and Congestion Variables in Albuquerque NM

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,471	2,600	2,753	2,930	3,107	3,260	3,582	3,719	3,864	3,993	4,025	4,411
Lane-Kilometers	306	306	306	314	314	322	330	346	354	362	370	386
VKT/lane-kilometer	8,079	8,500	9,000	9,333	9,897	10,125	10,854	10,744	10,909	11,022	10,870	11,416
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	10	10	10	20	20	20	20	20	20
Percent of Moderate Congestion	100.00	90.00	80.00	60.00	30.00	10.00	35.00	33.33	27.66	36.96	31.57	32.69
Percent of Heavy Congestion	-	10.00	20.00	40.00	60.00	40.00	40.00	40.00	46.81	39.13	37.45	30.22
Percent of Severe Congestion	-	-	-	-	10.00	50.00	25.00	26.67	25.53	23.91	30.98	37.10
Principal Arterial Streets												
Daily VKT (000)	4,605	4,959	5,426	5,796	6,038	6,279	6,440	6,762	6,923	6,843	6,923	7,245
Lane-kilometers	918	926	942	966	990	1,047	1,127	1,127	1,159	1,208	1,240	1,328
VKT/lane-kilometer	5,018	5,357	5,761	6,000	6,098	6,000	5,714	6,000	5,972	5,666	5,584	5,454
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	40	45	40	40	40	35	40	40	40	40	45
Percent of Moderate Congestion	47.83	67.50	49.09	53.33	63.33	60	58.14	43.40	37.93	45.76	42.62	38.23
Percent of Heavy Congestion	39.13	15.00	34.55	24.44	20.00	25	30.23	28.30	50.00	44.07	29.51	25.16
Percent of Severe Congestion	13.04	17.50	16.36	22.22	16.67	15	11.63	28.30	12.07	10.17	27.87	36.61
Population (000)	440	450	455	465	475	485	490	500	505	520	525	530
Urban Area (square kilometers)	544	544	544	648	648	648	648	648	660	673	673	673
Population Density	809	827	837	718	734	749	757	772	765	772	780	787
Registered Vehicles (000)	330	340	350	360	360	370	380	390	390	410	410	410
Fuel Cost ($/liter)	-	-	-	-	0.26	0.28	0.30	0.33	0.36	0.35	0.35	0.34
Total VKT (000)	11,682	12,544	13,405	14,266	14,720	15,174	15,627	16,380	16,491	16,343	16,678	17,193
Total Lane-Kilometers	2,673	2,705	2,713	2,724	2,818	2,892	2,946	2,950	2,953	2,979	2,995	3,004
Roadway Congestion Index	0.78	0.83	0.89	0.93	0.96	0.96	0.96	0.98	0.98	0.96	0.95	0.96

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
"-" denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-2. Mobility and Congestion Variables in Atlanta GA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,382	27,378	29,149	31,282	34,663	36,974	38,543	39,598	40,186	41,458	42,665	48,300
Lane-Kilometers	2,198	2,270	2,375	2,439	2,544	2,640	2,657	2,705	2,753	2,777	2,818	3,220
VKT/lane-kilometer	11,549	12,060	12,275	12,825	13,627	14,003	14,509	14,640	14,596	14,928	15,143	15,000
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	40	40	45	50	50	50	45	45	45	45	50	50
Percent of Moderate Congestion	40.00	39.13	50.71	47.50	35.00	25.00	20.00	18.42	14.09	9.35	10.00	12.00
Percent of Heavy Congestion	50.00	47.83	39.29	37.50	40.00	40.00	40.00	26.32	28.33	38.06	40.00	30.00
Percent of Severe Congestion	10.00	13.04	10.00	15.00	25.00	35.00	40.00	55.26	57.58	52.58	50.00	58.00
Principal Arterial Streets												
Daily VKT (000)	10,529	11,334	12,011	13,468	14,579	15,054	15,754	15,633	15,746	15,923	16,100	19,320
Lane-kilometers	1,964	2,077	2,149	2,174	2,198	2,246	2,399	2,512	2,528	2,536	2,608	3,220
VKT/lane-kilometer	5,361	5,457	5,588	6,196	6,634	6,703	6,567	6,224	6,229	6,279	6,173	6,000
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	60	60	65	65	65	65	65	65	65	65	65	65
Percent of Moderate Congestion	30.00	21.05	36.07	29.44	24.67	17.5	18.5	18.31	12.99	15.38	15.19	16.93
Percent of Heavy Congestion	40.00	45.61	32.79	33.61	33.67	33.75	27.7	18.31	22.08	25.64	18.99	15.23
Percent of Severe Congestion	30.00	33.33	31.15	36.94	41.67	48.75	53.9	63.38	64.94	58.97	65.82	67.97
Population (000)	1,610	1,610	1,610	1,615	1,695	1,770	1,900	2,000	2,100	2,150	2,275	2,320
Urban Area (square kilometers)	3,781	3,807	3,807	3,885	3,937	3,963	4,079	4,183	4,209	4,274	4,403	4,558
Population Density	426	423	423	416	431	447	466	478	499	503	517	508
Registered Vehicles (000)	1,230	1,240	1,240	1,250	1,310	1,380	1,480	1,560	1,650	1,690	1,790	1,830
Fuel Cost ($/liter)	-	-	-	-	0.25	0.27	0.29	0.32	0.34	0.33	0.33	0.29
Total VKT (000)	51,396	64,363	69,789	77,744	85,444	91,395	93,766	96,138	98,509	100,878	118,525	126,067
Total Lane-Kilometers	8,813	12,534	13,030	13,510	13,522	13,735	13,809	14,112	15,120	15,805	15,878	17,632
Roadway Congestion Index	0.91	0.95	0.97	1.02	1.09	1.11	1.14	1.14	1.14	1.16	1.17	1.16

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-3. Mobility and Congestion Variables in Austin TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,556	5,104	5,796	6,762	7,245	8,292	8,404	8,533	8,758	8,855	9,097	10,336
Lane-Kilometers	427	451	531	580	612	644	676	684	725	733	741	853
VKT/lane-kilometer	10,679	11,321	10,909	11,667	11,842	12,875	12,429	12,471	12,089	12,088	12,283	12,113
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	50	50	50	55	55	55	55	55	55	55	55	55
Percent of Moderate Congestion	30.00	26.50	30.00	36.45	33.07	40.00	36.40	36.40	32.61	34.26	35.00	26.32
Percent of Heavy Congestion	50.00	55.00	44.00	32.90	26.32	20.00	27.30	30.90	36.40	37.66	35.00	33.53
Percent of Severe Congestion	20.00	18.50	26.00	30.65	40.61	40.00	36.40	32.56	30.90	28.09	30.00	40.15
Principal Arterial Streets												
Daily VKT (000)	2,568	2,753	2,938	3,220	3,526	3,462	3,325	3,301	3,365	3,462	3,542	4,025
Lane-kilometers	547	580	612	644	660	668	676	684	692	700	716	772
VKT/lane-kilometer	4,691	4,750	4,803	5,000	5,341	5,181	4,917	4,824	4,860	4,943	4,944	5,208
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	40	40	45	45	45	45	45	45	45	45	45	50
Percent of Moderate Congestion	15.22	16.36	22.95	18.57	20.00	15.60	30.00	36.62	32.81	33.43	35.00	38.00
Percent of Heavy Congestion	65.33	65.45	59.02	51.43	24.40	33.30	30.00	38.03	34.38	36.72	35.00	31.00
Percent of Severe Congestion	19.44	18.18	18.03	30.00	55.60	51.10	40.00	25.35	32.81	29.85	30.00	31.00
Population (000)	380	380	420	450	465	480	505	520	540	560	565	570
Urban Area (square kilometers)	777	777	829	842	855	881	894	894	907	932	945	958
Population Density	489	489	507	535	544	545	565	582	596	601	598	594
Registered Vehicles (000)	300	300	330	350	370	380	400	410	430	440	450	450
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.30	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	11,433	12,840	13,849	17,457	18,542	18,629	18,776	18,723	19,312	19,243	20,297	24,061
Total Lane-Kilometers	2,500	2,602	3,027	3,470	3,598	3,821	3,975	4,141	4,139	4,143	4,146	4,551
Roadway Congestion Index	0.84	0.88	0.86	0.91	0.94	1.00	0.96	0.96	0.94	0.94	0.95	0.95

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-4. Mobility and Congestion Variables in Baltimore MD

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	16,486	16,986	17,517	19,594	20,954	22,113	22,411	24,440	25,438	26,146	28,336	28,980
Lane-Kilometers	1,586	1,650	1,715	1,932	1,956	1,956	1,964	1,980	2,013	2,045	2,174	2,205
VKT/lane-kilometer	10,396	10,293	10,216	10,142	10,712	11,305	11,410	12,341	12,640	12,787	13,037	13,138
Incident Ratio	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	25	25	25	25	25	25	25	25	30	30
Percent of Moderate Congestion	71.43	80.00	59.09	54.17	59.09	56.76	46.51	24.00	22.64	23.53	28.00	28.97
Percent of Heavy Congestion	28.57	20.00	31.82	20.83	27.27	21.62	20.93	36.00	30.19	27.65	22.00	19.37
Percent of Severe Congestion	-	-	9.09	25.00	13.64	21.62	32.56	40.00	47.17	48.82	50.00	51.66
Principal Arterial Streets												
Daily VKT (000)	12,043	12,526	13,331	13,878	14,377	14,522	14,748	15,013	15,859	15,899	15,939	16,100
Lane-kilometers	2,415	2,439	2,479	2,600	2,640	2,705	2,737	2,697	2,673	2,689	2,689	2,737
VKT/lane-kilometer	4,987	5,135	5,377	5,337	5,445	5,369	5,388	5,567	5,934	5,913	5,928	5,882
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	25	25	30	35	35	35	35	35	35	35	35	40
Percent of Moderate Congestion	13.46	9.43	10.56	12.79	14.29	19.05	19.77	17.44	12.64	8.64	13.79	12.83
Percent of Heavy Congestion	28.85	24.53	21.67	16.69	23.38	13.10	13.95	22.09	12.64	23.46	16.09	20.75
Percent of Severe Congestion	57.69	66.04	67.78	70.52	62.34	67.86	66.28	60.47	74.71	67.90	70.11	66.43
Population (000)	1,700	1,750	1,820	1,840	1,860	1,875	1,905	1,915	1,990	2,020	2,040	2,110
Urban Area (square kilometers)	1,166	1,269	1,347	1,347	1,347	1,360	1,373	1,399	1,489	1,554	1,684	1,851
Population Density	1,459	1,379	1,351	1,366	1,381	1,379	1,388	1,369	1,336	1,300	1,212	1,139
Registered Vehicles (000)	1,300	1,340	1,400	1,420	1,440	1,460	1,480	1,490	1,560	1,580	1,600	1,660
Fuel Cost ($/liter)	-	-	-	-	-	0.28	0.31	0.35	0.38	0.37	0.37	0.34
Total VKT (000)	39,390	42,837	45,843	49,023	51,330	52,955	53,666	56,274	58,562	59,446	62,262	64,572
Total Lane-Kilometers	7,200	7,844	9,077	9,185	9,256	9,333	9,420	9,517	9,576	9,678	10,103	10,157
Roadway Congestion Index	0.84	0.84	0.85	0.84	0.88	0.91	0.92	0.98	1.01	1.02	1.04	1.04

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-5. Mobility and Congestion Variables in Boston MA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,607	27,072	27,845	29,302	32,297	32,530	36,571	35,541	34,792	34,905	35,251	34,615
Lane-Kilometers	2,270	2,278	2,294	2,335	2,367	2,399	2,431	2,439	2,447	2,447	2,439	2,431
VKT/lane-kilometer	11,280	11,883	12,137	12,552	13,646	13,560	15,043	14,571	14,217	14,263	14,452	14,238
Incident Ratio	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	30	30	35	35	40	40	45	45	45	45	45	45
Percent of Moderate Congestion	12.5	20.83	30.00	44.19	30.00	42.86	26.88	17.65	22.86	15.15	13.43	20.66
Percent of Heavy Congestion	33.33	29.17	20.00	11.63	20.00	23.81	28.18	35.29	34.29	34.85	31.34	28.63
Percent of Severe Congestion	54.17	50.00	50.00	44.19	50.00	33.33	44.94	47.06	42.86	50.00	55.22	50.85
Principal Arterial Streets												
Daily VKT (000)	20,536	20,914	21,172	21,711	21,590	22,057	20,705	20,367	20,189	20,125	20,922	22,540
Lane-kilometers	4,154	4,186	4,202	4,218	4,242	4,315	4,331	4,355	4,444	4,444	4,589	4,652
VKT/lane-kilometer	4,944	4,996	5,038	5,147	5,089	5,112	4,781	4,677	4,543	4,529	4,560	4,844
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	35	35	35	35	35	40	40	40	40	40	40
Percent of Moderate Congestion	30.16	18.31	17.00	16	18.92	21.43	21.25	18.67	19.18	28.17	30.43	26.27
Percent of Heavy Congestion	15.87	30.99	23.00	18.67	17.57	11.43	22.50	20.00	16.44	14.08	20.29	21.85
Percent of Severe Congestion	53.97	50.70	60.00	65.33	63.51	67.14	56.25	61.33	64.38	57.75	49.28	51.88
Population (000)	2,850	2,760	2,760	2,760	2,760	2,850	2,905	2,950	2,955	2,955	2,960	2,975
Urban Area (square kilometers)	2,357	2,668	2,668	2,668	2,668	2,681	2,707	2,758	2,771	2,771	2,771	2,849
Population Density	1,209	1,035	1,035	1,035	1,035	1,063	1,073	1,069	1,066	1,066	1,068	1,044
Registered Vehicles (000)	2,320	2,250	2,250	2,260	2,260	2,340	2,390	2,440	2,450	2,450	2,460	2,480
Fuel Cost ($/liter)	-	-	-	-	-	0.26	0.28	0.31	0.36	0.35	0.36	0.33
Total VKT (000)	70,277	72,142	73,154	75,131	78,017	78,779	79,312	82,780	82,659	83,142	84,319	86,762
Total Lane-Kilometers	14,818	14,815	14,815	14,822	14,820	14,822	14,825	14,825	15,010	15,131	15,131	15,531
Roadway Congestion Index	0.9	0.93	0.95	0.98	1.04	1.04	1.12	1.09	1.06	1.06	1.07	1.07

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-6. Mobility and Congestion Variables in Charlotte NC

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,842	3,059	3,220	3,437	3,590	3,711	3,888	4,411	4,653	4,830	5,152	5,635
Lane-Kilometers	403	411	427	435	443	451	451	475	483	483	491	507
VKT/lane-kilometer	7,060	7,451	7,547	7,907	8,109	8,232	8,625	9,288	9,633	10,000	10,492	11,111
Incident Ratio	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	25	25	25	25	30	30	35	35	35
Percent of Moderate Congestion	100.00	100.00	100.00	80.95	93.88	94.12	84.40	84.40	84.40	85.00	54.56	47.11
Percent of Heavy Congestion	-	-	-	19.05	6.12	5.88	15.60	15.60	15.60	15.00	19.30	26.70
Percent of Severe Congestion	-	-	-	-	-	-	-	-	-	-	26.14	26.19
Principal Arterial Streets												
Daily VKT (000)	3,775	4,122	4,202	4,339	4,444	4572	4,580	4,597	4,967	5,136	5,152	5,192
Lane-kilometers	725	741	757	789	805	821	837	853	861	869	934	949
VKT/lane-kilometer	5,211	5,565	5,553	5,500	5,520	5,569	5,471	5,387	5,766	5,907	5,517	5,466
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	45	50	50	55	55	55	60	60	60	60	60	60
Percent of Moderate Congestion	50.85	57.14	57.63	58.57	10.29	16.70	10.80	11.94	4.35	6.33	7.95	5.87
Percent of Heavy Congestion	47.46	14.29	18.64	2.86	54.41	33.30	26.20	22.39	33.33	21.52	22.73	26.01
Percent of Severe Congestion	1.69	28.57	23.73	38.57	35.29	50.00	63.00	65.67	62.32	72.15	69.32	68.35
Population (000)	350	350	355	360	400	415	435	440	450	460	500	515
Urban Area (square kilometers)	518	544	570	583	583	596	596	622	622	673	751	777
Population Density	676	644	623	618	686	697	730	708	724	683	666	662
Registered Vehicles (000)	270	270	270	280	310	320	340	340	350	360	400	410
Fuel Cost ($/liter)	-	-	-	-	-	0.27	0.29	0.32	0.36	0.35	0.35	0.31
Total VKT (000)	10,859	11,283	11,507	12,383	12,399	12,370	13,910	14,823	16,335	17,034	18,333	19,047
Total Lane-Kilometers	2,903	2,964	2,998	3,053	3,078	3,159	3,199	3,299	3,350	3,452	3,655	3,765
Roadway Congestion Index	0.71	0.76	0.76	0.77	0.78	0.79	0.8	0.82	0.86	0.89	0.89	0.92

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
"-" denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-7. Mobility and Congestion Variables in Chicago IL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	40,983	41,602	43,092	46,159	49,821	49,821	51,464	55,448	61,228	62,758	63,112	65,953
Lane-Kilometers	3,292	3,309	3,341	3,429	3,510	3,518	3,550	3,703	3,904	3,920	3,928	4,161
VKT/lane-kilometer	12,447	12,574	12,899	13,460	14,195	14,162	14,497	14,974	15,682	16,008	16,066	15,847
Incident Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	50	50	55	55	55	55	55	55	55	55	60	60
Percent of Moderate Congestion	18.52	28.30	14.52	9.21	6.76	9.21	10.90	16.44	12.16	13.33	17.33	18.11
Percent of Heavy Congestion	29.63	35.85	20.97	15.79	14.86	22.37	21.80	15.07	20.27	16.00	12.00	12.13
Percent of Severe Congestion	51.85	35.85	64.52	75.00	78.38	68.42	69.10	68.49	67.57	70.67	70.67	69.76
Principal Arterial Streets												
Daily VKT (000)	33,665	34,776	36,322	36,821	40,218	40,194	41,965	45,048	47,415	50,771	52,808	56,350
Lane-kilometers	5,587	5,780	5,949	5,989	6,005	6,021	6,046	6,521	6,859	7,181	7,487	8,211
VKT/lane-kilometer	6,026	6,017	6,106	6,148	6,697	6,675	6,941	6,909	6,913	7,071	7,054	6,862
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	60	65	65	70	70	70	65	65	65	65	70	65
Percent of Moderate Congestion	23.88	24.24	23.19	24.69	16.05	20.24	22.08	20.00	24.68	22.82	18.75	20.26
Percent of Heavy Congestion	35.82	36.36	24.64	11.11	14.81	11.90	23.38	26.25	28.57	28.46	31.25	35.32
Percent of Severe Congestion	40.30	39.39	52.17	64.20	69.14	67.86	54.55	53.75	46.75	48.72	50.00	44.55
Population (000)	7,080	7,100	7,100	7,100	7,160	7,200	7,340	7,405	7,510	7,515	7,515	7,600
Urban Area (square kilometers)	4,921	5,076	5,076	5,076	5,076	5,076	5,154	5,141	5,154	5,154	5,154	5,957
Population Density	1,439	1,399	1,399	1,399	1,410	1,418	1,424	1,440	1,457	1,458	1,458	1,275
Registered Vehicles (000)	5,320	5,350	5,370	5,380	5,440	5,490	5,610	5,670	5,770	5,790	5,790	5,870
Fuel Cost ($/liter)	-	-	-	-	-	0.28	0.31	0.34	0.39	0.37	0.38	0.33
Total VKT (000)	154,252	158,715	163,536	166,839	172,969	176,435	181,944	192,622	198,788	203,567	204,840	220,864
Total Lane-Kilometers	30,490	30,542	30,577	30,501	30,547	30,780	30,815	30,943	31,087	31,131	31,342	34,624
Roadway Congestion Index	1.02	1.02	1.05	1.08	1.15	1.15	1.18	1.21	1.25	1.27	1.28	1.26

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-8. Mobility and Congestion Variables in Cincinnati OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,661	13,661	13,935	14,240	14,345	15,392	15,698	17,533	18,322	18,676	19,175	20,712
Lane-Kilometers	1,208	1,272	1,304	1,320	1,320	1,360	1,360	1,433	1,457	1,465	1,473	1,553
VKT/lane-kilometer	11,313	10,741	10,685	10,787	10,866	11,314	11,538	12,236	12,575	12,747	13,016	13,331
Incident Ratio	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	20	20	20	20	20	25	30	30	30	30	35	35
Percent of Moderate Congestion	96.43	80.77	56.25	47.27	55.00	65.52	54.05	66.67	60.00	57.50	47.91	31.40
Percent of Heavy Congestion	-	15.38	33.75	40.00	35.00	27.59	35.14	23.08	26.7	32.08	38.60	44.77
Percent of Severe Congestion	3.57	3.85	10.00	12.73	10.00	6.90	10.81	10.26	13.3	10.42	13.49	23.61
Principal Arterial Streets												
Daily VKT (000)	4,862	5,096	5,192	5,297	5,216	5,337	5,530	5,828	5,909	6,923	7,245	7,084
Lane-kilometers	1,248	1,248	1,248	1,256	1,256	1,272	1,280	1,280	1,320	1,328	1,328	1,328
VKT/lane-kilometer	3,897	4,084	4,161	4,218	4,154	4,196	4,321	4,553	4,476	5,212	5,455	5,333
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	20	20	20	25	25	25	25	25	25	30	30	30
Percent of Moderate Congestion	40.74	42.86	33.33	25.81	34.29	43.24	21.62	41.03	40.00	38.00	32.77	36.37
Percent of Heavy Congestion	37.04	37.61	40.00	48.39	28.57	24.32	29.73	12.82	12.50	14.27	22.55	25.16
Percent of Severe Congestion	22.22	19.52	26.67	25.81	37.14	32.43	48.65	46.15	47.50	47.73	44.68	38.24
Population (000)	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,140	1,140	1,200	1,220	1,250
Urban Area (square kilometers)	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,463	1,476	1,528	1,632	1,657
Population Density	779	779	779	779	779	779	779	779	772	785	748	754
Registered Vehicles (000)	870	870	870	870	880	880	880	880	880	930	950	970
Fuel Cost ($/liter)	-	-	-	-	-	0.27	0.3	0.34	0.36	0.35	0.35	0.31
Total VKT (000)	31,624	32,487	33,061	33,491	33,940	35,396	36,117	36,987	38,709	42,692	44,869	46,290
Total Lane-Kilometers	5,822	5,848	5,918	5,963	6,015	6,021	6,055	6,091	6,097	6,128	6,360	6,683
Roadway Congestion Index	0.86	0.83	0.82	0.83	0.84	0.87	0.88	0.94	0.96	0.99	1.01	1.03

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-9. Mobility and Congestion Variables in Cleveland OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	16,100	16,454	16,760	16,189	17,235	18,008	20,399	21,268	22,057	22,492	22,798	24,101
Lane-Kilometers	1,546	1,546	1,546	1,546	1,546	1,546	1,594	1,707	1,852	1,868	1,900	1,915
VKT/lane-kilometer	10,417	10,646	10,844	10,474	11,151	11,651	12,798	12,462	11,913	12,043	12,000	12,579
Incident Ratio	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	20	20	25	25	25	25	25	30	30	30	30	35
Percent of Moderate Congestion	100.00	100.00	81.82	69.23	69.23	64.29	54.55	50.00	60.00	60.00	51.61	46.66
Percent of Heavy Congestion	-	-	18.18	23.08	23.08	28.57	40.90	36.67	32.00	30.00	22.58	23.64
Percent of Severe Congestion	-	-	-	7.69	7.69	7.14	4.55	13.33	8.00	10.00	25.81	29.70
Principal Arterial Streets												
Daily VKT (000)	7,237	7,285	7,317	7,462	7,615	7,792	8,066	8,509	9,644	9,741	10,143	9,982
Lane-kilometers	1,771	1,771	1,771	1,771	1,771	1,771	1,787	1,795	1,803	1,811	1,835	1,843
VKT/lane-kilometer	4,086	4,114	4,132	4,214	4,300	4,400	4,514	4,740	5,348	5,378	5,526	5,414
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	20	20	20	20	20	25	30	30	30	30	35	30
Percent of Moderate Congestion	100.00	100.00	100.00	100.00	61.54	42.31	46.55	34.33	34.85	35.97	21.11	25.79
Percent of Heavy Congestion	-	-	-	-	38.46	57.69	44.83	41.79	33.33	33.73	45.56	41.47
Percent of Severe Congestion	-	-	-	-	-	-	8.62	23.88	31.82	30.30	33.33	32.27
Population (000)	1,750	1,750	1,750	1,750	1,750	1,750	1,785	1,785	1,790	1,790	1,790	1,800
Urban Area (square kilometers)	1,632	1,632	1,632	1,632	1,632	1,632	1,658	1,658	1,671	1,671	1,709	1,813
Population Density	1,073	1,073	1,073	1,073	1,073	1,073	1,077	1,077	1,072	1,072	1,047	992
Registered Vehicles (000)	1,320	1,320	1,320	1,320	1,320	1,320	1,350	1,350	1,360	1,360	1,360	1,370
Fuel Cost ($/liter)	-	-	-	-	-	0.27	0.3	0.34	0.36	0.35	0.35	0.31
Total VKT (000)	40,224	41,557	42,335	42,087	43,647	44,824	47,857	50,878	53,080	55,437	56,239	56,377
Total Lane-Kilometers	8,211	8,243	8,296	8,301	8,628	8,869	8,879	8,898	8,913	8,915	8,939	8,904
Roadway Congestion Index	0.8	0.82	0.83	0.81	0.86	0.89	0.97	0.96	0.94	0.95	0.95	0.98

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-10. Mobility and Congestion Variables in Columbus OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,708	10,401	10,546	10,731	11,769	12,381	12,630	13,041	14,490	14,893	15,231	15,697
Lane-Kilometers	1,135	1,159	1,175	1,208	1,232	1,248	1,264	1,272	1,288	1,296	1,304	1,328
VKT/lane-kilometer	8,553	8,972	8,973	8,887	9,556	9,923	9,994	10,253	11,250	11,491	11,679	11,818
Incident Ratio	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	25	25	25	25	25	25	25	25	30	30	30	30
Percent of Moderate Congestion	25.00	29.03	28.00	37.93	25.93	7.14	6.43	12.00	8.00	9.68	9.68	7.16
Percent of Heavy Congestion	47.69	45.16	28.00	24.14	44.44	39.29	40.00	40.00	40.00	39.68	29.68	32.97
Percent of Severe Congestion	27.31	25.81	44.00	37.93	29.63	53.57	53.57	48.00	52.00	50.65	60.65	59.87
Principal Arterial Streets												
Daily VKT (000)	3,679	3,977	4,033	4,073	4,186	4,291	4,452	4,894	5,120	5,490	5,756	5,635
Lane-kilometers	902	918	942	950	950	958	966	966	982	998	1,022	1,030
VKT/lane-kilometer	4,080	4,333	4,282	4,288	4,407	4,479	4,608	5,067	5,213	5,500	5,630	5,468
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	30	35	35	35	40	40	40	45	45	45	50	50
Percent of Moderate Congestion	20.59	69.05	63.27	55.56	43.40	35.71	14.04	12.77	18.52	19.64	21.48	26.11
Percent of Heavy Congestion	52.94	19.05	28.57	37.04	28.30	37.50	59.65	55.32	33.33	32.14	17.41	16.94
Percent of Severe Congestion	26.47	11.90	8.16	7.41	28.30	26.79	26.32	31.91	48.15	48.21	61.11	56.94
Population (000)	835	835	835	835	835	840	840	840	850	900	950	980
Urban Area (square kilometers)	790	790	790	790	790	790	790	790	803	816	907	1,036
Population Density	1,057	1,057	1,057	1,057	1,057	1,063	1,063	1,063	1,059	1,103	1,048	945
Registered Vehicles (000)	650	650	650	650	650	660	660	660	670	710	750	780
Fuel Cost ($/liter)	-	-	-	-	-	0.27	0.3	0.34	0.36	0.35	0.35	0.31
Total VKT (000)	20,057	20,742	21,033	21,413	22,247	23,029	23,857	26,512	29,597	33,269	34,156	34,890
Total Lane-Kilometers	4,589	4,746	4,867	5,038	5,041	5,052	5,102	5,141	5,142	5,146	5,175	5,430
Roadway Congestion Index	0.68	0.71	0.71	0.71	0.75	0.78	0.79	0.82	0.89	0.91	0.93	0.93

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-11. Mobility and Congestion Variables in Corpus Christi TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,093	2,206	2,190	2,254	2,286	2,415	2,431	2,447	2,512	2,584	2,697	3,139
Lane-Kilometers	258	266	266	266	274	290	298	298	298	299	303	338
VKT/lane-kilometer	8,125	8,303	8,242	8,485	8,353	8,333	8,162	8,216	8,432	8,629	8,910	9,285
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	10	10	10	10	10	10	15	15
Percent of Moderate Congestion	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100	90.00	78.18	72.70
Percent of Heavy Congestion	-	-	-	-	-	-	-	-	-	10.00	21.82	27.30
Percent of Severe Congestion	-	-	-	-	-	-	-	-	-	-	-	-
Principal Arterial Streets												
Daily VKT (000)	2,013	2,093	2,174	2,206	2,254	2,399	2,318	2,335	2,447	2,487	2,632	2,576
Lane-kilometers	499	507	515	515	515	515	523	531	539	564	602	595
VKT/lane-kilometer	4,032	4,127	4,219	4,281	4,375	4,656	4,431	4,394	4,537	4,414	4,372	4,324
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	10	10	10	10	10	10	10	10	10	15	15	15
Percent of Moderate Congestion	25.49	16.07	20.00	22.22	24.24	21.31	23.53	56.41	67.39	66.25	57.58	67.64
Percent of Heavy Congestion	30.00	28.57	50.00	60.00	46.97	47.54	61.76	30.77	21.74	20.63	33.33	32.36
Percent of Severe Congestion	44.51	55.36	30.00	17.78	28.79	31.15	14.71	12.82	10.87	13.13	9.09	-
Population (000)	250	250	250	260	270	275	275	275	280	285	285	290
Urban Area (square kilometers)	440	440	440	440	453	453	453	453	453	466	466	479
Population Density	568	568	568	591	596	607	607	607	618	611	611	605
Registered Vehicles (000)	180	180	180	190	200	200	200	200	200	210	210	210
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	8,554	8,705	8,630	8,874	9,869	10,119	10,074	10,259	10,546	10,702	10,727	10,679
Total Lane-Kilometers	2,280	2,355	2,486	2,573	2,668	2,813	2,908	3,017	3,019	3,030	3,043	3,059
Roadway Congestion Index	0.67	0.69	0.69	0.71	0.71	0.72	0.7	0.7	0.72	0.72	0.74	0.75

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-12. Mobility and Congestion Variables in Dallas TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	27,161	29,624	32,079	33,971	36,346	35,581	36,032	36,458	38,125	38,479	39,445	40,089
Lane-Kilometers	2,496	2,544	2,608	2,640	2,657	2,673	2,697	2,721	2,753	2,761	2,818	2,865
VKT/lane-kilometer	10,884	11,646	12,299	12,866	13,682	13,313	13,361	13,399	13,848	13,936	14,000	13,988
Incident Ratio	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	45	50	50	50	55	55	55	55	55	55	55	55
Percent of Moderate Congestion	20.00	26.47	33.33	39.02	12.96	34.55	29.41	31.48	22.41	21.43	22.95	27.95
Percent of Heavy Congestion	10.00	8.82	13.33	19.51	24.07	20.00	15.69	24.07	29.31	25.00	31.15	33.73
Percent of Severe Congestion	70.00	64.71	53.33	41.46	62.96	45.45	54.90	44.44	48.28	53.57	45.90	38.32
Principal Arterial Streets												
Daily VKT (000)	10,368	11,326	12,300	12,800	13,250	13,202	13,122	13,250	13,379	13,524	13,766	14,651
Lane-kilometers	2,504	2,568	2,657	2,697	2,705	2,721	2,729	2,729	2,753	2,769	2,818	2,881
VKT/lane-kilometer	4,141	4,411	4,630	4,746	4,899	4,852	4,808	4,855	4,860	4,884	4,886	5,083
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	25	25	30	30	30	30	35	35	35	35	35	40
Percent of Moderate Congestion	33.33	17.24	46.81	51.85	51.06	44.15	43.24	38.95	46.34	42.86	45.65	38.99
Percent of Heavy Congestion	66.67	72.76	21.28	22.22	31.91	31.46	43.24	42.11	26.83	30.82	26.09	31.01
Percent of Severe Congestion	-	10.00	31.91	25.93	17.02	24.39	13.51	18.95	26.83	26.33	28.26	30.00
Population (000)	1,810	1,830	1,845	1,865	1,890	1,910	1,950	1,970	1,990	2,070	2,080	2,090
Urban Area (square kilometers)	3,548	3,587	3,600	3,626	3,652	3,678	3,717	3,724	3,730	3,756	3,756	3,768
Population Density	510	510	512	514	518	519	525	529	534	551	554	554
Registered Vehicles (000)	1,380	1,400	1,420	1,430	1,460	1,470	1,510	1,520	1,540	1,610	1,620	1,630
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	61,898	65,166	68,027	72,291	78,611	78,911	79,529	81,001	80,709	81,828	81,949	85,330
Total Lane-Kilometers	14,590	15,166	15,731	16,382	17,042	18,014	18,769	19,822	19,827	20,125	20,608	20,930
Roadway Congestion Index	0.84	0.89	0.94	0.98	1.04	1.02	1.02	1.02	1.05	1.06	1.07	1.07

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-13. Mobility and Congestion Variables in Denver CO

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,363	13,588	14,071	14,571	14,957	15,376	16,889	17,275	18,145	18,394	20,125	21,332
Lane-Kilometers	1,280	1,280	1,288	1,288	1,312	1,377	1,385	1,385	1,425	1,441	1,546	1,593
VKT/lane-kilometer	10,440	10,616	10,925	11,313	11,399	11,170	12,198	12,477	12,734	12,765	13,021	13,383
Incident Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	45	45	45	45	50	50	50	50	50	55	55	55
Percent of Moderate Congestion	67.92	40.00	8.89	34.78	33.33	30.77	23.08	29.41	22.39	22.06	24.19	19.81
Percent of Heavy Congestion	28.30	42.22	60.00	32.61	29.41	36.54	42.31	37.25	26.87	32.35	27.42	20.44
Percent of Severe Congestion	3.77	17.78	31.11	32.61	37.25	32.69	34.62	33.33	50.75	45.59	48.39	59.75
Principal Arterial Streets												
Daily VKT (000)	14,748	15,134	16,269	16,857	17,195	17,066	16,816	17,066	17,549	17,388	17,710	17,871
Lane-kilometers	2,809	2,874	2,874	2,874	2,890	2,946	2,954	2,962	2,979	2,979	2,995	2,994
VKT/lane-kilometer	5,249	5,266	5,661	5,866	5,950	5,792	5,692	5,761	5,892	5,838	5,914	5,967
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	50	50	50	50	50	50	50	50	50	50	50	55
Percent of Moderate Congestion	51.92	34.00	24.49	44.07	50.00	52.94	54.72	36.84	22.00	14.06	23.81	22.70
Percent of Heavy Congestion	5.77	24.00	12.24	22.03	19.64	23.53	24.53	28.07	28.00	29.69	19.05	20.95
Percent of Severe Congestion	42.31	42.00	63.27	33.90	30.36	23.53	20.75	35.09	50.00	56.25	57.14	56.35
Population (000)	1,350	1,350	1,450	1,485	1,500	1,510	1,550	1,565	1,580	1,580	1,600	1,610
Urban Area (square kilometers)	2,150	2,150	2,176	2,214	2,240	2,266	2,292	2,292	2,305	2,305	2,331	2,382
Population Density	628	628	666	671	670	666	676	683	685	685	686	675
Registered Vehicles (000)	1,080	1,080	1,160	1,190	1,200	1,210	1,240	1,260	1,270	1,270	1,290	1,290
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.32	0.32	0.37	0.36	0.37	0.34
Total VKT (000)	43,166	43,800	44,206	44,737	44,731	45,790	46,481	46,529	46,561	46,624	51,240	55,886
Total Lane-Kilometers	8,213	8,673	9,072	9,180	9,249	9,394	9,436	9,475	9,547	9,586	10,164	10,268
Roadway Congestion Index	0.88	0.89	0.93	0.96	0.97	0.95	0.99	1.01	1.03	1.03	1.05	1.07

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}{\frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-14. Mobility and Congestion Variables in Detroit MI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	32,522	31,645	33,416	34,543	34,889	35,098	37,062	39,526	41,932	44,114	46,046	47,495
Lane-Kilometers	2,383	2,383	2,399	2,496	2,544	2,592	2,640	2,721	2,801	2,866	2,930	2,938
VKT/lane-kilometer	13,649	13,280	13,930	13,842	13,715	13,540	14,037	14,527	14,968	15,393	15,714	16,164
Incident Ratio	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	40	35	40	35	40	40	45	45	45	45	45	50
Percent of Moderate Congestion	42.55	33.33	32.00	30.00	31.25	33.33	23.88	24.19	25.00	21.13	19.70	17.28
Percent of Heavy Congestion	31.91	33.33	32.00	30.00	26.56	16.67	17.91	11.29	11.67	12.90	9.09	9.80
Percent of Severe Congestion	25.53	33.33	36.00	40.00	42.19	50.00	58.21	64.52	63.33	65.97	71.21	72.92
Principal Arterial Streets												
Daily VKT (000)	31,121	30,445	30,791	30,968	31,306	31,467	31,669	31,910	33,609	35,710	39,445	41,860
Lane-kilometers	5,716	5,748	5,796	5,860	5,957	6,038	6,150	6,247	6,279	6,480	6,875	6,923
VKT/lane-kilometer	5,445	5,297	5,313	5,284	5,255	5,212	5,149	5,108	5,353	5,511	5,738	6,046
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	60	55	60	55	60	60	60	60	65	65	65	65
Percent of Moderate Congestion	41.18	44.44	20.00	10.00	6.52	6.25	15.05	8.24	13.79	12.87	8.24	14.83
Percent of Heavy Congestion	14.71	11.11	30.00	20.00	10.87	9.38	7.53	12.94	19.54	21.97	24.71	12.47
Percent of Severe Congestion	44.12	44.44	50.00	70.00	82.61	84.38	77.42	78.82	66.67	65.17	67.06	72.70
Population (000)	3,810	3,810	3,810	3,885	3,885	3,885	3,900	3,900	4,000	3,985	4,000	4,000
Urban Area (square kilometers)	2,823	2,953	3,082	3,212	3,225	3,225	3,238	3,238	3,250	3,263	3,341	3,354
Population Density	1,350	1,290	1,236	1,210	1,205	1,205	1,205	1,205	1,231	1,221	1,197	1,192
Registered Vehicles (000)	2,790	2,790	2,800	2,850	2,850	2,860	2,870	2,870	2,940	2,930	2,950	2,950
Fuel Cost ($/liter)	-	-	-	-	-	0.28	0.3	0.33	0.36	0.35	0.35	0.31
Total VKT (000)	99,804	100,884	102,407	106,888	116,150	115,659	123,363	127,274	129,159	131,023	133,918	138,047
Total Lane-Kilometers	19,747	19,756	19,808	20,653	20,631	20,640	20,658	20,663	20,777	20,858	20,716	20,723
Roadway Congestion Index	1.06	1.03	1.07	1.06	1.05	1.04	1.07	1.09	1.13	1.16	1.19	1.23

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-15. Mobility and Congestion Variables in El Paso TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,122	4,331	4,508	5,023	5,506	5,152	5,345	5,313	5,361	5,458	5,635	5,957
Lane-Kilometers	523	539	555	555	555	564	564	564	564	572	572	595
VKT/lane-kilometer	7,877	8,030	8,116	9,043	9,913	9,143	9,486	9,429	9,514	9,549	9,859	10,000
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	15	15	15	20	20	20	20	20	20	20	25	25
Percent of Moderate Congestion	100.00	100.00	100.00	100.00	75.00	36.11	34.29	45.00	50.00	52.89	43.90	42.90
Percent of Heavy Congestion	-	-	-	-	25.00	63.89	65.71	55.00	43.33	42.11	44.00	48.06
Percent of Severe Congestion	-	-	-	-	-	-	-	-	6.67	5.00	12.10	9.04
Principal Arterial Streets												
Daily VKT (000)	4,186	4,355	4,540	4,637	4,693	4,830	5,007	5,112	5,152	5,273	5,353	5,377
Lane-kilometers	1,224	1,256	1,288	1,288	1,296	1,296	1,296	1,336	1,344	1,352	1,377	1,384
VKT/lane-kilometer	3,421	3,468	3,525	3,600	3,621	3,727	3,863	3,825	3,832	3,899	3,889	3,883
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	5	5	5	5	5	5	10	10
Percent of Moderate Congestion	27.03	31.58	59.26	60.00	60.00	60.71	60.00	57.83	25.00	28.57	33.33	28.71
Percent of Heavy Congestion	72.97	68.42	40.74	40.00	40.00	39.29	40.00	31.74	48.75	27.86	16.67	19.51
Percent of Severe Congestion	-	-	-	-	-	-	-	10.43	26.25	43.57	50.00	51.78
Population (000)	450	450	450	455	480	500	510	520	540	560	565	570
Urban Area (square kilometers)	389	492	466	479	492	518	531	531	544	544	544	569
Population Density	1,158	914	965	950	975	965	961	979	993	1,030	1,039	1,000
Registered Vehicles (000)	310	310	320	320	340	350	360	370	390	400	410	410
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	10,599	10,840	11,098	11,927	12,516	13,218	14,327	14,659	15,224	15,281	15,395	16,858
Total Lane-Kilometers	2,343	2,436	2,595	2,695	2,805	3,135	3,600	4,273	4,273	4,381	4,381	4,904
Roadway Congestion Index	0.63	0.64	0.65	0.70	0.75	0.71	0.74	0.74	0.74	0.75	0.76	0.77

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}{}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-16. Mobility and Congestion Variables in Fort Worth TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,886	14,860	15,593	16,213	17,308	17,710	17,952	18,161	19,062	19,803	20,608	21,091
Lane-Kilometers	1,457	1,505	1,554	1,570	1,570	1,594	1,610	1,634	1,642	1,658	1,691	1,722
VKT/lane-kilometer	9,530	9,872	10,036	10,328	11,026	11,111	11,150	11,113	11,608	11,942	12,190	12,242
Incident Ratio	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	30	35	35	35	40	40	40	40	40	40	40	45
Percent of Moderate Congestion	30.00	26.47	33.33	39.02	12.96	34.55	29.41	31.48	22.41	21.43	22.95	27.94
Percent of Heavy Congestion	10.00	8.82	13.33	19.51	24.07	20.00	15.69	24.07	29.31	25.00	31.15	33.73
Percent of Severe Congestion	60.00	64.71	53.33	41.46	62.96	45.45	54.90	44.44	48.28	53.57	45.90	38.32
Principal Arterial Streets												
Daily VKT (000)	5,893	6,190	6,464	6,665	6,843	6,843	6,762	6,794	6,826	6,843	6,987	7,567
Lane-kilometers	1,264	1,288	1,328	1,352	1,369	1,385	1,393	1,393	1,401	1,417	1,449	1,513
VKT/lane-kilometer	4,662	4,806	4,867	4,929	5,000	4,942	4,855	4,879	4,874	4,830	4,822	5,000
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	25	25	30	30	30	30	30	30	30	30	30	30
Percent of Moderate Congestion	40.00	50.00	46.81	51.85	51.06	34.15	43.24	28.95	46.34	42.86	45.65	38.99
Percent of Heavy Congestion	30.00	20.00	21.28	22.22	31.91	41.46	43.24	42.11	26.83	30.82	26.09	31.01
Percent of Severe Congestion	30.00	30.00	31.91	25.93	17.02	24.39	13.51	28.95	26.83	26.33	28.26	30.00
Population (000)	1,085	1,090	1,095	1,100	1,120	1,130	1,150	1,165	1,200	1,200	1,200	1,210
Urban Area (square kilometers)	2,098	2,098	2,111	2,124	2,137	2,150	2,189	2,189	2,202	2,202	2,202	2,214
Population Density	517	520	519	518	524	526	525	532	545	545	545	546
Registered Vehicles (000)	820	830	830	840	850	860	880	890	910	910	910	920
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	33,329	35,090	36,629	38,925	42,330	42,490	42,823	43,617	45,193	46,413	47,347	47,978
Total Lane-Kilometers	7,857	8,166	8,472	8,821	9,177	9,700	10,106	10,674	10,676	11,038	11,049	11,109
Roadway Congestion Index	0.76	0.79	0.80	0.82	0.87	0.87	0.87	0.87	0.90	0.92	0.94	0.95

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}{}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-17. Mobility and Congestion Variables in Ft. Lauderdale FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,597	8,630	8,758	8,968	9,177	9,982	10,385	10,996	11,439	11,479	12,478	13,685
Lane-Kilometers	837	845	853	869	894	902	934	950	966	966	1,047	1,094
VKT/lane-kilometer	10,269	10,210	10,264	10,315	10,270	11,071	11,121	11,576	11,842	11,883	11,923	12,500
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	20	25	30	30	35	40	40	40	40
Percent of Moderate Congestion	45.16	50.79	40.00	37.74	60.00	60.00	60.00	60.00	60.00	56.67	40.43	27.29
Percent of Heavy Congestion	19.35	19.20	25.00	26.42	20.00	20.00	20.00	28.00	32.00	33.33	45.57	53.72
Percent of Severe Congestion	35.48	30.00	35.00	35.85	20.00	20.00	20.00	12.00	8.00	10.00	14.00	18.84
Principal Arterial Streets												
Daily VKT (000)	8,791	8,694	8,710	8,694	8,662	8,855	8,919	9,024	9,338	9,660	10,224	10,304
Lane-kilometers	1,642	1,674	1,691	1,707	1,715	1,723	1,755	1,771	1,795	1,811	1,852	1,964
VKT/lane-kilometer	5,353	5,192	5,152	5,094	5,052	5,140	5,083	5,095	5,202	5,333	5,522	5,245
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	45	45	45	50	50	50	50	50	50	50	50	50
Percent of Moderate Congestion	60.53	55.56	36.47	24.36	11.54	12.35	10.14	20.00	14.30	18.81	25.46	36.26
Percent of Heavy Congestion	30.00	33.33	31.76	43.59	28.21	34.57	40.58	35.70	38.60	34.33	34.54	29.53
Percent of Severe Congestion	9.47	11.11	31.76	32.05	60.26	53.09	49.28	44.30	47.10	46.87	40.00	34.09
Population (000)	1,065	1,090	1,105	1,135	1,165	1,170	1,205	1,255	1,270	1,275	1,285	1,300
Urban Area (square kilometers)	881	1,010	1,036	1,036	1,036	1,062	1,088	1,114	1,114	1,114	1,127	1,139
Population Density	1,209	1,079	1,067	1,096	1,125	1,102	1,108	1,127	1,140	1,145	1,141	1,140
Registered Vehicles (000)	880	900	920	940	970	970	1,000	1,040	1,060	1,060	1,070	1,080
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.34	0.36	0.35	0.35	0.33
Total VKT (000)	30,010	30,229	30,976	32,250	32,762	35,634	35,979	38,273	39,121	40,902	45,854	45,672
Total Lane-Kilometers	5,284	5,379	5,505	5,517	5,542	6,055	6,773	6,783	6,791	6,791	6,802	6,787
Roadway Congestion Index	0.87	0.86	0.86	0.85	0.85	0.90	0.90	0.92	0.94	0.95	0.96	0.98

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-18. Mobility and Congestion Variables in Hartford CT

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,955	7,760	8,589	8,605	8,919	9,443	9,757	9,950	10,022	10,046	10,868	11,310
Lane-Kilometers	725	805	829	837	861	886	886	934	934	934	974	982
VKT/lane-kilometer	9,600	9,640	10,359	10,279	10,355	10,664	11,018	10,655	10,733	10,759	11,157	11,516
Incident Ratio	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	10	10	10	10	10	10	15	15	15	15	15	20
Percent of Moderate Congestion	90.00	90.00	80.00	80.77	48.15	50.00	43.75	38.57	35.00	38.82	26.67	30.00
Percent of Heavy Congestion	10.00	10.00	20.00	19.23	33.33	32.14	25.00	35.71	38.75	35.29	41.11	48.64
Percent of Severe Congestion	-	-	-	-	18.52	17.86	31.25	25.71	26.25	25.88	32.22	21.36
Principal Arterial Streets												
Daily VKT (000)	3,784	4,532	5,023	5,104	5,176	5,160	5,506	5,860	6,038	6,118	6,182	6,101
Lane-kilometers	869	894	902	918	942	942	942	998	1,022	1,047	1,055	1,054
VKT/lane-kilometer	4,352	5,072	5,571	5,561	5,496	5,479	5,846	5,871	5,906	5,846	5,863	5,786
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	20	25	25	25	25	30	30	35	35	35	35	35
Percent of Moderate Congestion	35.56	43.75	25.00	23.53	13.73	29.41	29.63	26.79	34.92	40.91	33.33	30.75
Percent of Heavy Congestion	48.89	41.67	41.67	41.18	50.98	45.10	42.59	44.64	34.92	31.82	36.11	36.81
Percent of Severe Congestion	15.56	14.58	33.33	35.29	35.29	25.49	27.78	28.57	30.16	27.27	30.56	32.44
Population (000)	565	570	575	575	585	590	600	605	610	610	615	620
Urban Area (square kilometers)	907	919	919	919	919	932	932	932	932	932	945	945
Population Density	623	620	625	625	636	633	644	649	654	654	651	655
Registered Vehicles (000)	420	430	430	430	440	440	450	460	460	460	470	470
Fuel Cost ($/liter)	-	-	-	-	-	0.29	0.32	0.36	0.38	0.37	0.37	0.36
Total VKT (000)	15,305	17,630	18,380	19,183	19,930	21,233	21,841	21,883	22,376	22,571	24,308	23,370
Total Lane-Kilometers	3,006	3,716	3,742	3,755	3,774	3,780	3,806	3,838	3,856	3,875	4,096	4,063
Roadway Congestion Index	0.76	0.79	0.86	0.85	0.85	0.87	0.90	0.89	0.89	0.89	0.91	0.93

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-19. Mobility and Congestion Variables in Honolulu HI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	5,957	6,029	6,223	6,424	6,770	6,979	7,100	7,285	7,438	7,567	8,195	8,855
Lane-Kilometers	523	523	531	531	531	531	531	547	547	547	604	635
VKT/lane-kilometer	11,385	11,523	11,712	12,091	12,742	13,136	13,364	13,309	13,588	13,824	13,573	13,924
Incident Ratio	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	40	40	45	45	45	45	50	50	50	50	50	50
Percent of Moderate Congestion	9.68	3.57	6.90	17.14	24.40	26.10	20.45	20.83	22.64	19.09	15.00	20.48
Percent of Heavy Congestion	32.26	25.00	20.69	12.86	13.30	13.90	22.73	20.83	26.42	26.36	30.00	20.48
Percent of Severe Congestion	58.06	71.43	72.41	70.00	62.20	60.00	56.82	58.33	50.94	54.55	55.00	59.29
Principal Arterial Streets												
Daily VKT (000)	1,996	2,093	2,125	2,004	2,318	2,343	2,455	2,504	2,529	2,608	2,809	3,107
Lane-kilometers	322	322	322	330	338	346	346	354	362	370	378	394
VKT/lane-kilometer	6,200	6,500	6,600	6,073	6,857	6,767	7,093	7,068	6,982	7,043	7,426	7,877
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	65	65	65	70	70	70	70	70	70	70	75	75
Percent of Moderate Congestion	28.17	30.56	22.11	31.43	32.88	51.43	45.07	40.58	40.48	37.14	22.09	26.90
Percent of Heavy Congestion	29.58	25.00	23.42	24.29	23.29	21.43	18.31	17.39	16.67	14.52	11.63	9.36
Percent of Severe Congestion	42.25	44.44	54.47	44.29	43.84	27.14	36.62	42.03	42.86	48.33	66.28	63.63
Population (000)	570	580	585	585	595	610	655	660	660	670	685	690
Urban Area (square kilometers)	298	298	311	311	337	337	350	350	350	389	466	466
Population Density	1,914	1,947	1,882	1,882	1,767	1,812	1,873	1,888	1,888	1,725	1,469	1,480
Registered Vehicles (000)	460	470	470	480	490	500	540	550	550	560	570	580
Fuel Cost ($/liter)	-	-	-	-	0.29	0.31	0.34	0.37	0.44	0.43	0.43	0.42
Total VKT (000)	14,092	14,284	14,421	14,936	16,379	17,023	17,348	18,087	18,302	18,439	18,454	18,300
Total Lane-Kilometers	1,235	1,270	1,277	1,319	1,354	1,370	1,381	1,396	1407	1,389	1,439	1,465
Roadway Congestion Index	0.92	0.94	0.95	0.96	1.03	1.05	1.07	1.07	1.09	1.10	1.10	1.13

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-20. Mobility and Congestion Variables in Houston TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	33,939	36,314	39,252	38,825	38,825	41,538	43,631	44,500	45,450	47,495	49,105	51,520
Lane-Kilometers	2,214	2,270	2,383	2,383	2,431	2,640	2,882	2,995	3,091	3,244	3,341	3,461
VKT/lane-kilometer	15,331	15,996	16,473	16,294	15,970	15,732	15,140	14,860	14,703	14,640	14,699	14,883
Incident Ratio	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	65	65	70	70	75	70	70	70	70	70	70	70
Percent of Moderate Congestion	3.03	20.31	16.90	18.06	11.11	17.81	15.71	9.72	8.57	11.05	14.86	8.95
Percent of Heavy Congestion	13.64	15.63	16.90	12.50	19.75	12.33	15.71	27.78	30.00	27.63	25.68	38.43
Percent of Severe Congestion	83.33	64.06	66.20	69.44	69.14	69.86	68.57	62.50	61.43	61.32	59.46	52.62
Principal Arterial Streets												
Daily VKT (000)	15,657	16,664	17,485	17,469	17,404	16,905	16,406	16,744	17,436	17,549	17,935	18,354
Lane-kilometers	2,874	2,970	3,091	3,107	3,148	3,172	3,188	3,236	3,429	3,502	3,510	3,542
VKT/lane-kilometer	5,448	5,610	5,656	5,622	5,529	5,330	5,146	5,174	5,085	5,011	5,110	5,181
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	50	50	55	55	55	50	50	50	50	50	50	50
Percent of Moderate Congestion	35.59	24.19	20.29	17.11	21.80	24.00	14.29	18.03	21.54	20.75	24.14	14.91
Percent of Heavy Congestion	6.78	10.00	10.00	9.21	14.60	16.00	55.36	45.90	44.62	41.51	46.55	47.40
Percent of Severe Congestion	57.63	65.81	69.71	73.68	63.60	60.00	30.36	36.07	33.85	37.74	29.31	37.69
Population (000)	2,400	2,405	2,410	2,415	2,790	2,820	2,850	2,865	2,880	2,900	2,910	2,930
Urban Area (square kilometers)	3,963	3,989	4,015	4,092	4,144	4,170	4,222	4,235	4,248	4,248	4,248	4,273
Population Density	606	603	600	590	673	676	675	677	678	683	685	685
Registered Vehicles (000)	1,800	1,810	1,810	1,820	2,110	2,130	2,160	2,180	2,190	2,210	2,220	2,240
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	87,077	90,319	92,245	92,741	99,269	103,238	111,370	115,297	116,934	117,667	117,933	120,534
Total Lane-Kilometers	16,203	17,353	18,233	18,829	21,386	23,226	26,444	27,354	27,372	27,451	27,692	27,725
Roadway Congestion Index	1.17	1.21	1.25	1.23	1.21	1.19	1.15	1.13	1.12	1.11	1.12	1.13

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-21. Mobility and Congestion Variables in Indianapolis IN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,469	9,225	9,805	10,111	11,125	12,300	12,469	12,703	12,961	13,122	13,387	14,329
Lane-Kilometers	1,079	1,087	1,095	1,111	1,111	1,143	1,159	1,159	1,224	1,232	1,240	1,255
VKT/lane-kilometer	7,851	8,489	8,956	9,101	10,014	10,761	10,757	10,958	10,592	10,654	10,799	11,410
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	5	5	10	10	10	10	10	15
Percent of Moderate Congestion	100.00	100.00	100.00	100.00	100.00	90.00	90.00	85.00	76.92	76.82	76.00	69.89
Percent of Heavy Congestion	-	-	-	-	-	10.00	10.00	15.00	13.08	10.00	12.00	16.63
Percent of Severe Congestion	-	-	-	-	-	-	-	-	10.00	13.18	12.00	13.71
Principal Arterial Streets												
Daily VKT (000)	6,070	5,989	6,537	6,601	6,601	6,601	6,617	6,641	6,730	6,762	6,843	7,245
Lane-kilometers	1,328	1,336	1,344	1,344	1,352	1,360	1,369	1,369	1,417	1,417	1,425	1,481
VKT/lane-kilometer	4,570	4,482	4,862	4,910	4,881	4,852	4,835	4,853	4,750	4,773	4,802	4,891
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	15	15	15	15	15	15	20	20	20	20	25	25
Percent of Moderate Congestion	26.09	37.84	30.00	20.00	40.00	45.00	60.00	63.64	65.79	68.70	58.00	40.63
Percent of Heavy Congestion	58.70	37.84	32.56	30.00	20.00	25.00	16.67	15.15	5.26	7.39	20.00	30.79
Percent of Severe Congestion	15.22	24.32	37.44	50.00	40.00	30.00	23.33	21.21	28.95	23.91	22.00	28.25
Population (000)	860	860	860	865	895	925	930	930	945	950	955	960
Urban Area (square kilometers)	1,088	1,088	1,088	1,088	1,101	1,114	1,127	1,127	1,140	1,140	1,153	1,152
Population Density	791	791	791	795	813	831	825	825	829	834	829	832
Registered Vehicles (000)	650	650	650	660	680	710	710	710	730	730	740	740
Fuel Cost ($/liter)	-	-	-	-	0.26	0.28	0.3	0.33	0.35	0.34	0.34	0.3
Total VKT (000)	24,231	24,966	25,470	25,061	27,174	29,621	29,862	31,110	33,929	33,533	36,751	39,878
Total Lane-Kilometers	5,583	5,608	5,685	5,849	5,870	5,997	6,078	6,112	6,129	6,166	6,311	6,386
Roadway Congestion Index	0.67	0.70	0.75	0.76	0.81	0.85	0.80	0.86	0.84	0.84	0.85	0.89

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-22. Mobility and Congestion Variables in Jacksonville FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,199	6,488	7,173	7,326	7,519	7,680	8,292	8,372	8,662	8,807	9,266	9,660
Lane-Kilometers	547	580	588	596	628	644	676	708	725	725	733	772
VKT/lane-kilometer	11,324	11,194	12,205	12,297	11,974	11,925	12,262	11,818	11,956	12,156	12,648	12,500
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	25	25	25	30	30	30	30	35	35	35	35	35
Percent of Moderate Congestion	100.00	100.00	75.00	72.73	92.86	68.75	94.12	76.47	77.42	71.34	36.59	36.58
Percent of Heavy Congestion	-	-	25.00	27.27	7.14	25.00	5.88	23.53	22.58	26.34	56.10	52.75
Percent of Severe Congestion	-	-	-	-	-	6.25	-	-	-	2.32	7.32	10.67
Principal Arterial Streets												
Daily VKT (000)	8,243	8,887	8,919	8,960	9,048	9,064	9,121	9,249	9,346	9,499	9,893	10,062
Lane-kilometers	1,650	1,739	1,771	1,795	1,811	1,835	1,868	1,916	1,932	1,948	2,061	2,109
VKT/lane-kilometer	4,995	5,111	5,036	4,991	4,996	4,939	4,884	4,828	4,838	4,876	4,801	4,770
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	35	40	40	40	45	45	50	50	50	50	55
Percent of Moderate Congestion	19.23	26.67	27.66	29.73	45.65	23.81	24.40	29.17	21.62	32.35	43.18	36.27
Percent of Heavy Congestion	19.23	44.44	19.15	24.32	19.57	35.71	44.40	33.33	29.73	26.47	11.36	19.33
Percent of Severe Congestion	61.54	28.89	53.19	45.95	34.78	40.48	31.10	37.50	48.65	41.18	45.45	44.40
Population (000)	615	620	630	645	650	660	690	715	720	750	760	770
Urban Area (square kilometers)	1,347	1,347	1,373	1,373	1,386	1,386	1,386	1,399	1,399	1,399	1,399	1,411
Population Density	457	460	459	470	469	476	498	511	514	536	543	545
Registered Vehicles (000)	460	470	480	490	490	500	530	550	550	580	590	590
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.34	0.36	0.35	0.35	0.33
Total VKT (000)	22,197	25,765	25,974	26,109	26,229	25,961	26,641	28,721	28,634	29,215	30,236	30,396
Total Lane-Kilometers	4,162	5,802	5,815	5,843	5,828	5,596	5,804	5,810	5,901	5,901	5,901	5,899
Roadway Congestion Index	0.91	0.92	0.96	0.96	0.95	0.94	0.95	0.93	0.93	0.95	0.97	0.96

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-23. Mobility and Congestion Variables in Kansas City MO

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	14,329	14,466	15,102	16,406	17,557	19,191	19,674	19,916	20,214	20,793	22,057	24,150
Lane-Kilometers	1,827	1,868	2,013	2,029	2,037	2,141	2,165	2,182	2,190	2,190	2,270	2,479
VKT/lane-kilometer	7,841	7,746	7,504	8,087	8,621	8,962	9,086	9,129	9,232	9,496	9,716	9,740
Incident Ratio	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	5	5	5	5	5	5	10	10
Percent of Moderate Congestion	75.00	40.00	33.33	38.46	57.14	76.19	30.77	50.00	55.56	56.00	62.96	57.31
Percent of Heavy Congestion	25.00	60.00	55.56	23.08	4.76	4.76	23.08	11.11	44.44	32.00	11.11	17.56
Percent of Severe Congestion	-	-	11.11	38.46	38.10	19.05	46.15	38.89	-	12.00	25.93	25.13
Principal Arterial Streets												
Daily VKT (000)	6,126	6,207	6,295	6,843	6,899	7,004	7,068	7,036	7,744	7,792	7,873	8,855
Lane-kilometers	1,634	1,634	1,642	1,658	1,666	1,674	1,682	1,682	1,707	1,723	1,755	1,811
VKT/lane-kilometer	3,749	3,798	3,833	4,126	4,140	4,183	4,201	4,182	4,538	4,523	4,486	4,888
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	20	20	20	20	20	20	25	25	25	25	25	25
Percent of Moderate Congestion	42.11	53.45	53.33	54.55	36.36	29.82	32.35	30.77	16.87	17.22	36.51	40.42
Percent of Heavy Congestion	24.56	6.90	6.67	14.55	34.55	21.05	33.82	35.38	13.25	19.17	28.57	24.08
Percent of Severe Congestion	33.33	39.66	40.00	30.91	29.09	49.12	33.82	33.85	69.88	63.61	34.92	35.50
Population (000)	1,090	1,095	1,100	1,130	1,135	1,140	1,145	1,155	1,160	1,160	1,200	1,300
Urban Area (square kilometers)	1,425	1,437	1,450	1,476	1,502	1,528	1,554	1,580	1,580	1,580	1,645	1,813
Population Density	765	762	758	765	756	746	737	731	734	734	730	717
Registered Vehicles (000)	840	840	850	870	880	880	890	900	900	900	940	1,020
Fuel Cost ($/liter)	-	-	-	-	0.23	0.26	0.28	0.32	0.32	0.31	0.32	0.29
Total VKT (000)	32,211	32,916	33,559	36,297	37,729	39,361	40,688	42,219	44,223	45,028	52,639	53,978
Total Lane-Kilometers	9,444	9,493	9,552	11,096	11,103	11,360	11,391	11,523	11,603	11,581	11,729	11,693
Roadway Congestion Index	0.62	0.62	0.60	0.65	0.68	0.71	0.72	0.72	0.74	0.75	0.77	0.78

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-24. Mobility and Congestion Variables in Los Angeles CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	121,539	127,737	134,250	141,100	148,297	155,993	164,445	171,755	177,655	177,551	180,240	183,459
Lane-Kilometers	7,326	7,454	7,535	7,648	7,728	7,857	7,986	8,243	8,420	8,412	8,686	8,814
VKT/lane-kilometer	16,591	17,136	17,817	18,451	19,190	19,855	20,593	20,836	21,098	21,106	20,751	20,812
Incident Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	75	80	80	80	80	80	75	75	75	75	75	75
Percent of Moderate Congestion	22.78	20.00	20.00	17.86	6.90	5.56	5.49	5.38	5.38	6.45	6.67	7.03
Percent of Heavy Congestion	25.32	18.82	20.00	21.43	14.94	13.33	5.49	4.30	4.30	4.30	4.44	4.51
Percent of Severe Congestion	51.90	61.18	60.00	60.71	78.16	81.11	89.01	90.32	90.32	89.25	88.89	88.46
Principal Arterial Streets												
Daily VKT (000)	92,003	96,930	102,122	107,596	113,360	118,834	125,966	128,486	129,396	131,553	132,825	133,630
Lane-kilometers	17,646	17,871	18,113	18,354	18,692	18,966	19,320	19,610	19,972	19,964	20,125	20,205
VKT/lane-kilometer	5,214	5,424	5,638	5,862	6,065	6,266	6,520	6,552	6,479	6,590	6,600	6,613
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	35	40	45	50	50	55	55	55	55	55	55
Percent of Moderate Congestion	23.91	34.62	27.87	17.19	18.31	26.03	22.22	18.52	21.95	19.75	13.75	16.75
Percent of Heavy Congestion	63.04	17.31	11.48	23.44	18.31	24.66	19.75	27.16	34.15	28.46	36.25	28.09
Percent of Severe Congestion	13.04	48.08	60.66	59.38	63.38	49.32	58.02	54.32	43.90	51.79	50.00	55.29
Population (000)	9,900	9,900	9,900	10,500	10,710	10,920	11,140	11,305	11,420	11,760	11,845	11,950
Urban Area (square kilometers)	4,740	4,740	4,740	5,180	5,310	5,439	5,569	5,620	5,659	5,659	5,776	5,775
Population Density	2,089	2,089	2,089	2,027	2,017	2,008	2,001	2,011	2,018	2,078	2,051	2,069
Registered Vehicles (000)	7,680	7,690	7,690	8,160	8,320	8,480	8,670	8,800	8,880	9,150	9,220	9,300
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	266,286	284,059	296,134	315,906	326,577	353,566	377,407	394,392	403,584	397,912	400,848	410,302
Total Lane-Kilometers	36,792	37,555	37,566	38,168	38,371	38,745	39,548	40,099	40,368	40,553	41,182	41,510
Roadway Congestion Index	1.22	1.27	1.32	1.36	1.42	1.47	1.52	1.54	1.55	1.56	1.54	1.54

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}{\frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-25. Mobility and Congestion Variables in Louisville KY

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,303	7,140	7,406	7,567	7,704	8,662	9,724	9,885	9,974	10,063	10,513	11,270
Lane-Kilometers	692	725	757	773	805	837	910	942	950	950	974	990
VKT/lane-kilometer	9,105	9,856	9,787	9,792	9,570	10,346	10,690	10,496	10,500	10,593	10,793	11,382
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	5	5	5	5	5	5	5	10
Percent of Moderate Congestion	53.85	12.50	10.00	7.69	35.14	41.06	47.22	43.33	56.76	56.76	41.95	37.20
Percent of Heavy Congestion	34.62	41.67	44.55	15.38	10.81	10.00	2.78	5.00	2.70	1.62	16.83	18.45
Percent of Severe Congestion	11.54	45.83	45.45	76.92	54.05	48.94	50.00	51.67	40.54	40.54	41.22	44.35
Principal Arterial Streets												
Daily VKT (000)	4,226	4,379	4,419	4,436	4,403	4,790	4,605	4,653	4,741	5,023	5,353	5,635
Lane-kilometers	789	797	797	805	805	813	821	821	837	837	845	933
VKT/lane-kilometer	5,357	5,495	5,545	5,510	5,470	5,891	5,608	5,667	5,663	6,000	6,333	6,034
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	50	50	50	50	50	55	55	55	55	55	60	60
Percent of Moderate Congestion	27.59	20.75	45.10	12.96	14.55	14.75	30.36	33.33	25.81	20.59	13.51	21.19
Percent of Heavy Congestion	63.79	69.81	49.02	77.78	60.00	55.74	51.79	47.37	53.23	55.29	35.14	26.23
Percent of Severe Congestion	8.62	9.43	5.88	9.26	25.45	29.51	17.86	19.30	20.97	24.12	51.35	52.84
Population (000)	770	780	780	785	785	790	805	805	810	810	815	820
Urban Area (square kilometers)	932	932	932	932	945	958	971	971	984	984	997	1,010
Population Density	826	837	837	842	830	824	829	829	823	823	817	811
Registered Vehicles (000)	600	610	610	620	620	620	640	640	640	640	650	650
Fuel Cost ($/liter)	-	-	-	-	0.26	0.27	0.29	0.33	0.35	0.34	0.34	0.3
Total VKT (000)	22,382	22,947	23,604	24,863	25,544	27,283	28,086	27,845	28,455	29,970	33,321	35,344
Total Lane-Kilometers	3,991	4,131	4,254	4,267	4,283	4,294	4,474	4,803	5,049	5,289	5,327	5,427
Roadway Congestion Index	0.78	0.82	0.82	0.82	0.80	0.86	0.87	0.86	0.86	0.88	0.90	0.93

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-26. Mobility and Congestion Variables in Memphis TN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,750	4,830	4,854	4,911	5,329	6,005	6,360	6,851	6,987	7,567	8,098	8,291
Lane-Kilometers	483	523	547	588	588	612	612	612	628	660	708	732
VKT/lane-kilometer	9,833	9,231	8,868	8,356	9,068	9,816	10,395	11,197	11,128	11,463	11,432	11,318
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	10	10	10	10	10	10	10	10	10	15	15	15
Percent of Moderate Congestion	76.92	100.00	64.71	80.00	100.00	100.00	100.00	100.00	86.96	88.89	65.71	53.47
Percent of Heavy Congestion	23.08	-	35.29	20.00	-	-	-	-	13.04	11.11	23.57	31.42
Percent of Severe Congestion	-	-	-	-	-	-	-	-	-	-	10.71	14.80
Principal Arterial Streets												
Daily VKT (000)	5,313	5,474	5,659	5,667	6,054	6,327	6,521	6,633	6,818	7,245	8,066	8,951
Lane-kilometers	1,079	1,095	1,111	1,159	1,183	1,216	1,296	1,312	1,377	1,457	1,578	1,674
VKT/lane-kilometer	4,925	5,000	5,094	4,889	5,116	5,205	5,031	5,055	4,953	4,972	5,112	5,346
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	30	30	30	30	35	35	35	35	35	35	35	35
Percent of Moderate Congestion	47.06	45.71	45.00	45.95	62.50	52.00	40.00	28.81	21.67	29.03	33.85	42.19
Percent of Heavy Congestion	41.18	44.29	35.00	29.73	16.07	22.00	24.00	38.98	43.33	38.71	39.23	26.70
Percent of Severe Congestion	11.76	10.00	20.00	24.32	21.43	26.00	36.00	32.20	35.00	32.26	26.92	31.32
Population (000)	760	770	770	775	800	815	830	850	860	865	880	885
Urban Area (square kilometers)	907	907	907	932	984	1,036	1,088	1,088	1,101	1,101	1,127	1,139
Population Density	838	849	849	831	813	787	763	781	781	786	781	776
Registered Vehicles (000)	570	580	580	580	600	620	630	650	650	660	670	680
Fuel Cost ($/liter)	-	-	-	-	0.26	0.27	0.3	0.33	0.36	0.35	0.35	0.31
Total VKT (000)	18,657	20,175	17,559	20,540	21,213	23,108	24,097	25,135	25,971	26,610	27,996	30,907
Total Lane-Kilometers	3,114	3,450	3,713	4,172	4,394	4,957	4,964	4,988	5,002	5,009	5,123	5,164
Roadway Congestion Index	0.83	0.8	0.79	0.75	0.8	0.84	0.86	0.9	0.89	0.91	0.92	0.93

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-27. Mobility and Congestion Variables in Miami FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,580	10,087	10,417	11,447	11,713	11,946	12,695	13,444	13,798	14,136	15,086	15,922
Lane-Kilometers	829	829	845	869	869	894	926	934	974	990	1,006	1,030
VKT/lane-kilometer	11,553	12,165	12,324	13,167	13,472	13,369	13,713	14,397	14,165	14,276	14,992	15,453
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	45	45	45	50	50	50	60	60	60	60	60	60
Percent of Moderate Congestion	14.81	42.86	40.00	55.32	42.00	42.86	23.30	19.15	30.77	33.55	34.57	23.57
Percent of Heavy Congestion	62.96	26.19	27.5	10.64	22.00	26.19	26.70	25.53	14.1	16.51	13.58	14.02
Percent of Severe Congestion	22.22	30.95	32.5	34.04	36.00	30.95	50.00	55.32	55.13	49.94	51.85	62.41
Principal Arterial Streets												
Daily VKT (000)	19,111	19,803	20,125	20,447	20,608	20,930	22,121	23,836	25,446	25,760	27,048	27,370
Lane-kilometers	3,019	3,059	3,099	3,156	3,180	3,220	3,252	3,276	3,341	3,349	3,590	3,630
VKT/lane-kilometer	6,331	6,474	6,494	6,480	6,481	6,500	6,802	7,275	7,617	7,692	7,534	7,538
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	60	60	60	70	70	70	70	70	70	70	65	70
Percent of Moderate Congestion	2.53	14.10	24.66	16.30	17.78	16.13	1.08	2.17	3.26	3.80	5.13	12.12
Percent of Heavy Congestion	16.46	37.18	6.85	4.35	31.11	5.38	25.81	11.96	10.87	13.92	19.23	14.08
Percent of Severe Congestion	81.01	48.72	68.49	79.35	51.11	78.49	73.12	85.87	85.87	82.28	75.64	73.81
Population (000)	1,730	1,720	1,750	1,775	1,780	1,785	1,810	1,840	1,850	1,880	1,920	1,935
Urban Area (square kilometers)	1,062	1,062	1,140	1,140	1,166	1,191	1,217	1,230	1,243	1,256	1,269	1,295
Population Density	1,629	1,620	1,536	1,558	1,527	1,498	1,487	1,496	1,488	1,497	1,513	1,494
Registered Vehicles (000)	1,400	1,390	1,410	1,420	1,430	1,430	1,440	1,460	1,470	1,490	1,520	1,530
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.34	0.36	0.35	0.35	0.33
Total VKT (000)	37,510	38,423	38,648	41,240	43,959	45,429	49,166	51,641	53,977	54,418	55,352	58,294
Total Lane-Kilometers	4,907	5,242	5,609	6,414	6,793	7,301	8,142	8,866	9,019	9,030	9,030	10,028
Roadway Congestion Index	1.05	1.09	1.1	1.13	1.14	1.14	1.18	1.25	1.27	1.28	1.3	1.32

Note: A Congestion Index of 1.0 indicates a level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-28. Mobility and Congestion Variables in Milwaukee WI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,016	9,338	9,467	9,765	10,167	10,980	11,487	12,099	12,381	12,574	12,614	12,622
Lane-Kilometers	869	869	877	886	886	886	942	950	958	966	966	974
VKT/lane-kilometer	10,370	10,741	10,789	11,027	11,482	12,400	12,197	12,737	12,924	13,017	13,058	12,958
Incident Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	25	25	25	30	30	30	30	30	30	30
Percent of Moderate Congestion	51.43	53.33	50.83	39.41	25.81	23.81	20.45	32.14	27.78	28.57	26.32	24.46
Percent of Heavy Congestion	48.57	46.67	49.17	60.59	67.74	47.62	36.36	30.36	33.33	35.71	31.58	33.31
Percent of Severe Congestion	-	-	-	-	6.45	28.57	43.18	37.5	38.89	35.71	42.11	42.23
Principal Arterial Streets												
Daily VKT (000)	6,907	6,891	7,495	7,760	7,567	7,470	7,607	7,511	7,696	7,937	8,372	9,016
Lane-kilometers	1,497	1,513	1,513	1,546	1,562	1,578	1,594	1,610	1,618	1,626	1,707	1,803
VKT/lane-kilometer	4,613	4,553	4,952	5,021	4,845	4,735	4,773	4,665	4,756	4,881	4,906	5,000
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	30	30	35	35	35	35	35	35	35	35	35	30
Percent of Moderate Congestion	18.75	17.02	36.84	8.62	3.39	25.40	33.93	34.55	33.96	31.48	30.00	17.16
Percent of Heavy Congestion	59.38	70.21	52.63	68.97	67.80	53.97	44.64	41.82	26.42	25.93	29.63	30.34
Percent of Severe Congestion	21.88	12.77	10.53	22.41	28.81	20.63	21.43	23.64	39.62	42.59	40.37	52.50
Population (000)	1,210	1,210	1,210	1,210	1,215	1,220	1,225	1,225	1,230	1,225	1,230	1,230
Urban Area (square kilometers)	1,425	1,425	1,425	1,425	1,425	1,425	1,425	1,425	1,425	1,425	1,425	1,424
Population Density	849	849	849	849	853	856	860	860	863	860	863	863
Registered Vehicles (000)	920	920	920	920	920	920	930	920	930	920	930	930
Fuel Cost ($/liter)	-	-	-	-	0.26	0.27	0.3	0.33	0.36	0.35	0.35	0.32
Total VKT (000)	33,081	33,757	37,531	39,107	41,129	42,504	44,772	45,212	46,141	47,413	47,651	49,106
Total Lane-Kilometers	7,454	7,461	7,490	7,515	7,559	7,620	7,668	7,718	7,709	7,794	7,870	7,885
Roadway Congestion Index	0.83	0.84	0.87	0.88	0.90	0.95	0.94	0.97	0.99	1.00	1.00	1.00

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-29. Mobility and Congestion Variables in Minn-St. Paul MN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	18,032	19,586	20,930	22,033	23,442	25,148	26,436	27,145	28,642	29,318	30,590	32,200
Lane-Kilometers	1,900	1,900	1,980	2,045	2,077	2,238	2,310	2,335	2,383	2,407	2,431	2,471
VKT/lane-kilometer	9,492	10,309	10,569	10,776	11,287	11,237	11,443	11,628	12,020	12,181	12,583	13,029
Incident Ratio	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	20	25	30	30	30	30	30	30	30
Percent of Moderate Congestion	63.64	50.00	53.33	31.25	38.89	16.67	22.22	22.22	24.14	27.14	32.14	39.29
Percent of Heavy Congestion	36.36	41.67	26.67	31.25	38.89	25.00	25.93	25.93	20.69	21.43	7.14	9.64
Percent of Severe Congestion	-	8.33	20.00	37.50	22.22	58.33	51.85	51.85	55.17	51.43	60.71	51.07
Principal Arterial Streets												
Daily VKT (000)	6,923	7,165	7,487	7,873	8,211	8,372	8,533	8,678	9,080	9,660	10,948	11,431
Lane-kilometers	1,465	1,481	1,497	1,513	1,530	1,546	1,562	1,586	1,610	1,674	1,852	1,932
VKT/lane-kilometer	4,725	4,837	5,000	5,202	5,368	5,417	5,464	5,472	5,640	5,769	5,913	5,916
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	40	40	45	45	50	55	55	55	55	55	55	50
Percent of Moderate Congestion	23.19	12.68	16.00	24.42	21.74	26.92	25.00	30.00	25.32	20.00	10.00	15.35
Percent of Heavy Congestion	36.23	53.52	30.67	30.23	13.04	11.54	14.29	10.00	7.59	11.25	21.25	12.82
Percent of Severe Congestion	40.58	33.80	53.33	45.35	65.22	61.54	60.71	60.00	67.09	68.75	68.75	71.83
Population (000)	1,750	1,750	1,750	1,800	1,845	1,885	1,925	1,970	2,010	2,060	2,110	2,115
Urban Area (square kilometers)	2,150	2,202	2,279	2,409	2,486	2,577	2,629	2,629	2,694	2,849	3,082	3,095
Population Density	814	795	768	747	742	731	732	749	746	723	685	683
Registered Vehicles (000)	1,400	1,400	1,400	1,440	1,470	1,500	1,530	1,570	1,600	1,640	1,680	1,680
Fuel Cost ($/liter)	-	-	-	-	0.26	0.29	0.31	0.34	0.36	0.35	0.35	0.31
Total VKT (000)	48,150	51,451	53,919	57,274	61,476	64,382	66,696	68,055	69,528	70,727	74,466	77,940
Total Lane-Kilometers	13,452	13,524	13,526	13,753	14,300	14,395	14,348	14,368	14,411	14,952	15,794	16,265
Roadway Congestion Index	0.76	0.81	0.84	0.85	0.89	0.89	0.90	0.92	0.95	0.96	0.99	1.02

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-30. Mobility and Congestion Variables in Nashville TN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	5,233	5,313	5,868	6,303	6,843	7,245	7,712	7,905	8,050	8,388	9,660	11,270
Lane-Kilometers	564	564	604	684	684	692	708	773	789	813	886	1,014
VKT/lane-kilometer	9,286	9,429	9,720	9,212	10,000	10,465	10,886	10,229	10,204	10,317	10,909	11,111
Incident Ratio	-	-	-	-	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	15	15	20	25	25	25	25	25	20
Percent of Moderate Congestion	26.32	55.56	50.00	50.00	61.54	75.00	37.50	58.33	70.00	70.37	63.64	52.28
Percent of Heavy Congestion	57.89	11.11	50.00	50.00	38.46	16.67	40.63	29.17	20.00	22.22	18.18	22.89
Percent of Severe Congestion	15.79	33.33	-	-	-	8.33	21.88	12.50	10.00	7.41	18.18	24.83
Principal Arterial Streets												
Daily VKT (000)	5,716	6,110	6,915	7,382	7,736	7,913	8,670	8,694	8,758	8,791	8,855	9,016
Lane-kilometers	1,272	1,304	1,369	1,417	1,449	1,457	1,473	1,505	1,513	1,530	1,546	1,561
VKT/lane-kilometer	4,494	4,685	5,053	5,210	5,339	5,431	5,885	5,775	5,787	5,747	5,729	5,773
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	35	40	40	40	40	40	40	40	40	40	35
Percent of Moderate Congestion	17.24	13.64	12.09	20.48	18.05	17.98	10.75	13.64	10.00	13.07	34.69	34.45
Percent of Heavy Congestion	65.52	47.73	29.67	32.53	26.44	15.73	16.13	11.36	22.22	24.10	38.78	37.99
Percent of Severe Congestion	17.24	38.64	58.24	46.99	55.52	66.29	73.12	75.00	67.78	62.83	26.53	27.36
Population (000)	500	505	510	515	520	530	540	550	565	575	590	600
Urban Area (square kilometers)	984	1,062	1,114	1,140	1,178	1,217	1,256	1,282	1,295	1,373	1,425	1,476
Population Density	508	476	458	452	441	435	430	429	436	419	414	406
Registered Vehicles (000)	390	390	400	400	410	420	430	440	450	460	470	480
Fuel Cost ($/liter)	-	-	-	-	0.26	0.27	0.3	0.33	0.36	0.35	0.35	0.31
Total VKT (000)	16,369	16,504	17,332	19,204	21,031	22,361	24,237	24,702	25,127	26,409	28,017	29,287
Total Lane-Kilometers	2,822	2,824	2,996	3,098	3,746	4,236	4,408	4,437	4,466	4,543	4,741	4,743
Roadway Congestion Index	0.77	0.79	0.83	0.81	0.86	0.89	0.94	0.90	0.89	0.90	0.92	0.93

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-31. Mobility and Congestion Variables in New Orleans LA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,279	6,440	6,682	6,891	6,963	7,487	7,664	7,825	8,002	8,114	8,131	8,372
Lane-Kilometers	523	531	531	531	531	531	547	564	580	588	604	619
VKT/lane-kilometer	12,000	12,121	12,576	12,970	13,106	14,091	14,000	13,886	13,806	13,808	13,467	13,506
Incident Ratio	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	40	40	45	45	50	50	50	50	50	50	50	50
Percent of Moderate Congestion	91.80	63.02	15.87	20.00	23.61	28.57	36.00	17.69	17.81	16.85	20.00	19.83
Percent of Heavy Congestion	8.20	29.43	31.75	30.00	30.56	27.14	13.33	40.00	49.38	47.40	60.00	66.04
Percent of Severe Congestion	-	7.55	52.38	50.00	45.83	44.29	50.67	42.31	32.81	32.75	20.00	14.13
Principal Arterial Streets												
Daily VKT (000)	5,313	5,514	5,812	5,973	6,182	6,529	6,537	6,545	6,601	6,657	6,762	7,084
Lane-kilometers	910	910	910	918	934	998	998	998	1,006	1,022	1,055	1,127
VKT/lane-kilometer	5,841	6,062	6,389	6,509	6,621	6,540	6,548	6,556	6,560	6,512	6,412	6,285
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	45	45	50	50	50	50	50	50	50	50	50	50
Percent of Moderate Congestion	28.81	42.19	23.64	20.00	10.64	17.02	9.76	29.82	23.19	19.86	32.88	28.61
Percent of Heavy Congestion	11.86	6.25	12.73	10.00	8.51	4.26	4.88	5.26	20.29	23.38	23.29	30.67
Percent of Severe Congestion	59.32	51.56	63.64	70.00	80.85	78.72	85.37	64.91	56.52	56.76	43.84	40.72
Population (000)	1,080	1,080	1,075	1,070	1,070	1,060	1,055	1,050	1,080	1,095	1,100	1,105
Urban Area (square kilometers)	881	881	894	894	907	907	932	932	932	932	932	945
Population Density	1,226	1,226	1,203	1,197	1,180	1,169	1,131	1,126	1,158	1,174	1,180	1,168
Registered Vehicles (000)	810	810	800	800	800	800	790	790	820	830	830	840
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.31	0.32	0.37	0.36	0.36	0.33
Total VKT (000)	18,901	20,811	22,110	22,625	23,615	23,633	24,292	24,429	25,314	26,364	27,075	28,239
Total Lane-Kilometers	4,745	4,772	4,772	4,825	4,809	4,807	4,803	4,799	4,801	4,801	4,957	5,243
Roadway Congestion Index	0.98	1.00	1.05	1.07	1.09	1.14	1.13	1.13	1.12	1.12	1.10	1.09

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-32. Mobility and Congestion Variables in New York NY

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	101,704	103,434	105,157	106,349	115,268	118,520	125,588	130,273	133,501	133,147	134,435	138,460
Lane-Kilometers	8,436	8,557	9,064	9,080	9,097	9,322	9,354	9,443	9,499	9,531	9,741	9,901
VKT/lane-kilometer	12,055	12,087	11,601	11,712	12,672	12,714	13,426	13,796	14,054	13,970	13,802	13,983
Incident Ratio	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	55	55	55	55	55	55	55	60	60	60	60	60
Percent of Moderate Congestion	51.72	36.36	57.69	35.48	40.54	37.50	40.00	42.59	47.17	45.91	35.71	29.28
Percent of Heavy Congestion	17.24	36.36	15.38	38.71	40.54	32.50	26.67	12.96	16.98	21.82	30.95	40.24
Percent of Severe Congestion	31.03	27.27	26.92	25.81	18.92	30.00	33.33	44.44	35.85	32.27	33.33	30.68
Principal Arterial Streets												
Daily VKT (000)	71,379	74,141	74,688	75,187	76,403	78,069	80,033	81,836	83,809	85,362	89,065	88,550
Lane-kilometers	10,787	10,948	10,948	10,948	10,980	11,109	11,447	11,834	12,172	12,268	12,276	12,397
VKT/lane-kilometer	6,617	6,772	6,822	6,868	6,958	7,028	6,992	6,916	6,886	6,958	7,255	7,142
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	75	75	75	75	75	75	80	80	80	80	85	85
Percent of Moderate Congestion	29.58	25.00	33.33	27.50	29.41	21.79	16.09	19.32	17.98	18.89	11.96	7.03
Percent of Heavy Congestion	38.03	36.11	43.59	25.00	11.76	16.67	19.54	13.64	21.35	18.89	23.91	21.99
Percent of Severe Congestion	32.39	38.89	23.08	47.50	58.82	61.54	64.37	67.05	60.67	62.22	64.13	70.98
Population (000)	16,660	16,660	15,340	15,340	15,340	16,000	16,320	16,420	16,780	16,830	16,945	17,000
Urban Area (square kilometers)	8,236	8,159	8,184	8,184	8,184	8,184	8,249	8,249	8,249	8,252	8,418	8,676
Population Density	2,023	2,042	1,874	1,874	1,874	1,955	1,978	1,991	2,034	2,040	2,013	1,959
Registered Vehicles (000)	13,010	13,040	12,030	12,060	12,090	12,620	12,910	13,000	13,320	13,380	13,510	13,570
Fuel Cost ($/liter)	-	-	-	-	-	0.26	0.29	0.33	0.38	0.36	0.37	0.35
Total VKT (000)	295,997	302,656	310,551	311,966	330,073	338,494	356,507	363,076	363,876	364,219	366,919	376,733
Total Lane-Kilometers	54,597	54,907	55,286	55,418	56,442	56,463	56,529	56,640	56,794	56,899	57,345	58,861
Roadway Congestion Index	1.01	1.02	0.99	1.00	1.06	1.06	1.10	1.12	1.14	1.14	1.14	1.15

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-33. Mobility and Congestion Variables in Norfolk VA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,231	6,432	6,722	7,197	7,978	8,316	8,420	8,589	8,775	8,960	9,451	9,619
Lane-Kilometers	660	676	692	708	716	725	733	741	749	805	902	925
VKT/lane-kilometer	9,439	9,512	9,709	10,159	11,135	11,478	11,495	11,598	11,720	11,130	10,482	10,391
Incident Ratio	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	35	35	35	40	45	45	45	45	45	45	40	40
Percent of Moderate Congestion	90.70	90.91	29.09	13.33	36.36	17.31	7.84	7.69	7.69	18.00	22.22	35.00
Percent of Heavy Congestion	6.98	6.82	69.09	85.00	19.70	30.77	39.22	36.54	36.54	39.14	43.33	50.00
Percent of Severe Congestion	2.33	2.27	1.82	1.67	43.94	51.92	52.94	55.77	55.77	42.86	34.44	15.00
Principal Arterial Streets												
Daily VKT (000)	5,265	5,321	5,474	5,651	5,844	6,207	6,376	6,569	6,851	7,132	7,688	7,889
Lane-kilometers	1,071	1,079	1,087	1,087	1,119	1,127	1,143	1,167	1,183	1,208	1,208	1,223
VKT/lane-kilometer	4,917	4,933	5,037	5,200	5,223	5,507	5,577	5,628	5,789	5,907	6,367	6,447
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	30	30	30	30	30	35	35	35	35	35	40	40
Percent of Moderate Congestion	-	-	-	22.22	10.81	16.67	26.00	31.82	28.57	28.00	18.06	15.00
Percent of Heavy Congestion	29.41	27.78	29.41	7.41	13.51	23.81	28.00	13.64	24.49	25.00	20.83	30.00
Percent of Severe Congestion	70.59	72.22	70.59	70.37	75.68	59.52	46.00	54.55	46.94	47.00	61.11	55.00
Population (000)	770	780	790	800	840	870	895	920	925	950	965	975
Urban Area (square kilometers)	2,059	2,059	2,072	2,072	2,085	2,085	2,098	2,098	2,111	2,111	2,111	2,123
Population Density	374	379	381	386	403	417	427	439	438	450	457	459
Registered Vehicles (000)	600	610	620	630	660	690	710	730	730	750	770	780
Fuel Cost ($/liter)	-	-	-	-	-	0.27	0.3	0.32	0.36	0.35	0.36	0.31
Total VKT (000)	20,344	21,300	21,626	25,515	26,873	28,586	29,316	32,232	32,640	33,124	34,032	35,420
Total Lane-Kilometers	4,722	4,807	5,022	5,152	5,252	5,340	5,406	5,514	5,603	5,682	5,793	5,876
Roadway Congestion Index	0.79	0.79	0.81	0.84	0.90	0.93	0.94	0.95	0.96	0.93	0.92	0.92

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-34. Mobility and Congestion Variables in Oklahoma City OK

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,378	9,563	9,757	9,942	10,111	10,191	10,658	10,996	11,165	11,471	11,753	12,397
Lane-Kilometers	1,071	1,087	1,095	1,103	1,111	1,127	1,135	1,159	1,159	1,167	1,167	1,183
VKT/lane-kilometer	8,759	8,800	8,912	9,015	9,101	9,043	9,390	9,486	9,632	9,828	10,069	10,476
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	5	5	5	5	5	5	10	10	10	10	10	10
Percent of Moderate Congestion	50.00	50.00	50.00	50.00	50.00	50.00	53.85	58.00	55.38	58.00	54.17	56.18
Percent of Heavy Congestion	50.00	50.00	50.00	50.00	50.00	50.00	46.15	42.00	44.62	42.00	45.83	41.12
Percent of Severe Congestion	-	-	-	-	-	-	-	-	-	-	-	2.70
Principal Arterial Streets												
Daily VKT (000)	4,428	4,669	5,361	5,394	5,442	5,579	5,546	5,772	5,772	6,070	6,392	7,245
Lane-kilometers	926	974	1,014	1,038	1,038	1,055	1,055	1,095	1,095	1,111	1,159	1,288
VKT/lane-kilometer	4,783	4,793	5,286	5,194	5,260	5,290	5,240	5,272	5,272	5,464	5,514	5,625
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	30	30	35	35	35	35	35	35	35	35	40	40
Percent of Moderate Congestion	10.00	10.00	10.00	10.00	10.00	-	2.86	20.59	25.00	22.86	22.86	26.44
Percent of Heavy Congestion	30.00	30.00	30.00	30.00	30.00	40.00	31.43	32.35	31.25	28.57	31.43	32.21
Percent of Severe Congestion	70.00	70.00	70.00	70.00	70.00	60.00	65.71	47.06	43.75	48.57	45.71	41.16
Population (000)	640	670	690	730	735	725	720	730	735	740	745	800
Urban Area (square kilometers)	1,088	1,166	1,243	1,269	1,295	1,295	1,295	1,295	1,295	1,321	1,347	1,450
Population Density	588	575	555	575	568	560	556	564	568	560	553	551
Registered Vehicles (000)	490	510	530	560	560	550	550	560	560	570	570	620
Fuel Cost ($/liter)	-	-	-	-	0.25	0.27	0.29	0.31	0.35	0.34	0.34	0.3
Total VKT (000)	25,915	26,641	28,283	28,392	28,624	28,766	28,975	29,997	29,866	31,405	32,382	34,592
Total Lane-Kilometers	6,066	6,173	6,366	6,360	6,368	6,374	6,583	6,595	6,607	6,611	6,809	6,945
Roadway Congestion Index	0.72	0.72	0.75	0.75	0.76	0.76	0.78	0.78	0.79	0.81	0.83	0.86

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-35. Mobility and Congestion Variables in Orlando FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,955	7,261	7,487	8,420	8,557	8,919	9,314	9,370	9,580	9,732	9,741	10,022
Lane-Kilometers	757	765	789	845	853	877	894	926	950	966	966	990
VKT/lane-kilometer	9,191	9,495	9,490	9,962	10,028	10,165	10,423	10,122	10,085	10,075	10,083	10,121
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	25	25	25	25	30	30	30	30	30	30	30	35
Percent of Moderate Congestion	100.00	100.00	82.76	70.59	74.30	68.60	71.40	74.14	64.71	62.25	47.84	44.72
Percent of Heavy Congestion	-	-	6.90	-	5.70	5.70	5.70	5.17	16.18	15.21	18.82	20.00
Percent of Severe Congestion	-	-	10.34	29.41	20.00	25.70	22.90	20.69	19.12	22.54	33.33	35.28
Principal Arterial Streets												
Daily VKT (000)	5,740	5,957	5,699	5,852	5,917	5,949	5,957	6,158	6,601	7,084	7,809	8,372
Lane-kilometers	1,473	1,497	1,562	1,610	1,650	1,658	1,691	1,707	1,723	1,739	1,755	1,787
VKT/lane-kilometer	3,896	3,978	3,649	3,635	3,585	3,587	3,524	3,608	3,832	4,074	4,450	4,684
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	20	20	25	25	25	25	25	25	25	25	25	30
Percent of Moderate Congestion	13.23	26.60	12.90	23.40	4.65	9.57	13.54	5.00	5.21	6.06	4.17	5.41
Percent of Heavy Congestion	26.88	10.64	32.26	22.34	37.21	17.02	20.83	24.00	15.63	11.11	11.46	16.75
Percent of Severe Congestion	59.89	62.77	54.84	54.26	58.14	73.40	65.63	71.00	79.17	82.83	84.38	77.73
Population (000)	610	630	650	670	690	760	785	800	850	880	880	920
Urban Area (square kilometers)	984	984	1,010	1,010	1,023	1,023	1,036	1,036	1,062	1,062	1,075	1,087
Population Density	620	640	644	663	674	743	758	772	800	829	819	845
Registered Vehicles (000)	480	500	520	540	550	610	630	650	690	720	720	750
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.34	0.36	0.35	0.35	0.33
Total VKT (000)	18,745	20,838	22,962	24,477	25,910	26,472	27,451	28,516	30,155	33,430	35,304	35,698
Total Lane-Kilometers	3,635	3,761	3,878	3,986	4,152	4,624	4,743	4,833	4,862	4,878	4,878	5,755
Roadway Congestion Index	0.72	0.75	0.73	0.76	0.76	0.77	0.78	0.77	0.77	0.78	0.80	0.82

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-36. Mobility and Congestion Variables in Philadelphia PA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,924	21,655	21,952	22,226	22,741	24,351	26,847	29,423	29,503	30,671	31,218	32,522
Lane-Kilometers	2,013	2,045	2,045	2,069	2,093	2,149	2,254	2,423	2,431	2,528	2,600	2,720
VKT/lane-kilometer	9,900	10,591	10,736	10,743	10,865	11,330	11,911	12,143	12,136	12,134	12,006	11,952
Incident Ratio	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	25	25	25	25	25	25	25	25	25
Percent of Moderate Congestion	42.42	43.48	51.52	73.08	70.97	60.47	62.75	54.72	49.06	47.78	27.27	30.79
Percent of Heavy Congestion	18.18	17.39	18.18	11.54	12.90	27.91	27.45	28.30	22.64	20.56	18.18	25.73
Percent of Severe Congestion	39.39	39.13	30.30	15.38	16.13	11.63	9.80	16.98	28.30	31.67	54.55	43.26
Principal Arterial Streets												
Daily VKT (000)	30,590	31,427	31,886	32,852	34,494	36,306	35,605	34,035	34,438	34,808	34,857	34,872
Lane-kilometers	4,347	4,444	4,508	4,669	4,750	5,184	5,200	5,224	5,233	5,249	5,249	5,296
VKT/lane-kilometer	7,037	7,072	7,073	7,036	7,263	7,003	6,847	6,515	6,582	6,632	6,641	6,583
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	70	70	70	75	75	75	75	75	75	75	75	75
Percent of Moderate Congestion	24.68	35.62	19.72	10.53	18.82	17.44	14.29	18.29	17.33	15.19	14.46	10.40
Percent of Heavy Congestion	14.29	26.03	35.21	35.53	17.65	16.28	13.1	12.20	18.67	26.58	22.89	16.18
Percent of Severe Congestion	61.04	38.36	45.07	53.95	63.53	66.28	72.62	69.51	64.00	58.23	62.65	73.53
Population (000)	4,070	4,070	4,070	4,070	4,070	4,085	4,130	4,220	4,500	4,700	5,000	5,200
Urban Area (square kilometers)	2,512	2,512	2,849	2,849	2,849	2,888	2,901	2,979	3,108	3,212	3,600	3,859
Population Density	1,620	1,620	1,429	1,429	1,429	1,415	1,424	1,417	1,448	1,463	1,389	1,347
Registered Vehicles (000)	3,150	3,160	3,160	3,170	3,180	3,190	3,240	3,310	3,540	3,700	3,950	4,110
Fuel Cost ($/liter)	-	-	-	-	-	0.26	0.29	0.32	0.36	0.35	0.35	0.32
Total VKT (000)	82,881	85,515	86,982	91,293	95,230	101,074	103,438	105,656	105,872	107,506	113,758	118,212
Total Lane-Kilometers	16,960	16,987	17,019	17,328	17,328	17,399	17,502	18,027	19,022	19,705	20,115	20,992
Roadway Congestion Index	1.00	1.03	1.04	1.04	1.06	1.06	1.07	1.05	1.05	1.05	1.05	1.04

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-37. Mobility and Congestion Variables in Phoenix AZ

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,589	4,685	5,072	5,683	7,438	7,374	9,419	11,351	12,832	14,571	15,698	15,778
Lane-Kilometers	338	370	451	467	499	547	837	974	1,006	1,071	1,127	1,143
VKT/lane-kilometer	13,571	12,652	11,250	12,172	14,903	13,471	11,250	11,653	12,752	13,609	13,929	13,802
Incident Ratio	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	50	55	60	65	70	70	60	60	60	60	60	65
Percent of Moderate Congestion	87.88	87.69	80.49	75.90	15.75	4.49	38.46	30.30	12.12	15.90	18.31	19.49
Percent of Heavy Congestion	12.12	12.31	19.51	24.10	55.75	35.96	15.38	13.64	53.03	49.93	15.63	15.83
Percent of Severe Congestion	-	-	-	-	28.50	59.55	46.15	56.06	34.85	34.18	66.06	64.68
Principal Arterial Streets												
Daily VKT (000)	24,037	24,094	24,641	25,285	25,502	26,525	26,855	26,798	28,352	29,004	29,149	29,785
Lane-kilometers	3,993	4,009	4,025	4,057	4,089	4,130	4,476	4,589	5,023	5,184	5,329	5,393
VKT/lane-kilometer	6,020	6,010	6,122	6,232	6,236	6,423	6,000	5,840	5,644	5,595	5,470	5,522
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	65	65	65	70	70	70	70	70	70	70	70	70
Percent of Moderate Congestion	46.30	51.92	51.92	44.90	44.44	45.28	21.92	26.03	36.76	38.10	30.51	28.49
Percent of Heavy Congestion	25.93	23.08	23.08	28.57	18.52	26.42	24.66	24.66	32.35	25.40	32.20	37.61
Percent of Severe Congestion	27.78	25.00	25.00	26.53	37.04	28.30	53.42	49.32	30.88	36.51	37.29	33.74
Population (000)	1,430	1,520	1,590	1,650	1,735	1,820	1,830	1,875	1,895	1,930	2,022	2,070
Urban Area (square kilometers)	1,425	1,632	1,891	2,137	2,214	2,305	2,512	2,512	2,525	2,551	2,720	2,745
Population Density	1,004	932	841	772	783	790	728	746	750	757	744	753
Registered Vehicles (000)	1,070	1,140	1,190	1,240	1,300	1,370	1,380	1,420	1,430	1,460	1,530	1,570
Fuel Cost ($/liter)	-	-	-	-	0.28	0.3	0.32	0.33	0.36	0.35	0.35	0.34
Total VKT (000)	44,203	44,623	45,057	45,776	46,344	49,699	61,275	60,092	63,843	66,689	68,860	73,147
Total Lane-Kilometers	9,183	9,191	9,183	10,595	10,800	11,246	11,597	13,777	13,996	14,445	15,841	16,661
Roadway Congestion Index	1.15	1.13	1.10	1.13	1.20	1.18	1.04	1.03	1.05	1.08	1.08	1.08

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-38. Mobility and Congestion Variables in Pittsburgh PA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,887	9,853	10,401	10,715	11,109	11,576	11,882	12,478	13,194	13,283	14,707	15,053
Lane-Kilometers	1,248	1,369	1,393	1,417	1,465	1,505	1,530	1,578	1,610	1,634	1,803	1,851
VKT/lane-kilometer	7,123	7,200	7,468	7,563	7,582	7,690	7,768	7,908	8,195	8,128	8,156	8,130
Incident Ratio	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	15	15	15	15	20	20	20	20	20	20	20	20
Percent of Moderate Congestion	100.00	57.14	50.00	36.36	18.18	14.29	50.00	60.00	20.00	20.00	22.73	23.95
Percent of Heavy Congestion	-	42.86	16.67	18.18	36.36	42.86	16.67	-	30.00	27.83	31.82	35.71
Percent of Severe Congestion	-	-	33.33	45.45	45.45	42.86	33.33	40.00	50.00	52.17	45.45	40.34
Principal Arterial Streets												
Daily VKT (000)	14,257	14,385	14,619	15,206	15,786	15,947	17,114	17,332	17,565	17,831	17,871	18,515
Lane-kilometers	2,455	2,552	2,673	2,657	2,705	2,737	2,842	2,850	2,930	2,987	2,987	2,994
VKT/lane-kilometer	5,807	5,637	5,470	5,724	5,836	5,826	6,023	6,082	5,995	5,970	5,984	6,182
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	50	55	55	60	60	60	60	60	60	60	60	65
Percent of Moderate Congestion	39.02	34.09	33.33	35.71	35.00	32.69	11.11	14.49	23.53	27.27	25.89	32.05
Percent of Heavy Congestion	26.83	29.55	21.43	42.86	33.33	21.15	17.46	14.49	14.71	22.73	19.12	17.41
Percent of Severe Congestion	34.15	36.36	45.24	21.43	31.67	46.15	71.43	71.01	61.76	50.00	55.00	50.39
Population (000)	1,810	1,810	1,810	1,810	1,810	1,810	1,845	1,850	1,865	1,865	1,875	1,900
Urban Area (square kilometers)	1,761	1,761	1,839	1,839	1,839	1,852	1,878	1,891	1,943	1,994	2,124	2,331
Population Density	1,028	1,028	984	984	984	977	983	978	960	935	883	815
Registered Vehicles (000)	1,470	1,480	1,480	1,480	1,480	1,480	1,510	1,520	1,530	1,530	1,550	1,570
Fuel Cost ($/liter)	-	-	-	-	-	0.26	0.29	0.32	0.36	0.35	0.35	0.32
Total VKT (000)	42,985	44,227	45,700	46,680	48,099	48,244	49,095	50,106	52,270	53,400	55,289	54,852
Total Lane-Kilometers	12,389	12,254	12,220	12,201	12,201	11,864	11,974	12,011	12,180	12,181	12,250	13,018
Roadway Congestion Index	0.78	0.76	0.76	0.78	0.79	0.79	0.81	0.82	0.82	0.82	0.81	0.82

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-39. Mobility and Congestion Variables in Portland OR

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	7,631	8,654	8,968	9,539	10,183	10,787	11,431	12,027	12,027	12,107	12,832	13,443
Lane-Kilometers	708	773	821	829	845	869	869	886	894	902	926	966
VKT/lane-kilometer	10,773	11,198	10,922	11,505	12,048	12,407	13,148	13,582	13,459	13,429	13,861	13,916
Incident Ratio	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	30	30	30	30	30	35	35	35	35	35	40	40
Percent of Moderate Congestion	53.33	66.67	68.00	51.85	40.63	48.08	50.00	47.14	46.05	46.75	31.58	27.53
Percent of Heavy Congestion	13.33	14.29	16.00	33.33	50.00	32.69	27.42	15.71	22.37	22.99	19.74	26.00
Percent of Severe Congestion	33.33	19.05	16.00	14.81	9.38	19.23	22.58	37.14	31.58	30.26	48.68	46.47
Principal Arterial Streets												
Daily VKT (000)	4,468	4,484	4,500	4,774	5,055	5,152	5,281	5,426	5,973	6,166	6,295	7,084
Lane-kilometers	829	829	829	837	845	853	869	894	910	942	974	1,062
VKT/lane-kilometer	5,388	5,408	5,427	5,702	5,981	6,038	6,074	6,072	6,566	6,547	6,463	6,666
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	60	60	60	60	60	60	60	60	60	60	60	60
Percent of Moderate Congestion	54.24	48.28	61.54	60.27	48.61	19.70	17.65	16.18	11.94	10.27	15.07	20.48
Percent of Heavy Congestion	10.17	12.07	7.69	17.81	33.33	39.39	42.65	41.18	43.28	42.43	42.47	40.97
Percent of Severe Congestion	35.59	39.66	30.77	21.92	18.06	40.91	39.71	42.65	44.78	47.30	42.47	39.83
Population (000)	1,010	1,000	1,010	1,030	1,040	1,045	1,025	1,025	1,030	1,040	1,060	1,080
Urban Area (square kilometers)	907	907	907	984	1,036	1,062	1,062	1,062	1,088	1,101	1,101	1,139
Population Density	1,114	1,103	1,114	1,047	1,004	984	965	965	947	945	963	947
Registered Vehicles (000)	810	810	810	830	840	840	820	820	830	840	850	870
Fuel Cost ($/liter)	-	-	-	-	0.24	0.26	0.28	0.35	0.37	0.36	0.36	0.36
Total VKT (000)	21,204	22,817	23,957	25,000	26,623	27,727	29,857	31,015	31,231	32,181	33,692	36,326
Total Lane-Kilometers	6,136	6,377	6,438	6,459	6,500	6,532	6,801	7,005	7,053	7,113	7,153	7,385
Roadway Congestion Index	0.87	0.90	0.88	0.93	0.97	0.99	1.04	1.07	1.08	1.08	1.10	1.11

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-40. Mobility and Congestion Variables in Sacramento CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,533	9,338	10,433	11,109	11,914	12,969	13,556	14,249	14,909	15,520	16,285	16,550
Lane-Kilometers	1,014	1,014	1,030	1,030	1,047	1,063	1,087	1,175	1,208	1,224	1,288	1,296
VKT/lane-kilometer	8,413	9,206	10,125	10,781	11,385	12,205	12,474	12,123	12,347	12,684	12,644	12,770
Incident Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	25	25	25	30	30	30	30	30	30	30	30	35
Percent of Moderate Congestion	100.00	100.00	71.43	80.00	74.74	54.39	47.46	46.70	50.79	50.00	42.19	37.76
Percent of Heavy Congestion	-	-	28.57	10.00	20.00	42.11	49.15	40.00	36.51	40.00	50.00	53.93
Percent of Severe Congestion	-	-	-	10.00	5.26	3.51	3.39	13.3	12.70	10.00	7.81	8.31
Principal Arterial Streets												
Daily VKT (000)	8,042	8,372	8,726	9,097	9,475	9,877	10,715	10,964	11,262	11,270	12,453	12,638
Lane-kilometers	1,336	1,369	1,449	1,513	1,562	1,610	1,691	1,739	1,771	1,795	1,996	2,012
VKT/lane-kilometer	6,018	6,118	6,022	6,011	6,067	6,135	6,338	6,306	6,359	6,278	6,238	6,280
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	40	40	45	45	45	45	50	50	50	50	50	55
Percent of Moderate Congestion	40.00	40.00	37.88	31.56	24.35	15.79	22.22	5.88	3.28	8.67	15.32	16.24
Percent of Heavy Congestion	30.00	30.00	34.85	21.88	52.61	52.63	44.44	33.33	26.23	20.67	24.05	22.47
Percent of Severe Congestion	30.00	30.00	27.27	46.56	23.04	31.58	33.33	60.78	70.49	70.67	60.63	61.42
Population (000)	830	830	830	910	955	995	1,040	1,055	1,095	1,165	1,190	1,205
Urban Area (square kilometers)	725	725	725	829	855	881	907	919	932	945	992	1,010
Population Density	1,145	1,145	1,145	1,098	1,117	1,130	1,147	1,147	1,174	1,232	1,200	1,192
Registered Vehicles (000)	650	640	640	710	740	770	800	810	840	890	910	920
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	24,441	26,847	29,056	30,706	31,105	33,248	35,362	36,772	38,027	38,555	38,614	39,939
Total Lane-Kilometers	4,589	4,648	4,687	4,703	4,774	4,917	5,163	5,371	5,627	5,833	6,099	6,174
Roadway Congestion Index	0.80	0.84	0.88	0.92	0.95	1.00	1.03	1.01	1.02	1.04	1.04	1.04

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-41. Mobility and Congestion Variables in Salt Lake City UT

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,621	4,790	4,862	5,184	5,555	6,134	6,561	8,179	8,581	8,989	9,298	9,756
Lane-Kilometers	644	676	676	676	716	757	773	821	821	829	845	861
VKT/lane-kilometer	7,175	7,083	7,190	7,667	7,753	8,106	8,490	9,961	10,451	10,841	11,000	11,327
Incident Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	10	10	10	10	10	15	15	15	15	20	20	25
Percent of Moderate Congestion	37.5	14.29	64.71	54.55	33.33	28.57	53.3	38.89	45	37.78	30.41	26.84
Percent of Heavy Congestion	37.5	85.71	35.29	18.18	51.52	59.52	40	19.44	42.5	42.78	40.41	38.04
Percent of Severe Congestion	25	-	-	27.27	15.15	11.9	6.7	41.67	12.5	19.44	29.18	34.95
Principal Arterial Streets												
Daily VKT (000)	2,343	2,455	2,697	2,890	2,938	3,003	3,075	3,140	3,276	3,671	4,146	4,298
Lane-kilometers	451	467	483	531	539	555	564	572	572	620	684	700
VKT/lane-kilometer	5,196	5,259	5,583	5,439	5,448	5,406	5,457	5,492	5,732	5,922	6,059	6,137
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	35	35	40	40	45	40	40	40	40	40	45	45
Percent of Moderate Congestion	48.72	22.22	50	58.7	66.67	40.43	42.55	44.68	45.1	54.1	57.75	56.3
Percent of Heavy Congestion	5.13	14.81	17.5	10.87	9.26	36.17	38.3	36.17	27.45	24.59	29.58	32.17
Percent of Severe Congestion	46.15	62.96	32.5	30.43	24.07	23.4	19.15	19.15	27.45	21.31	12.68	11.53
Population (000)	680	700	720	750	760	765	785	785	800	840	860	875
Urban Area (square kilometers)	932	932	932	958	984	1,023	1,114	1,191	1,217	1,217	1,230	1,256
Population Density	729	751	772	783	772	748	705	659	657	690	699	696
Registered Vehicles (000)	530	550	560	580	590	600	610	610	620	650	670	680
Fuel Cost ($/liter)	-	-	-	-	0.26	0.29	0.31	0.33	0.38	0.36	0.37	0.31
Total VKT (000)	17,993	18,946	19,254	20,157	20,973	21,891	22,769	23,461	24,422	25,644	25,935	27,043
Total Lane-Kilometers	4,097	4,114	4,109	4,130	4,286	4,318	4,313	4,564	4,572	4,598	4,643	4,644
Roadway Congestion Index	0.63	0.63	0.65	0.68	0.68	0.70	0.72	0.81	0.85	0.88	0.90	0.92

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{\text{Freeway VKT}} \times \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{\text{Prin. Art. Str. VKT}}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{\text{Prin. Art. Str. VKT}} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Prin. Art. Str. VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-42. Mobility and Congestion Variables in San Antonio TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	12,236	12,824	13,605	14,619	14,893	14,490	14,571	14,772	14,941	15,094	15,995	17,227
Lane-Kilometers	1,224	1,248	1,264	1,288	1,304	1,312	1,320	1,328	1,328	1,336	1,417	1,513
VKT/lane-kilometer	10,000	10,277	10,764	11,350	11,420	11,043	11,037	11,121	11,248	11,295	11,290	11,382
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	35	35	35	40	40	40	40	40	40	40	40	40
Percent of Moderate Congestion	60.00	60.00	50.00	38.46	14.63	13.89	20.00	15.00	14.63	12.50	16.22	15.29
Percent of Heavy Congestion	20.00	20.00	20.00	15.00	15.37	8.33	15.00	40.00	43.90	40.00	32.43	34.26
Percent of Severe Congestion	20.00	20.00	30.00	46.54	70.00	77.78	65.00	45.00	41.46	47.50	51.35	50.44
Principal Arterial Streets												
Daily VKT (000)	5,675	5,933	6,311	6,899	7,382	7,728	8,034	8,340	8,436	8,775	9,563	9,660
Lane-kilometers	1,513	1,554	1,578	1,642	1,658	1,691	1,723	1,739	1,755	1,795	1,811	1,819
VKT/lane-kilometer	3,750	3,819	4,000	4,201	4,451	4,571	4,664	4,796	4,807	4,888	5,280	5,309
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	5	10	10	15	15	15	20	20	20	20	25	30
Percent of Moderate Congestion	77.27	39.39	23.08	41.51	38.46	29.31	36.00	33.33	33.33	28.30	34.48	34.90
Percent of Heavy Congestion	18.18	12.12	10.00	10.00	23.08	8.62	8.00	8.77	13.73	22.08	24.14	24.34
Percent of Severe Congestion	4.55	48.48	66.92	48.49	38.46	62.07	56.00	57.89	52.94	49.62	41.38	40.92
Population (000)	950	960	980	995	1,020	1,050	1,165	1,165	1,170	1,180	1,185	1,195
Urban Area (square kilometers)	1,114	1,140	1,140	1,166	1,191	1,217	1,230	1,243	1,256	1,256	1,269	1,282
Population Density	853	842	860	854	856	863	947	937	931	939	934	932
Registered Vehicles (000)	680	690	710	720	740	770	860	860	870	880	880	890
Fuel Cost ($/liter)	-	-	-	-	0.25	0.28	0.3	0.32	0.35	0.34	0.34	0.31
Total VKT (000)	28,677	30,273	30,518	33,767	35,914	36,417	36,890	39,007	40,760	41,459	42,984	43,595
Total Lane-Kilometers	6,632	6,868	7,139	7,515	7,963	8,634	9,431	10,483	10,835	11,239	11,239	11,468
Roadway Congestion Index	0.77	0.79	0.82	0.87	0.88	0.86	0.86	0.87	0.88	0.89	0.90	0.91

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-43. Mobility and Congestion Variables in San Bernardino-Riv CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	18,869	19,079	19,513	19,723	20,399	20,689	21,816	21,928	23,474	24,102	24,327	24,504
Lane-Kilometers	1,304	1,312	1,320	1,344	1,352	1,377	1,401	1,417	1,441	1,457	1,465	1,505
VKT/lane-kilometer	14,469	14,540	14,780	14,671	15,083	15,029	15,575	15,477	16,291	16,541	16,604	16,278
Incident Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	60	60	60	60	65	65	65	65	70	70	70	70
Percent of Moderate Congestion	100.00	100.00	48.28	72.34	26.7	16.67	9.09	6.41	18.75	16.33	6.49	11.81
Percent of Heavy Congestion	-	-	51.72	27.66	53.3	62.12	66.67	59.23	32.5	17.72	16.88	19.64
Percent of Severe Congestion	-	-	-	-	20	21.21	24.24	34.36	48.75	65.95	76.62	68.55
Principal Arterial Streets												
Daily VKT (000)	12,365	13,299	13,927	14,104	14,281	14,329	14,732	15,086	16,342	17,147	17,308	17,871
Lane-kilometers	2,286	2,351	2,528	2,544	2,544	2,608	2,705	2,777	3,123	3,357	3,381	3,413
VKT/lane-kilometer	5,408	5,658	5,510	5,544	5,614	5,494	5,446	5,432	5,232	5,108	5,119	5,235
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	50	50	50	55	55	55	55	55	55	55	55	60
Percent of Moderate Congestion	100.00	100.00	66.67	50.88	38.5	41.5	41.51	40.58	46.2	45.71	41.1	34.42
Percent of Heavy Congestion	-	-	33.33	34.12	30.8	27.7	28.3	37.68	30.8	30.95	24.66	27.51
Percent of Severe Congestion	-	-	-	15	30.8	30.8	30.19	21.74	23.1	23.33	34.25	37.94
Population (000)	945	950	965	970	990	1,015	1,040	1,100	1,170	1,275	1,300	1,325
Urban Area (square kilometers)	1,036	1,114	1,166	1,217	1,243	1,256	1,256	1,256	1,269	1,295	1,321	1,333
Population Density	912	853	828	797	796	808	828	876	922	985	984	993
Registered Vehicles (000)	700	700	710	710	730	750	760	800	850	930	940	960
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	22,753	25,618	27,925	28,288	30,601	32,128	34,673	38,096	40,329	43,491	43,834	45,530
Total Lane-Kilometers	4,978	5,012	5,152	5,216	5,274	5,434	5,856	6,099	6,521	7,517	7,728	7,800
Roadway Congestion Index	1.11	1.12	1.13	1.12	1.15	1.14	1.18	1.17	1.21	1.22	1.22	1.21

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
"-" denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-44. Mobility and Congestion Variables in San Diego, CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	24,271	26,525	29,753	31,637	33,842	37,280	40,306	43,084	44,581	44,597	44,758	44,677
Lane-Kilometers	2,447	2,496	2,536	2,568	2,616	2,640	2,729	2,769	2,777	2,777	2,801	2,809
VKT/lane-kilometer	9,918	10,629	11,733	12,320	12,935	14,119	14,770	15,558	16,052	16,058	15,977	15,902
Incident Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	35	35	35	35	40	45	50	50	50	50	50	50
Percent of Moderate Congestion	66.67	72.73	34.29	37.84	58.18	28.38	26.67	26.03	28.77	26.41	33.85	41.16
Percent of Heavy Congestion	33.33	27.27	40.00	13.51	9.09	41.89	20.00	15.07	24.66	26.41	22.82	29.59
Percent of Severe Congestion	-	-	25.71	48.65	32.73	29.73	53.33	58.90	46.58	47.18	43.33	29.25
Principal Arterial Streets												
Daily VKT (000)	9,869	10,449	11,407	12,075	12,639	13,170	14,240	14,377	15,037	15,295	15,617	15,536
Lane-kilometers	2,302	2,335	2,383	2,415	2,463	2,512	2,608	2,689	2,753	2,785	2,793	2,793
VKT/lane-kilometer	4,287	4,476	4,787	5,000	5,131	5,244	5,460	5,347	5,462	5,491	5,591	5,561
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	25	25	30	30	30	30	30	30	30	30	35	35
Percent of Moderate Congestion	100.00	90.00	80.00	75.00	42.86	17.39	15.38	12.12	26.70	24.72	16.48	14.98
Percent of Heavy Congestion	-	10.00	20.00	25.00	57.14	82.61	65.38	81.82	66.70	63.60	58.79	61.44
Percent of Severe Congestion	-	-	-	-	-	-	19.23	6.06	6.70	11.69	24.73	24.58
Population (000)	1,780	1,800	1,830	1,890	1,980	2,070	2,175	2,220	2,295	2,350	2,480	2,530
Urban Area (square kilometers)	1,580	1,619	1,658	1,684	1,722	1,761	1,800	1,826	1,839	1,839	1,891	1,903
Population Density	1,127	1,112	1,104	1,123	1,150	1,175	1,208	1,216	1,248	1,278	1,312	1,329
Registered Vehicles (000)	1,400	1,420	1,440	1,490	1,560	1,640	1,720	1,760	1,820	1,870	1,970	2,010
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	57,722	59,227	60,005	63,677	65,986	71,022	76,440	80,960	83,086	83,293	84,151	84,840
Total Lane-Kilometers	8,024	8,047	8,203	8,298	8,386	8,567	8,876	8,910	9,174	9,396	9,533	9,666
Roadway Congestion Index	0.78	0.83	0.91	0.95	1.00	1.08	1.13	1.18	1.22	1.22	1.22	1.21

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-45. Mobility and Congestion Variables in San Fran-Oak CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	46,473	48,300	51,866	55,811	59,449	63,724	64,988	67,572	68,570	67,620	68,103	68,827
Lane-Kilometers	3,542	3,558	3,558	3,655	3,679	3,711	3,743	3,784	3,848	3,848	3,912	3,920
VKT/lane-kilometer	13,120	13,575	14,577	15,271	16,160	17,171	17,361	17,860	17,820	17,573	17,407	17,556
Incident Ratio	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	65	70	75	75	75	80	80	80	80	80	80	80
Percent of Moderate Congestion	26.47	16.44	6.49	7.69	9.09	9.64	11.90	13.79	17.05	13.79	17.24	13.33
Percent of Heavy Congestion	19.12	30.14	28.57	20.51	7.79	4.82	5.95	5.75	10.23	16.09	14.94	18.89
Percent of Severe Congestion	54.41	53.42	64.94	71.79	83.12	85.54	82.14	80.46	72.73	70.11	67.82	67.79
Principal Arterial Streets												
Daily VKT (000)	15,593	16,462	17,372	18,322	19,320	20,399	21,799	22,073	22,532	22,588	22,830	22,862
Lane-kilometers	2,954	2,979	3,059	3,123	3,180	3,228	3,325	3,445	3,623	3,703	3,735	3,783
VKT/lane-kilometer	5,278	5,527	5,679	5,866	6,076	6,319	6,557	6,407	6,220	6,100	6,112	6,042
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	60	60	60	60	60	60	60	60	60	60	60	65
Percent of Moderate Congestion	59.15	27.59	9.33	13.58	21.18	15.66	14.81	10.13	6.67	10.23	9.30	10.22
Percent of Heavy Congestion	4.23	29.31	29.33	27.16	14.12	18.07	4.94	5.06	15.56	11.36	15.12	15.91
Percent of Severe Congestion	36.62	43.10	61.33	59.26	64.71	66.27	80.25	84.81	77.78	78.41	75.58	73.98
Population (000)	3,290	3,310	3,330	3,350	3,435	3,520	3,610	3,620	3,675	3,725	3,805	3,830
Urban Area (square kilometers)	2,007	2,020	2,046	2,072	2,098	2,124	2,150	2,163	2,189	2,266	2,331	2,395
Population Density	1,639	1,638	1,627	1,617	1,637	1,657	1,679	1,674	1,679	1,644	1,632	1,598
Registered Vehicles (000)	2,680	2,700	2,710	2,730	2,800	2,870	2,950	2,960	3,000	3,040	3,110	3,130
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	84,691	90,785	99,667	107,099	110,201	115,757	120,415	125,250	123,890	123,941	125,124	127,054
Total Lane-Kilometers	13,479	13,699	13,796	13,827	13,809	14,113	14,371	14,408	14,503	14,757	14,894	15,064
Roadway Congestion Index	1.01	1.05	1.12	1.17	1.24	1.31	1.33	1.36	1.36	1.34	1.33	1.33

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-46. Mobility and Congestion Variables in San Jose CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,425	20,053	21,316	22,427	22,959	23,490	24,077	25,019	25,406	26,597	26,734	26,806
Lane-Kilometers	1,739	1,763	1,803	1,819	1,827	1,835	1,852	1,868	1,868	1,892	1,932	1,964
VKT/lane-kilometer	11,171	11,374	11,821	12,327	12,564	12,798	13,004	13,397	13,603	14,060	13,838	13,647
Incident Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	45	50	50	55	55	60	60	60	60	60	60	60
Percent of Moderate Congestion	14.49	4.62	14.75	16.92	6.25	11.76	17.11	14.29	19.44	20	20	15.16
Percent of Heavy Congestion	39.13	18.46	6.56	9.23	20.31	13.24	14.47	22.08	18.06	18.57	19.87	20
Percent of Severe Congestion	46.38	76.92	78.69	73.85	73.44	75	68.42	63.64	62.5	61.43	60.13	64.84
Principal Arterial Streets												
Daily VKT (000)	8,443	8,710	9,266	9,749	9,966	10,207	10,465	10,876	10,908	10,988	11,914	11,753
Lane-kilometers	1,900	1,940	1,988	2,004	2,013	2,029	2,045	2,069	2,085	2,093	2,222	2,221
VKT/lane-kilometer	4,444	4,490	4,660	4,863	4,952	5,032	5,118	5,257	5,232	5,250	5,362	5,289
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	40	40	45	50	55	55	60	60	60	60	60	55
Percent of Moderate Congestion	92.54	92.42	74.19	54.94	24.3	17.1	16.84	15.46	22.22	20	22.05	27.56
Percent of Heavy Congestion	4.48	4.55	10	25	31.4	14.3	7.37	11.34	8.89	5	16.67	17.31
Percent of Severe Congestion	2.99	3.03	15.81	20.06	44.3	68.6	75.79	73.2	68.89	75	61.28	54.99
Population (000)	1,200	1,250	1,275	1,300	1,340	1,355	1,370	1,390	1,410	1,500	1,505	1,525
Urban Area (square kilometers)	1,049	1,062	1,075	1,088	1,101	1,114	1,127	1,153	1,166	1,166	1,191	1,204
Population Density	1,144	1,177	1,186	1,195	1,217	1,217	1,216	1,206	1,210	1,287	1,263	1,266
Registered Vehicles (000)	880	920	940	970	1,000	1,020	1,030	1,050	1,070	1,150	1,150	1,170
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.35	0.38	0.36	0.37	0.35
Total VKT (000)	35,494	38,658	41,672	44,064	44,555	47,716	50,058	51,826	52,236	52,930	53,265	53,158
Total Lane-Kilometers	5,756	5,809	5,881	5,905	5,939	5,947	5,994	6,020	6,141	6,255	6,285	6,343
Roadway Congestion Index	0.86	0.88	0.91	0.95	0.97	0.99	1.00	1.03	1.05	1.08	1.07	1.05

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-47. Mobility and Congestion Variables in Seattle-Everett WA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,755	21,083	22,403	23,909	24,955	26,726	27,676	29,302	30,461	30,590	32,643	33,327
Lane-Kilometers	1,618	1,666	1,715	1,771	1,787	1,835	1,835	1,868	1,948	1,964	2,045	2,068
VKT/lane-kilometer	12,209	12,652	13,066	13,500	13,964	14,561	15,079	15,690	15,636	15,574	15,965	16,108
Incident Ratio	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	40	45	50	50	55	65	70	70	70	70	70	70
Percent of Moderate Congestion	58.33	28.57	28.85	40.00	32.20	37.18	30.12	12.20	15.66	11.76	10.98	8.55
Percent of Heavy Congestion	22.22	50.00	34.62	22.00	37.29	29.49	34.94	50.00	54.22	51.76	39.27	34.15
Percent of Severe Congestion	19.44	21.43	36.54	38.00	30.51	33.33	34.94	37.8	30.12	36.47	49.76	57.42
Principal Arterial Streets												
Daily VKT (000)	11,004	11,785	12,542	12,977	13,403	14,410	14,192	14,587	14,699	15,810	15,778	15,617
Lane-kilometers	2,157	2,198	2,270	2,318	2,335	2,375	2,375	2,455	2,536	2,576	2,616	2,616
VKT/lane-kilometer	5,101	5,363	5,525	5,597	5,741	6,068	5,976	5,941	5,797	6,138	6,031	5,969
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	50	55	55	55	55	55	55	55	55	55	55	55
Percent of Moderate Congestion	17.65	23.64	19.30	21.82	30.65	20.59	19.44	24.62	18.18	18.57	14.03	21.76
Percent of Heavy Congestion	41.18	27.27	35.09	20.00	8.06	32.35	26.39	13.85	15.15	20.00	19.30	19.20
Percent of Severe Congestion	41.18	49.09	45.61	58.18	61.29	47.06	54.17	61.54	66.67	61.43	66.67	59.19
Population (000)	1,440	1,480	1,520	1,540	1,565	1,595	1,625	1,680	1,730	1,820	1,840	1,875
Urban Area (square kilometers)	1,684	1,684	1,684	1,761	1,800	1,826	1,852	1,852	1,878	1,878	1,891	1,903
Population Density	855	879	903	874	869	874	878	907	921	969	973	984
Registered Vehicles (000)	1,220	1,250	1,290	1,310	1,330	1,360	1,380	1,430	1,470	1,550	1,570	1,600
Fuel Cost ($/liter)	-	-	-	-	0.27	0.28	0.31	0.32	0.37	0.36	0.36	0.34
Total VKT (000)	41,631	47,785	47,928	49,697	51,885	56,846	62,838	65,675	65,752	69,388	77,132	78,635
Total Lane-Kilometers	9,354	9,750	9,861	10,367	10,370	10,586	10,686	10,735	10,742	10,798	10,903	11,055
Roadway Congestion Index	0.95	0.99	1.02	1.05	1.09	1.14	1.17	1.20	1.20	1.20	1.22	1.23

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-48. Mobility and Congestion Variables in St. Louis MO

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,376	20,986	23,200	23,852	25,148	26,227	27,990	30,139	29,785	30,107	30,477	31,395
Lane-Kilometers	1,948	1,996	2,206	2,278	2,286	2,302	2,391	2,713	2,721	2,729	2,737	2,769
VKT/lane-kilometer	9,946	10,512	10,518	10,470	11,000	11,392	11,707	11,110	10,947	11,032	11,135	11,337
Incident Ratio	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	20	20	20	20	20	20	20	20	25
Percent of Moderate Congestion	42.86	36.11	52.63	26.67	56.00	42.86	46.43	37.84	50.00	50.00	56.67	34.76
Percent of Heavy Congestion	57.14	63.89	23.68	60.00	36.00	33.33	15.00	21.62	10.00	10.63	30.00	37.55
Percent of Severe Congestion	-	-	23.68	13.33	8.00	23.81	38.57	40.54	40.00	39.38	13.33	27.68
Principal Arterial Streets												
Daily VKT (000)	14,418	14,949	15,689	16,519	17,332	18,056	18,467	19,658	19,658	19,884	20,093	20,447
Lane-kilometers	2,705	2,705	2,753	2,785	2,785	2,809	2,809	2,890	2,898	2,946	3,051	3,099
VKT/lane-kilometer	5,330	5,527	5,699	5,931	6,223	6,427	6,573	6,802	6,783	6,749	6,586	6,597
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	65	65	65	65	65	65	55	60	60	60	60	60
Percent of Moderate Congestion	37.78	39.58	30.36	25.00	28.07	35.09	25.45	13.64	21.05	19.93	25.40	33.86
Percent of Heavy Congestion	15.56	20.83	16.07	21.15	26.32	17.54	23.64	28.79	49.12	45.30	31.75	24.42
Percent of Severe Congestion	46.67	39.58	53.57	53.85	45.61	47.37	50.91	57.58	29.82	34.78	42.86	41.72
Population (000)	1,850	1,850	1,850	1,925	1,930	1,940	1,950	1,955	1,960	1,970	1,985	1,990
Urban Area (square kilometers)	1,684	1,813	1,813	1,813	1,813	1,839	1,865	1,878	1,891	1,904	1,917	1,994
Population Density	1,099	1,020	1,020	1,062	1,065	1,055	1,046	1,041	1,037	1,035	1,036	997
Registered Vehicles (000)	1,420	1,420	1,430	1,480	1,490	1,500	1,510	1,510	1,520	1,530	1,540	1,550
Fuel Cost ($/liter)	-	-	-	-	1.02	0.26	0.28	0.32	0.32	0.31	0.32	0.29
Total VKT (000)	46,191	52,703	55,761	57,340	59,879	62,560	65,662	72,239	72,914	74,509	77,056	83,388
Total Lane-Kilometers	10,405	11,296	11,375	11,394	11,415	11,594	11,632	11,508	11,534	11,571	11,603	13,189
Roadway Congestion Index	0.83	0.87	0.88	0.89	0.93	0.96	0.98	0.96	0.95	0.95	0.95	0.96

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-49. Mobility and Congestion Variables in Tampa FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	3,188	3,453	4,089	4,580	4,733	5,313	5,538	5,522	5,844	5,877	6,118	6,359
Lane-Kilometers	306	306	354	419	435	451	467	475	483	491	499	515
VKT/lane-kilometer	10,421	11,289	11,545	10,942	10,889	11,786	11,862	11,627	12,100	11,967	12,258	12,343
Incident Ratio	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pct of Congested Freeway DVKT												
(ADT/lane greater than 15,000)	20	20	20	20	20	20	25	25	25	25	25	20
Percent of Moderate Congestion	17.14	14.29	6.67	14.89	19.61	35.82	38.10	30.43	17.71	16.28	16.98	12.80
Percent of Heavy Congestion	40.00	24.29	23.33	25.11	45.10	12.99	11.90	27.83	33.33	34.29	22.64	17.00
Percent of Severe Congestion	42.86	61.43	70.00	60.00	35.29	51.19	50.00	41.74	48.96	49.43	60.38	70.20
Principal Arterial Streets												
Daily VKT (000)	5,136	5,418	5,885	6,182	5,877	6,247	6,545	6,730	7,020	7,084	7,487	7,502
Lane-kilometers	877	877	918	958	966	982	1,006	1,014	1,063	1,079	1,127	1,159
VKT/lane-kilometer	5,853	6,174	6,412	6,454	6,083	6,361	6,504	6,635	6,606	6,567	6,643	6,472
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT												
(ADT/lane greater than 15,000)	60	60	65	65	65	65	65	65	65	65	65	65
Percent of Moderate Congestion	19.18	15.79	22.50	20.93	16.67	17.98	12.35	31.40	28.09	36.42	23.41	16.42
Percent of Heavy Congestion	33.97	30.26	28.75	15.12	30.95	22.47	18.64	12.79	13.48	16.73	21.98	21.97
Percent of Severe Congestion	46.85	53.95	48.75	63.95	52.38	59.55	69.01	55.81	58.43	56.85	55.61	61.49
Population (000)	540	560	570	580	615	645	665	670	700	710	715	740
Urban Area (square kilometers)	907	907	1,010	1,010	1,062	1,101	1,127	1,127	1,153	1,166	1,166	1,178
Population Density	596	618	564	574	579	586	590	595	607	609	613	627
Registered Vehicles (000)	420	440	450	460	480	510	530	530	560	560	570	590
Fuel Cost ($/liter)	-	-	-	-	0.27	0.29	0.31	0.34	0.36	0.35	0.35	0.33
Total VKT (000)	16,034	17,523	17,995	18,729	19,299	19,694	23,649	23,738	25,322	26,163	27,209	27,370
Total Lane-Kilometers	4,824	4,880	4,906	4,915	4,946	5,078	5,223	5,223	5,253	5,297	5,313	5,345
Roadway Congestion Index	0.94	1.01	1.03	1.00	0.96	1.02	1.03	1.03	1.05	1.05	1.07	1.06

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index (RCI)} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

Table E-50. Mobility and Congestion Variables in Washington DC

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,897	26,002	29,085	32,015	36,072	36,885	37,996	40,282	40,789	41,466	44,186	46,690
Lane-Kilometers	1,996	1,996	2,209	2,238	2,325	2,367	2,397	2,447	2,455	2,528	2,608	2,624
VKT/lane-kilometer	12,972	13,024	13,167	14,306	15,516	15,585	15,850	16,461	16,613	16,404	16,941	17,791
Incident Ratio	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Pct of Congested Freeway DVKT (ADT/lane greater than 15,000)	60	60	65	65	65	65	65	65	65	65	70	70
Percent of Moderate Congestion	63.33	36.36	30.56	50.00	38.24	32.88	30.30	16.00	17.81	12.16	10.53	16.97
Percent of Heavy Congestion	16.67	45.45	47.22	19.23	36.76	38.36	40.91	44.00	30.14	33.78	28.95	19.17
Percent of Severe Congestion	20.00	18.18	22.22	30.77	25.00	28.77	28.79	40.00	52.05	54.05	60.53	63.86
Principal Arterial Streets												
Daily VKT (000)	21,397	21,413	22,347	23,876	25,599	27,434	27,660	27,837	28,755	29,383	29,785	29,624
Lane-kilometers	2,818	2,930	3,123	3,204	3,301	3,381	3,462	3,542	3,623	3,703	3,735	3,783
VKT/lane-kilometer	7,594	7,308	7,155	7,452	7,756	8,114	7,991	7,859	7,938	7,935	7,974	7,829
Incident Ratio	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pct of Congested Prin. Art. DVKT (ADT/lane greater than 15,000)	80	80	80	80	80	85	85	85	85	85	85	85
Percent of Moderate Congestion	11.43	11.59	15.19	12.35	15.85	15.12	10.98	9.52	7.10	8.82	15.73	16.08
Percent of Heavy Congestion	31.43	15.94	18.99	29.63	25.61	20.93	25.61	23.81	30.60	24.12	17.98	22.30
Percent of Severe Congestion	57.14	72.46	65.82	58.02	58.54	63.95	63.41	66.67	62.40	67.06	66.29	61.62
Population (000)	2,700	2,780	2,810	2,860	2,920	2,980	3,040	3,080	3,100	3,280	3,285	3,400
Urban Area (square kilometers)	2,059	2,072	2,085	2,098	2,111	2,124	2,150	2,163	2,176	2,383	2,396	2,525
Population Density	1,311	1,342	1,348	1,363	1,383	1,403	1,414	1,424	1,425	1,377	1,371	1,346
Registered Vehicles (000)	2,180	2,250	2,280	2,330	2,390	2,440	2,500	2,540	2,560	2,720	2,730	2,830
Fuel Cost ($/liter)	-	-	-	-	-	0.28	0.31	0.33	0.38	0.36	0.37	0.32
Total VKT (000)	72,384	73,163	78,681	86,272	93,808	97,553	98,978	101,398	103,560	104,766	109,958	112,997
Total Lane-Kilometers	11,284	11,540	12,186	12,614	13,128	13,276	13,442	13,608	13,775	13,899	14,081	14,419
Roadway Congestion Index	1.12	1.11	1.11	1.19	1.27	1.29	1.30	1.33	1.34	1.33	1.36	1.41

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index (RCI)} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane-kilometers
Principal Arterial = 5,000 VKT/lane-kilometers

APPENDIX F

URBAN AREA

DELAY, FUEL AND COST STATISTICS

Table F-1. Mobility and Congestion Variables in Albuquerque NM

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,471	2,600	2,753	2,930	3,107	3,260	3,582	3,719	3,864	3,993	4,025	4,411
VKT/lane-kilometer	8,079	8,500	9,000	9,333	9,897	10,125	10,854	10,744	10,909	11,022	10,870	11,417
Principal Arterial Streets												
Daily VKT (000)	4,605	4,959	5,426	5,796	6,038	6,279	6,440	6,762	6,923	6,843	6,923	7,245
VKT/lane-kilometer	5,018	5,357	5,761	6,000	6,098	6,000	5,714	6,000	5,972	5,667	5,584	5,455
Roadway Congestion Index	0.78	0.83	0.89	0.93	0.96	0.96	0.96	0.98	0.98	0.96	0.95	0.96
Hours of Delay												
Total Daily (1000 person-hrs)	12	14	19	19	19	21	22	28	28	27	29	35
Annual per Capita (person-hrs)	7	8	10	10	10	11	11	14	14	13	14	17
Annual per Driver (person-hrs)	9	10	13	13	13	14	15	18	18	17	18	21
Freeway Daily Delay												
Recurring Veh-Hrs	340	370	410	930	1,120	1,360	2,640	2,760	2,910	2,920	3,040	3,370
Incident Veh-Hrs	370	410	450	1,030	1,230	1,500	2,900	3,040	3,200	3,210	3,340	3,700
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,410	5,020	6,710	6,380	6,220	6,530	5,850	7,920	7,890	7,490	8,130	10,010
Incident Veh-Hrs	4,850	5,520	7,390	7,010	6,840	7,190	6,430	8,720	8,680	8,230	8,940	11,010
Excess Fuel Consumed due to Congestion												
Total (million liters)	13	14	19	20	20	21	23	29	29	28	30	36
per Capita (liters)	29	32	42	42	42	44	47	58	58	54	57	68
per Eligible Driver (liters)	38	43	54	55	55	57	61	74	75	69	73	87
Congestion Cost												
Total ($ million)	-	-	-	-	50	60	60	90	90	90	100	120
per Capita ($)	-	-	-	-	110	120	130	170	180	180	190	230
per Eligible Driver ($)	-	-	-	-	140	150	170	220	240	220	250	300

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-2. Mobility and Congestion Variables in Atlanta GA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,382	27,378	29,149	31,282	34,663	36,974	38,543	39,598	40,186	41,458	42,665	48,300
VKT/lane-kilometer	11,549	12,060	12,275	12,825	13,627	14,003	14,509	14,640	14,596	14,928	15,143	15,000
Principal Arterial Streets												
Daily VKT (000)	10,529	11,334	12,011	13,468	14,579	15,054	15,754	15,633	15,746	15,923	16,100	19,320
VKT/lane-kilometer	5,361	5,457	5,588	6,196	6,634	6,703	6,567	6,224	6,229	6,279	6,173	6,000
Roadway Congestion Index	0.91	0.95	0.97	1.02	1.09	1.11	1.14	1.14	1.14	1.16	1.17	1.16
Hours of Delay												
Total Daily (1000 person-hrs)	145	160	179	215	249	277	275	288	297	303	334	388
Annual per Capita (person-hrs)	22	25	28	33	37	39	36	36	35	35	37	42
Annual per Driver (person-hrs)	29	32	36	43	48	50	46	46	45	45	47	53
Freeway Daily Delay												
Recurring Veh-Hrs	35,480	38,670	44,270	54,040	63,830	71,780	69,070	73,680	76,020	78,580	89,220	102,170
Incident Veh-Hrs	39,030	42,540	48,700	59,450	70,210	78,950	75,980	81,050	83,620	86,430	98,140	112,390
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	19,670	22,140	23,790	27,860	31,140	33,660	35,610	36,210	37,300	36,840	37,930	45,550
Incident Veh-Hrs	21,630	24,350	26,170	30,650	34,260	37,030	39,180	39,830	41,030	40,530	41,730	50,100
Excess Fuel Consumed due to Congestion												
Total (million liters)	157	172	194	233	268	296	292	305	313	319	353	409
per Capita (liters)	97	107	121	145	158	167	154	152	149	148	155	176
per Eligible Driver (liters)	127	139	157	187	205	214	197	195	190	189	197	223
Congestion Cost												
Total ($ million)	-	-	-	-	680	780	800	890	980	1,020	1,160	1,360
per Capita ($)	-	-	-	-	400	440	420	440	470	480	510	590
per Eligible Driver ($)	-	-	-	-	520	560	540	570	590	610	650	740

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \text{Freeway VKT} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \text{Prin. Art. Str. VKT}}{\text{Freeway VKT} + \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-3. Mobility and Congestion Variables in Austin TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,556	5,104	5,796	6,762	7,245	8,292	8,404	8,533	8,758	8,855	9,097	10,336
VKT/lane-kilometer	10,679	11,321	10,909	11,667	11,842	12,875	12,429	12,471	12,089	12,088	12,283	12,113
Principal Arterial Streets												
Daily VKT (000)	2,568	2,753	2,938	3,220	3,526	3,462	3,325	3,301	3,365	3,462	3,542	4,025
VKT/lane-kilometer	4,691	4,750	4,803	5,000	5,341	5,181	4,917	4,824	4,860	4,943	4,944	5,208
Roadway Congestion Index	0.84	0.88	0.86	0.91	0.94	1.00	0.96	0.96	0.94	0.94	0.95	0.95
Hours of Delay												
Total Daily (1000 person-hrs)	31	34	39	49	55	59	58	58	60	60	62	74
Annual per Capita (person-hrs)	20	22	23	27	29	31	29	28	28	27	27	33
Annual per Driver (person-hrs)	26	28	30	35	37	39	36	35	35	34	34	41
Freeway Daily Delay												
Recurring Veh-Hrs	8,420	9,490	10,860	13,820	15,310	17,150	17,430	17,500	18,100	18,110	18,650	22,250
Incident Veh-Hrs	9,260	10,440	11,950	15,200	16,840	18,860	19,180	19,250	19,910	19,920	20,510	24,470
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	3,290	3,500	4,090	4,720	5,510	5,430	4,790	4,440	4,700	4,780	4,860	6,080
Incident Veh-Hrs	3,620	3,850	4,500	5,190	6,060	5,970	5,270	4,880	5,170	5,260	5,350	6,690
Excess Fuel Consumed due to Congestion												
Total (million liters)	33	37	42	53	59	64	64	63	65	66	67	80
per Capita (liters)	87	97	101	117	127	134	126	121	121	117	119	141
per Eligible Driver (liters)	111	123	129	151	159	169	159	153	152	149	150	179
Congestion Cost												
Total ($ million)	-	-	-	-	150	170	170	180	200	210	220	270
per Capita ($)	-	-	-	-	320	350	340	350	370	370	390	470
per Eligible Driver ($)	-	-	-	-	400	440	430	440	470	470	490	590

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-4. Mobility and Congestion Variables in Baltimore MD

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	16,486	169,866	17,517	19,594	20,954	22,113	22,411	24,440	25,438	26,146	28,336	28,980
VKT/lane-kilometer	10,396	10,293	10,216	10,142	10,712	11,305	11,410	12,341	12,640	12,787	13,037	13,139
Principal Arterial Streets												
Daily VKT (000)	12,043	12,526	13,331	13,878	14,377	14,522	14,748	15,013	15,859	15,899	15,939	16,100
VKT/lane-kilometer	4,987	5,135	5,377	5,337	5,445	5,369	5,388	5,567	5,934	5,913	5,928	5,882
Roadway Congestion Index	0.84	0.84	0.85	0.84	0.88	0.91	0.92	0.98	1.01	1.02	1.04	1.04
Hours of Delay												
Total Daily (1000 person-hrs)	70	72	98	117	119	126	132	148	160	163	194	205
Annual per Capita (person-hrs)	10	10	13	16	16	17	17	19	20	20	24	24
Annual per Driver (person-hrs)	13	13	17	21	21	22	22	25	26	26	30	31
Freeway Daily Delay												
Recurring Veh-Hrs	10,080	10,060	14,340	16,990	17,360	18,850	20,290	24,060	25,540	26,280	33,850	34,650
Incident Veh-Hrs	23,180	23,130	32,970	39,090	39,930	43,370	46,670	55,340	58,750	60,450	77,850	79,700
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	10,760	11,580	14,800	17,960	18,140	18,270	18,440	18,640	20,740	20,730	20,540	23,570
Incident Veh-Hrs	11,830	12,740	16,280	19,760	19,950	20,100	20,280	20,510	22,820	22,800	22,590	25,930
Excess Fuel Consumed due to Congestion												
Total (million liters)	75	77	105	124	127	134	140	156	167	170	204	216
per Capita (liters)	44	44	57	67	68	71	73	81	84	84	100	102
per Eligible Driver (liters)	58	58	75	87	88	92	94	104	107	108	128	130
Congestion Cost												
Total ($ million)	-	-	-	-	-	350	390	460	530	550	680	730
per Capita ($)	-	-	-	-	-	190	200	240	270	270	330	350
per Eligible Driver ($)	-	-	-	-	-	240	260	310	340	350	420	440

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-5. Mobility and Congestion Variables in Boston MA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,607	27,072	27,845	29,302	32,297	32,530	36,571	35,541	34,792	34,905	35,251	34,615
VKT/lane-kilometer	11,280	11,883	12,137	12,552	13,646	13,560	15,043	14,571	14,217	14,263	14,452	14,238
Principal Arterial Streets												
Daily VKT (000)	20,536	20,914	21,172	21,711	21,590	22,057	20,705	20,367	20,189	20,125	20,922	22,540
VKT/lane-kilometer	4,944	4,996	5,038	5,147	5,089	5,112	4,781	4,677	4,543	4,529	4,560	4,844
Roadway Congestion Index	0.90	0.93	0.95	0.98	1.04	1.04	1.12	1.09	1.06	1.06	1.07	1.07
Hours of Delay												
Total Daily (1000 person-hrs)	244	252	286	288	358	341	441	442	426	436	446	437
Annual per Capita (person-hrs)	21	23	26	26	32	30	38	37	36	37	38	37
Annual per Driver (person-hrs)	26	28	32	32	40	36	46	45	43	44	45	44
Freeway Daily Delay												
Recurring Veh-Hrs	32,200	32,990	38,590	38,460	51,150	47,740	65,000	65,110	62,250	64,790	66,460	63,500
Incident Veh-Hrs	112,690	115,460	135,060	134,630	179,030	167,090	227,490	227,880	217,890	226,770	232,620	222,240
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	23,930	25,240	26,300	27,430	26,880	27,470	28,670	28,840	28,760	27,280	27,480	30,290
Incident Veh-Hrs	26,320	27,760	28,930	30,180	29,570	30,220	31,540	31,730	31,640	30,010	30,230	33,310
Excess Fuel Consumed due to Congestion												
Total (million liters)	255	264	302	306	381	365	471	469	453	463	472	463
per Capita (liters)	89	95	109	111	138	128	162	159	153	157	160	156
per Eligible Driver (liters)	110	117	134	135	168	156	197	192	185	189	192	187
Congestion Cost												
Total ($ million)	-	-	-	-	-	950	1,290	1,360	1,420	1,490	1,560	1,560
per Capita ($)	-	-	-	-	-	330	440	460	480	500	530	520
per Eligible Driver ($)	-	-	-	-	-	410	540	560	580	610	640	630

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-6. Mobility and Congestion Variables in Charlotte NC

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,842	3,059	3,220	3,437	3,590	3,711	3,888	4,411	4,653	4,830	5,152	5,635
VKT/lane-kilometer	7,060	7,451	7,547	7,907	8,109	8,232	8,625	9,288	9,633	10,000	10,492	11,111
Principal Arterial Streets												
Daily VKT (000)	3,775	4,122	4,202	4,339	4,444	4,572	4,580	4,597	4,967	5,136	5,152	5,192
VKT/lane-kilometer	5,211	5,565	5,553	5,500	5,520	5,569	5,471	5,387	5,766	5,907	5,517	5,466
Roadway Congestion Index	0.71	0.76	0.76	0.77	0.78	0.79	0.80	0.82	0.86	0.89	0.89	0.92
Hours of Delay												
Total Daily (1000 person-hrs)	15	19	19	23	28	29	33	35	38	42	45	47
Annual per Capita (person-hrs)	11	13	13	16	17	17	19	20	21	23	22	23
Annual per Driver (person-hrs)	14	17	18	21	22	22	24	26	27	29	28	28
Freeway Daily Delay												
Recurring Veh-Hrs	1,560	1,680	1,760	2,540	2,520	2,600	2,830	3,850	4,060	4,910	6,270	7,020
Incident Veh-Hrs	1,240	1,340	1,410	2,030	2,010	2,080	2,260	3,080	3,250	3,930	5,010	5,610
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,410	5,690	5,690	6,760	8,330	8,710	10,040	10,110	11,110	11,690	11,580	11,750
Incident Veh-Hrs	4,850	6,260	6,260	7,440	9,160	9,580	11,050	11,120	12,220	12,860	12,740	12,930
Excess Fuel Consumed due to Congestion												
Total (million liters)	16	20	20	25	29	30	34	37	40	44	46	48
per Capita (liters)	45	56	56	68	71	72	77	83	88	95	92	94
per Eligible Driver (liters)	59	73	74	88	92	93	99	108	114	121	115	118
Congestion Cost												
Total ($ million)	-	-	-	-	-	80	90	110	130	140	150	160
per Capita ($)	-	-	-	-	-	190	220	240	280	310	310	320
per Eligible Driver ($)	-	-	-	-	-	250	280	320	360	390	380	400

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
"-" denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-7. Mobility and Congestion Variables in Chicago IL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	40,983	41,602	43,092	46,159	49,821	49,821	51,464	55,448	61,228	62,758	63,112	65,954
VKT/lane-kilometer	12,447	12,574	12,899	13,460	14,195	14,162	14,497	14,974	15,682	16,008	16,066	15,847
Principal Arterial Streets												
Daily VKT (000)	33,665	34,776	36,322	36,821	40,218	40,194	41,965	45,048	47,415	50,771	52,808	56,350
VKT/lane-kilometer	6,026	6,017	6,106	6,148	6,697	6,675	6,941	6,909	6,913	7,071	7,054	6,863
Roadway Congestion Index	1.02	1.02	1.05	1.08	1.15	1.15	1.18	1.21	1.25	1.27	1.28	1.26
Hours of Delay												
Total Daily (1000 person-hrs)	405	414	488	544	606	593	589	624	669	703	779	788
Annual per Capita (person-hrs)	14	15	17	19	21	21	20	21	22	23	26	26
Annual per Driver (person-hrs)	19	19	23	25	28	27	26	28	29	30	34	34
Freeway Daily Delay												
Recurring Veh-Hrs	84,090	80,150	100,980	112,010	122,470	119,310	124,840	130,340	145,260	149,390	162,200	168,840
Incident Veh-Hrs	100,910	96,180	121,180	134,420	146,960	143,170	149,810	156,410	174,320	179,270	194,640	202,610
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	66,320	73,920	80,280	89,990	102,600	100,730	93,730	101,150	102,700	111,330	127,010	123,490
Incident Veh-Hrs	72,950	81,310	88,310	98,980	112,860	110,810	103,100	111,270	112,970	122,460	139,710	135,840
Excess Fuel Consumed due to Congestion												
Total (million liters)	424	435	507	562	622	611	613	648	696	730	809	821
per Capita (liters)	60	61	71	79	87	85	84	87	93	97	108	108
per Eligible Driver (liters)	80	81	94	104	114	111	109	114	121	126	140	140
Congestion Cost												
Total ($ million)	-	-	-	-	-	1,640	1,710	1,910	2,230	2,390	2,720	2,790
per Capita ($)	-	-	-	-	-	230	230	260	300	320	360	370
per Eligible Driver ($)	-	-	-	-	-	300	310	340	390	410	470	470

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \text{Freeway VKT} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \text{Prin. Art. Str. VKT}}{\text{Freeway VKT} + \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-8. Mobility and Congestion Variables in Cincinnati OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,661	13,661	13,935	14,240	14,345	15,392	15,698	17,533	18,322	18,676	19,175	20,713
VKT/lane-kilometer	11,313	10,741	10,685	10,787	10,866	11,314	11,538	12,236	12,575	12,747	13,016	13,332
Principal Arterial Streets												
Daily VKT (000)	4,862	5,096	5,192	5,297	5,216	5,337	5,530	5,828	5,909	6,923	7,245	7,084
VKT/lane-kilometer	3,897	4,084	4,161	4,218	4,154	4,196	4,321	4,553	4,476	5,212	5,455	5,333
Roadway Congestion Index	0.86	0.83	0.82	0.83	0.84	0.87	0.88	0.94	0.96	0.99	1.01	1.03
Hours of Delay												
Total Daily (1000 person-hrs)	25	26	29	33	32	38	48	50	53	59	70	78
Annual per Capita (person-hrs)	5	6	6	7	7	8	11	11	12	12	14	16
Annual per Driver (person-hrs)	7	7	8	9	9	11	14	14	15	16	18	20
Freeway Daily Delay												
Recurring Veh-Hrs	7,680	8,160	9,230	9,790	9,550	12,250	15,750	16,830	18,140	18,510	23,070	26,840
Incident Veh-Hrs	6,140	6,530	7,390	7,830	7,640	9,800	12,600	13,470	14,510	14,810	18,450	21,470
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	2,830	2,910	3,160	4,140	4,070	3,960	4,680	4,550	4,650	6,590	6,980	6,590
Incident Veh-Hrs	3,110	3,200	3,470	4,560	4,480	4,360	5,150	5,000	5,110	7,250	7,680	7,250
Excess Fuel Consumed due to Congestion												
Total (million liters)	28	29	32	36	35	42	53	56	59	65	77	85
per Capita (liters)	25	26	28	32	31	37	47	49	52	54	63	68
per Eligible Driver (liters)	32	33	37	41	40	48	60	63	67	70	81	87
Congestion Cost												
Total ($ million)	-	-	-	-	-	110	140	160	180	210	250	280
per Capita ($)	-	-	-	-	-	100	130	140	160	170	210	220
per Eligible Driver ($)	-	-	-	-	-	120	160	180	210	220	260	290

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-9. Mobility and Congestion Variables in Cleveland OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	16,100	16,454	16,760	16,189	17,235	18,008	20,399	21,268	22,057	22,492	22,798	24,102
VKT/lane-kilometer	10,417	10,646	10,844	10,474	11,151	11,651	12,798	12,462	11,913	12,043	12,000	12,580
Principal Arterial Streets												
Daily VKT (000)	7,237	7,285	7,317	7,462	7,615	7,792	8,066	8,509	9,644	9,741	10,143	9,982
VKT/lane-kilometer	4,086	4,114	4,132	4,214	4,300	4,400	4,514	4,740	5,348	5,378	5,526	5,415
Roadway Congestion Index	0.80	0.82	0.83	0.81	0.86	0.89	0.97	0.96	0.94	0.95	0.95	0.98
Hours of Delay												
Total Daily (1000 person-hrs)	26	27	34	35	39	44	53	66	69	70	81	89
Annual per Capita (person-hrs)	4	4	5	5	6	6	7	9	10	10	11	12
Annual per Driver (person-hrs)	5	5	6	7	7	8	10	12	13	13	15	16
Freeway Daily Delay												
Recurring Veh-Hrs	8,820	9,010	12,320	12,740	13,570	14,400	16,750	21,770	21,530	22,080	23,970	30,320
Incident Veh-Hrs	6,170	6,310	8,620	8,920	9,500	10,080	11,720	15,240	15,070	15,450	16,780	21,230
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	2,840	2,860	2,870	2,930	3,720	5,230	6,560	7,670	8,880	8,890	11,550	9,500
Incident Veh-Hrs	3,130	3,150	3,160	3,220	4,100	5,750	7,220	8,430	9,770	9,780	12,710	10,450
Excess Fuel Consumed due to Congestion												
Total (million liters)	30	30	38	39	43	49	58	73	76	77	88	98
per Capita (liters)	17	17	22	22	25	28	33	41	43	43	49	54
per Eligible Driver (liters)	22	23	29	30	33	37	43	54	56	57	65	71
Congestion Cost												
Total ($ million)	-	-	-	-	-	130	160	210	240	240	290	320
per Capita ($)	-	-	-	-	-	70	90	120	130	140	160	180
per Eligible Driver ($)	-	-	-	-	-	100	120	160	170	180	210	240

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
"-" denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-10. Mobility and Congestion Variables in Columbus OH

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,708	10,401	10,546	10,731	11,769	12,381	12,630	13,041	14,490	14,893	15,231	15,698
VKT/lane-kilometer	8,553	8,972	8,973	8,887	9,556	9,923	9,994	10,253	11,250	11,491	11,679	11,818
Principal Arterial Streets												
Daily VKT (000)	3,679	3,977	4,033	4,073	4,186	4,291	4,452	4,894	5,120	5,490	5,756	5,635
VKT/lane-kilometer	4,080	4,333	4,282	4,288	4,407	4,479	4,608	5,067	5,213	5,500	5,630	5,469
Roadway Congestion Index	0.68	0.71	0.71	0.71	0.75	0.78	0.79	0.82	0.89	0.91	0.93	0.93
Hours of Delay												
Total Daily (1000 person-hrs)	29	30	31	31	37	41	44	48	60	62	68	68
Annual per Capita (person-hrs)	9	9	9	9	11	12	13	14	18	17	18	17
Annual per Driver (person-hrs)	11	11	12	12	14	16	17	18	22	22	23	22
Freeway Daily Delay												
Recurring Veh-Hrs	9,260	9,770	10,360	10,100	11,250	13,140	13,430	13,500	18,350	18,730	19,560	20,260
Incident Veh-Hrs	6,480	6,840	7,250	7,070	7,880	9,200	9,400	9,450	12,850	13,110	13,690	14,180
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	3,530	3,420	3,530	3,690	4,910	5,170	5,840	7,370	7,880	8,420	10,080	9,600
Incident Veh-Hrs	3,880	3,770	3,880	4,060	5,400	5,690	6,420	8,110	8,670	9,260	11,090	10,560
Excess Fuel Consumed due to Congestion												
Total (million liters)	31	32	34	34	40	44	46	51	63	65	71	72
per Capita (liters)	37	39	40	40	47	52	55	60	74	73	75	73
per Eligible Driver (liters)	48	50	52	52	61	67	70	77	94	92	95	92
Congestion Cost												
Total ($ million)	-	-	-	-	-	120	130	150	200	210	240	240
per Capita ($)	-	-	-	-	-	140	150	180	230	230	250	250
per Eligible Driver ($)	-	-	-	-	-	180	190	220	300	300	320	310

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \text{Freeway VKT} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \text{Prin. Art. Str. VKT}}{\text{Freeway VKT} + \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-11. Mobility and Congestion Variables in Corpus Christi TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	2,093	2,206	2,190	2,254	2,286	2,415	2,431	2,447	2,512	2,584	2,697	3,140
VKT/lane-kilometer	8,125	8,303	8,242	8,485	8,353	8,333	8,162	8,216	8,432	8,629	8,910	9,286
Principal Arterial Streets												
Daily VKT (000)	2,013	2,093	2,174	2,206	2,254	2,399	2,318	2,335	2,447	2,487	2,632	2,576
VKT/lane-kilometer	4,032	4,127	4,219	4,281	4,375	4,656	4,431	4,394	4,537	4,414	4,372	4,324
Roadway Congestion Index	0.67	0.69	0.69	0.71	0.71	0.72	0.70	0.70	0.72	0.72	0.74	0.75
Hours of Delay												
Total Daily (1000 person-hrs)	2	3	3	3	4	4	4	3	3	4	6	6
Annual per Capita (person-hrs)	2	3	3	3	3	3	3	3	3	4	5	5
Annual per Driver (person-hrs)	3	4	4	3	4	5	5	4	4	5	7	7
Freeway Daily Delay												
Recurring Veh-Hrs	290	300	300	310	630	660	670	670	690	740	1,210	1,430
Incident Veh-Hrs	320	330	330	340	690	730	730	740	760	810	1,330	1,580
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	660	740	700	680	720	780	710	610	600	940	1,020	920
Incident Veh-Hrs	730	810	770	750	790	850	780	670	670	1030	1,120	1,010
Excess Fuel Consumed due to Congestion												
Total (million liters)	3	3	3	3	4	4	4	4	4	5	6	7
per Capita (liters)	11	11	11	11	14	15	14	13	13	17	22	23
per Eligible Driver (liters)	15	16	15	15	19	21	20	19	19	23	30	32
Congestion Cost												
Total ($ million)	-	-	-	-	10	10	10	10	10	20	20	20
per Capita ($)	-	-	-	-	40	40	40	40	40	50	70	80
per Eligible Driver ($)	-	-	-	-	50	50	50	50	60	70	100	110

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-12. Mobility and Congestion Variables in Dallas TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	27,161	29,624	32,079	33,971	36,346	35,581	36,032	36,458	38,125	38,479	39,445	40,089
VKT/lane-kilometer	10,884	11,646	12,299	12,866	13,682	13,313	13,361	13,399	13,848	13,936	14,000	13,989
Principal Arterial Streets												
Daily VKT (000)	10,368	11,326	12,300	12,800	13,250	13,202	13,122	13,250	13,379	13,524	13,766	14,651
VKT/lane-kilometer	4,141	4,411	4,630	4,746	4,899	4,852	4,808	4,855	4,860	4,884	4,886	5,084
Roadway Congestion Index	0.84	0.89	0.94	0.98	1.04	1.02	1.02	1.02	1.05	1.06	1.07	1.07
Hours of Delay												
Total Daily (1000 person-hrs)	201	237	250	253	327	295	312	309	331	339	341	346
Annual per Capita (person-hrs)	28	32	34	34	43	39	40	39	42	41	41	41
Annual per Driver (person-hrs)	36	42	44	44	56	50	52	51	54	53	53	53
Freeway Daily Delay												
Recurring Veh-Hrs	51,920	61,160	63,380	64,260	85,230	75,710	79,460	78,070	84,480	86,490	86,820	85,530
Incident Veh-Hrs	93,450	110,080	114,090	115,670	153,410	136,270	143,020	140,530	152,060	155,670	156,270	153,950
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	7,250	8,750	10,780	10,760	10,860	11,430	12,840	13,450	13,490	13,820	13,980	17,580
Incident Veh-Hrs	7,980	9,620	11,850	11,840	11,940	12,570	14,130	14,800	14,830	15,200	15,380	19,340
Excess Fuel Consumed due to Congestion												
Total (million liters)	216	257	272	278	352	323	339	337	359	367	370	376
per Capita (liters)	119	140	148	149	186	169	174	171	181	177	178	180
per Eligible Driver (liters)	157	183	192	194	241	220	225	222	233	228	228	231
Congestion Cost												
Total ($ million)	-	-	-	-	890	840	930	970	1,110	1,170	1,210	1,250
per Capita ($)	-	-	-	-	470	440	470	490	560	560	580	600
per Eligible Driver ($)	-	-	-	-	610	570	610	640	720	720	740	760

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \text{Freeway VKT} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \text{Prin. Art. Str. VKT}}{\text{Freeway VKT} + \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-13. Mobility and Congestion Variables in Denver CO

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,363	13,588	14,071	14,571	14,957	15,376	16,889	17,275	18,145	18,394	20,125	21,333
VKT/lane-kilometer	104,440	10,616	10,925	11,313	11,399	11,170	12,198	12,477	12,734	12,765	13,021	13,384
Principal Arterial Streets												
Daily VKT (000)	14,748	15,134	16,269	16,857	17,195	17,066	16,816	17,066	17,549	17,388	17,710	17,871
VKT/lane-kilometer	5,249	5,266	5,661	5,866	5,950	5,792	5,692	5,761	5,892	5,838	5,914	5,968
Roadway Congestion Index	0.88	0.89	0.93	0.96	0.97	0.95	0.99	1.01	1.03	1.03	1.05	1.07
Hours of Delay												
Total Daily (1000 person-hrs)	104	117	138	127	136	135	142	151	170	182	191	211
Annual per Capita (person-hrs)	19	22	24	21	23	22	23	24	27	29	30	33
Annual per Driver (person-hrs)	24	27	30	27	28	28	29	30	33	36	37	41
Freeway Daily Delay												
Recurring Veh-Hrs	18,810	21,790	25,500	24,600	28,490	29,200	32,940	32,980	36,750	40,560	44,390	48,800
Incident Veh-Hrs	18,810	21,790	25,500	24,600	28,490	29,200	32,940	32,980	36,750	40,560	44,390	48,800
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	21,760	24,010	28,350	25,050	24,640	23,610	22,870	26,230	29,790	30,880	30,440	33,860
Incident Veh-Hrs	23,940	26,410	31,190	27,560	27,110	25,970	25,150	28,850	32,770	33,970	33,490	37,240
Excess Fuel Consumed due to Congestion												
Total (million liters)	112	124	143	134	144	143	151	160	178	191	201	221
per Capita (liters)	83	92	99	90	96	95	97	102	113	121	126	137
per Eligible Driver (liters)	103	115	123	113	120	118	122	127	140	151	156	171
Congestion Cost												
Total ($ million)	-	-	-	-	370	380	420	470	570	620	670	750
per Capita ($)	-	-	-	-	250	250	270	300	360	390	420	460
per Eligible Driver ($)	-	-	-	-	310	310	340	370	450	490	520	580

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-14. Mobility and Congestion Variables in Detroit MI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	32,522	31,645	33,416	34,543	34,889	35,098	37,062	39,526	41,932	44,114	46,046	47,495
VKT/lane-kilometer	13,649	13,280	13,930	13,842	13,715	13,540	14,037	14,527	14,968	15,393	15,714	16,164
Principal Arterial Streets												
Daily VKT (000)	31,121	30,445	30,791	30,968	31,306	31,467	31,669	31,910	33,609	35,710	39,445	41,860
VKT/lane-kilometer	5,445	5,297	5,313	5,284	5,255	5,212	5,149	5,108	5,353	5,511	5,738	6,047
Roadway Congestion Index	1.06	1.03	1.07	1.06	1.05	1.04	1.07	1.09	1.13	1.16	1.19	1.23
Hours of Delay												
Total Daily (1000 person-hrs)	340	302	370	354	408	414	460	488	521	556	604	673
Annual per Capita (person-hrs)	22	20	24	23	26	27	29	31	33	35	38	42
Annual per Driver (person-hrs)	30	27	33	31	36	36	40	43	44	47	51	57
Freeway Daily Delay												
Recurring Veh-Hrs	46,870	41,810	50,970	46,800	54,100	55,070	68,380	73,860	77,990	83,370	88,310	102,210
Incident Veh-Hrs	103,120	91,970	112,140	102,960	119,020	121,150	150,450	162,490	171,580	183,410	194,280	224,860
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	57,930	51,300	63,190	63,490	73,000	73,750	70,920	73,330	79,740	84,680	95,460	100,460
Incident Veh-Hrs	63,720	56,430	69,510	69,840	80,300	81,130	78,010	80,670	87,710	93,150	105,010	110,500
Excess Fuel Consumed due to Congestion												
Total (million liters)	357	316	385	365	420	426	475	504	539	573	620	691
per Capita (liters)	94	83	101	94	108	110	122	129	135	144	155	173
per Eligible Driver (liters)	128	113	137	128	148	149	166	175	183	196	210	234
Congestion Cost												
Total ($ million)	-	-	-	-	-	1,140	1,330	1,490	1710	1870	2,080	2,340
per Capita ($)	-	-	-	-	-	290	340	380	430	470	520	590
per Eligible Driver ($)	-	-	-	-	-	400	460	520	580	640	700	790

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-15. Mobility and Congestion Variables in El Paso TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,122	4,331	4,508	5,023	5,506	5,152	5,345	5,313	5,361	5,458	5,635	5,957
VKT/lane-kilometer	7,877	8,030	8,116	9,043	9,913	9,143	9,486	9,429	9,514	9,549	9,859	10,000
Principal Arterial Streets												
Daily VKT (000)	4,186	4,355	4,540	4,637	4,693	4,830	5,007	5,112	5,152	5,273	5,353	5,377
VKT/lane-kilometer	3,421	3,468	3,525	3,600	3,621	3,727	3,863	3,825	3,832	3,899	3,889	3,884
Roadway Congestion Index	0.63	0.64	0.65	0.70	0.75	0.71	0.74	0.74	0.74	0.75	0.76	0.77
Hours of Delay												
Total Daily (1000 person-hrs)	6	6	6	9	10	11	11	11	12	12	17	18
Annual per Capita (person-hrs)	3	3	4	5	5	5	6	5	5	5	8	8
Annual per Driver (person-hrs)	5	5	5	7	8	8	8	7	7	7	11	11
Freeway Daily Delay												
Recurring Veh-Hrs	1,690	1,780	1,850	2,750	3,320	3,550	3,710	3,560	3,600	3,610	4,890	5,140
Incident Veh-Hrs	1,860	1,960	2,040	3,030	3,650	3,910	4,080	3,920	3,960	3,970	5,380	5,660
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	600	610	560	570	580	590	620	660	810	860	1,740	1,790
Incident Veh-Hrs	660	680	620	630	640	650	680	730	890	940	1,920	1,970
Excess Fuel Consumed due to Congestion												
Total (million liters)	7	7	7	10	12	12	13	12	13	13	19	20
per Capita (liters)	15	16	16	22	24	24	25	24	24	23	34	35
per Eligible Driver (liters)	22	23	22	31	34	35	35	33	33	33	47	49
Congestion Cost												
Total ($ million)	-	-	-	-	30	30	30	40	40	40	60	70
per Capita ($)	-	-	-	-	60	60	70	70	70	70	110	120
per Eligible Driver ($)	-	-	-	-	80	90	90	90	100	100	150	160

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-16. Mobility and Congestion Variables in Fort Worth TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	13,886	14,860	15,593	16,213	17,308	17,710	17,952	18,161	19,062	19,803	20,608	21,091
VKT/lane-kilometer	9,530	9,872	10,036	10,328	11,026	11,111	11,150	11,113	11,608	11,942	12,190	12,243
Principal Arterial Streets												
Daily VKT (000)	5,893	6,190	6,464	6,665	6,843	6,843	6,762	6,794	6,826	6,843	6,987	7,567
VKT/lane-kilometer	4,662	4,806	4,867	4,929	5,000	4,942	4,855	4,879	4,874	4,830	4,822	5,000
Roadway Congestion Index	0.76	0.79	0.80	0.82	0.87	0.87	0.87	0.87	0.90	0.92	0.94	0.95
Hours of Delay												
Total Daily (1000 person-hrs)	71	87	90	90	118	112	116	116	123	129	131	147
Annual per Capita (person-hrs)	16	20	21	20	26	25	25	25	26	27	27	30
Annual per Driver (person-hrs)	22	26	27	27	35	33	33	32	34	35	36	40
Freeway Daily Delay												
Recurring Veh-Hrs	16,860	21,480	21,570	21,470	29,520	27,410	28,790	28,280	30,720	32,370	32,990	36,810
Incident Veh-Hrs	30,350	38,660	38,820	38,640	53,130	49,330	51,820	50,910	55,300	58,270	59,380	66,260
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,400	4,430	5,660	5,600	5,610	6,180	5,670	6,350	5,900	5,990	6,080	6,810
Incident Veh-Hrs	4,840	4,870	6,230	6,160	6,170	6,800	6,240	6,990	6,490	6,590	6,690	7,490
Excess Fuel Consumed due to Congestion												
Total (million liters)	76	94	98	98	127	122	125	126	133	139	143	160
per Capita (liters)	70	86	89	89	113	108	109	108	111	116	119	132
per Eligible Driver (liters)	93	113	118	117	149	142	142	141	146	153	157	174
Congestion Cost												
Total ($ million)	-	-	-	-	320	320	340	360	410	440	460	530
per Capita ($)	-	-	-	-	290	280	300	310	340	370	390	440
per Eligible Driver ($)	-	-	-	-	380	370	390	410	450	490	510	580

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-17. Mobility and Congestion Variables in Ft. Lauderdale FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,597	8,630	8,758	8,968	9,177	9,982	10,385	10,996	11,439	11,479	12,478	13,685
VKT/lane-kilometer	10,269	10,210	10,264	10,315	10,270	11,071	11,121	11,576	11,842	11,883	11,923	12,500
Principal Arterial Streets												
Daily VKT (000)	8,791	8,694	8,710	8,694	8,662	8,855	8,919	9,024	9,338	9,660	10,224	10,304
VKT/lane-kilometer	5,353	5,192	5,152	5,094	5,052	5,140	5,083	5,095	5,202	5,333	5,522	5,246
Roadway Congestion Index	0.87	0.86	0.86	0.85	0.85	0.90	0.90	0.92	0.94	0.95	0.96	0.98
Hours of Delay												
Total Daily (1000 person-hrs)	46	46	52	58	65	73	74	79	89	91	99	105
Annual per Capita (person-hrs)	11	11	12	13	14	16	15	16	18	18	19	20
Annual per Driver (person-hrs)	13	13	14	15	17	19	19	19	21	21	23	24
Freeway Daily Delay												
Recurring Veh-Hrs	6,300	6,130	6,510	6,720	7,710	10,060	10,470	12,660	14,890	15,190	17,590	20,300
Incident Veh-Hrs	9,440	9,190	9,760	10,080	11,560	15,090	15,700	18,990	22,330	22,790	26,390	30,450
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	10,060	10,250	11,950	13,920	15,680	15,690	15,770	15,200	16,180	16,460	16,670	15,810
Incident Veh-Hrs	11,070	11,280	13,140	15,310	17,250	17,260	17,350	16,720	17,800	18,100	18,340	17,390
Excess Fuel Consumed due to Congestion												
Total (million liters)	48	48	54	59	68	76	78	84	95	97	105	111
per Capita (liters)	45	44	48	52	58	65	65	67	75	76	82	86
per Eligible Driver (liters)	55	54	58	63	70	78	78	81	90	91	98	103
Congestion Cost												
Total ($ million)	-	-	-	-	180	200	220	250	300	310	350	370
per Capita ($)	-	-	-	-	150	170	180	200	230	240	270	290
per Eligible Driver ($)	-	-	-	-	180	210	220	240	280	290	320	350

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-18. Mobility and Congestion Variables in Hartford CT

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,955	7,760	8,589	8,605	8,919	9,443	9,757	9,950	10,022	10,046	10,868	11,310
VKT/lane-kilometer	9,600	9,640	10,359	10,279	10,355	10,664	11,018	10,655	10,733	10,759	11,157	11,516
Principal Arterial Streets												
Daily VKT (000)	3,784	4,532	5,023	5,104	5,176	5,160	5,506	5,860	6,038	6,118	6,182	6,102
VKT/lane-kilometer	4,352	5,072	5,571	5,561	5,496	5,479	5,846	5,871	5,906	5,846	5,863	5,786
Roadway Congestion Index	0.76	0.79	0.86	0.85	0.85	0.87	0.90	0.89	0.89	0.89	0.91	0.93
Hours of Delay												
Total Daily (1000 person-hrs)	15	19	22	23	26	28	38	42	43	42	46	56
Annual per Capita (person-hrs)	7	8	10	10	11	12	16	17	17	17	19	23
Annual per Driver (person-hrs)	9	11	13	13	15	16	21	23	23	23	25	30
Freeway Daily Delay												
Recurring Veh-Hrs	1,980	2,210	2,540	2,540	3,100	3,260	5,330	5,450	5,550	5,500	6,260	8,380
Incident Veh-Hrs	5,350	5,970	6,870	6,860	8,380	8,800	14,390	14,700	14,990	14,840	16,900	22,640
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	2,200	3,170	4,030	4,140	4,350	4,770	5,120	6,440	6,450	6,320	6,660	6,680
Incident Veh-Hrs	2,420	3,490	4,430	4,550	4,790	5,240	5,630	7,080	7,100	6,950	7,320	7,340
Excess Fuel Consumed due to Congestion												
Total (million liters)	16	20	24	24	27	29	40	44	45	44	49	60
per Capita (liters)	29	35	41	42	46	49	67	73	73	73	79	96
per Eligible Driver (liters)	39	46	55	56	61	66	90	96	97	96	103	127
Congestion Cost												
Total ($ million)	-	-	-	-	-	80	110	130	140	140	160	200
per Capita ($)	-	-	-	-	-	130	190	220	230	240	260	330
per Eligible Driver ($)	-	-	-	-	-	180	250	280	310	310	350	430

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-19. Mobility and Congestion Variables in Honolulu HI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	5,957	6,029	6,223	6,424	6,770	6,979	7,100	7,285	7,438	7,567	8,195	8,855
VKT/lane-kilometer	11,385	11,523	11,712	12,091	12,742	13,136	13,364	13,309	13,588	13,824	13,573	13,924
Principal Arterial Streets												
Daily VKT (000)	1,996	2,093	2,125	2,004	2,318	2,343	2,455	2,504	2,529	2,608	2,809	3,107
VKT/lane-kilometer	6,200	6,500	6,600	6,073	6,857	6,767	7,093	7,068	6,982	7,043	7,426	7,878
Roadway Congestion Index	0.92	0.94	0.95	0.96	1.03	1.05	1.07	1.07	1.09	1.10	1.10	1.13
Hours of Delay												
Total Daily (1000 person-hrs)	47	49	56	55	58	57	65	67	67	70	79	86
Annual per Capita (person-hrs)	20	21	24	24	24	23	25	25	25	26	29	31
Annual per Driver (person-hrs)	25	26	30	29	29	29	30	30	31	31	35	37
Freeway Daily Delay												
Recurring Veh-Hrs	10,140	10,720	12,360	12,370	12,570	12,850	14,650	15,060	15,060	15,590	17,090	18,410
Incident Veh-Hrs	18,260	19,290	22,250	22,270	22,630	23,130	26,370	27,110	27,110	28,070	30,760	33,130
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,210	4,400	4,740	4,530	5,200	4,620	5,130	5,420	5,490	5,830	7,460	8,050
Incident Veh-Hrs	4,640	4,850	5,220	4,980	5,720	5,080	5,640	5,960	6,040	6,410	8,210	8,860
Excess Fuel Consumed due to Congestion												
Total (million liters)	49	51	59	58	61	61	69	71	72	74	84	91
per Capita (liters)	86	89	100	100	103	100	105	108	109	111	123	131
per Eligible Driver (liters)	107	109	124	122	125	122	128	130	130	133	147	156
Congestion Cost												
Total ($ million)	-	-	-	-	160	160	190	210	230	240	280	310
per Capita ($)	-	-	-	-	270	270	290	320	350	370	420	450
per Eligible Driver ($)	-	-	-	-	320	330	360	380	420	440	500	540

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-20. Mobility and Congestion Variables in Houston TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	33,939	36,314	39,252	38,825	38,825	41,538	43,631	44,500	45,450	47,495	49,105	51,520
VKT/lane-kilometer	15,331	15,996	16,473	16,294	15,970	15,732	15,140	14,860	14,703	14,640	14,699	14,884
Principal Arterial Streets												
Daily VKT (000)	15,657	16,664	17,485	17,469	17,404	16,905	16,406	16,744	17,436	17,549	17,935	18,354
VKT/lane-kilometer	5,448	5,610	5,656	5,622	5,529	5,330	5,146	5,174	5,085	5,011	5,110	5,182
Roadway Congestion Index	1.17	1.21	1.25	1.23	1.21	1.19	1.15	1.13	1.12	1.11	1.12	1.13
Hours of Delay												
Total Daily (1000 person-hrs)	369	374	441	440	468	449	464	474	485	502	509	537
Annual per Capita (person-hrs)	38	39	46	46	42	40	41	41	42	43	44	46
Annual per Driver (person-hrs)	51	52	61	60	55	53	54	54	55	57	57	60
Freeway Daily Delay												
Recurring Veh-Hrs	100,480	98,940	116,740	115,900	126,350	124,180	130,800	133,820	136,780	141,990	144,770	152,090
Incident Veh-Hrs	140,670	138,520	163,430	162,260	176,890	173,860	183,110	187,350	191,500	198,780	202,680	212,920
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	25,800	29,260	34,590	35,280	33,710	29,260	27,180	27,780	28,370	28,950	28,520	30,940
Incident Veh-Hrs	28,380	32,190	38,040	38,810	37,080	32,180	29,890	30,560	31,210	31,840	31,370	34,040
Excess Fuel Consumed due to Congestion												
Total (million liters)	388	398	469	468	496	480	496	506	518	537	546	576
per Capita (liters)	162	166	195	194	178	170	174	177	180	185	188	197
per Eligible Driver (liters)	216	220	259	257	235	225	229	232	236	243	246	257
Congestion Cost												
Total ($ million)	-	-	-	-	1,260	1,260	1,360	1,470	1,620	1,710	1,790	1,920
per Capita ($)	-	-	-	-	450	450	480	510	560	590	620	660
per Eligible Driver ($)	-	-	-	-	600	590	630	670	740	780	810	860

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-21. Mobility and Congestion Variables in Indianapolis IN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,469	9,225	9,805	10,111	11,125	12,300	12,469	12,703	12,961	13,122	13,387	14,329
VKT/lane-kilometer	7,851	8,489	8,956	9,101	10,014	10,761	10,757	10,958	10,592	10,654	10,799	11,410
Principal Arterial Streets												
Daily VKT (000)	6,070	5,989	6,537	6,601	6,601	6,601	6,617	6,641	6,730	6,762	6,843	7,245
VKT/lane-kilometer	4,570	4,482	4,862	4,910	4,881	4,852	4,835	4,853	4,750	4,773	4,802	4,891
Roadway Congestion Index	0.67	0.70	0.75	0.76	0.81	0.85	0.85	0.86	0.84	0.84	0.85	0.89
Hours of Delay												
Total Daily (1000 person-hrs)	11	11	12	13	13	13	20	21	22	22	25	36
Annual per Capita (person-hrs)	3	3	4	4	4	4	5	6	6	6	7	9
Annual per Driver (person-hrs)	4	4	5	5	5	5	7	7	7	7	8	12
Freeway Daily Delay												
Recurring Veh-Hrs	1,160	1,260	1,340	1,380	1,520	1,750	3,550	3,690	4,000	4,080	4,170	6,880
Incident Veh-Hrs	1,740	1,890	2,010	2,080	2,280	2,630	5,330	5,540	5,990	6,130	6,250	10,330
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	2,760	2,660	3,120	3,390	3,050	2,900	3,540	3,470	3,570	3,480	4,600	5,350
Incident Veh-Hrs	3,030	2,930	3,430	3,730	3,350	3,190	3,900	3,820	3,930	3,830	5,060	5,880
Excess Fuel Consumed due to Congestion												
Total (million liters)	11	12	13	14	14	14	22	23	24	24	27	39
per Capita (liters)	13	14	15	16	15	15	24	24	25	25	28	40
per Eligible Driver (liters)	18	18	20	21	20	20	31	32	33	33	37	52
Congestion Cost												
Total ($ million)	-	-	-	-	30	40	60	60	70	80	90	130
per Capita ($)	-	-	-	-	40	40	70	70	80	80	90	130
per Eligible Driver ($)	-	-	-	-	50	50	90	90	100	100	120	170

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-22. Mobility and Congestion Variables in Jacksonville FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,199	6,488	7,173	7,326	7,519	7,680	8,292	8,372	8,662	8,807	9,266	9,660
VKT/lane-kilometer	11,324	11,194	12,205	12,297	11,974	11,925	12,262	11,818	11,956	12,156	12,648	12,500
Principal Arterial Streets												
Daily VKT (000)	8,243	8,887	8,919	8,960	9,048	9,064	9,121	9,249	9,346	9,499	9,893	10,063
VKT/lane-kilometer	4,995	5,111	5,036	4,991	4,996	4,939	4,884	4,828	4,838	4,876	4,801	4,771
Roadway Congestion Index	0.91	0.92	0.96	0.96	0.95	0.94	0.95	0.93	0.93	0.95	0.97	0.96
Hours of Delay												
Total Daily (1000 person-hrs)	40	40	48	52	48	58	56	66	70	69	76	83
Annual per Capita (person-hrs)	16	16	19	20	18	22	20	23	24	23	25	27
Annual per Driver (person-hrs)	22	21	25	26	24	29	26	30	32	30	32	35
Freeway Daily Delay												
Recurring Veh-Hrs	4,240	4,440	5,410	6,680	6,350	7,240	6,970	8,790	9,060	9,490	11,380	11,960
Incident Veh-Hrs	6,360	6,660	8,110	10,030	9,530	10,860	10,460	13,190	13,590	14,230	17,070	17,950
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	10,200	9,780	11,970	11,690	10,720	13,400	13,090	14,760	15,830	15,130	15,280	17,520
Incident Veh-Hrs	11,220	10,760	13,160	12,860	11,790	14,740	14,400	16,240	17,410	16,640	16,810	19,270
Excess Fuel Consumed due to Congestion												
Total (million liters)	42	42	51	55	51	61	60	70	74	74	80	87
per Capita (liters)	69	68	80	85	79	92	87	98	103	98	105	113
per Eligible Driver (liters)	92	89	105	111	105	121	113	128	134	127	135	148
Congestion Cost												
Total ($ million)	-	-	-	-	130	160	170	210	230	240	260	300
per Capita ($)	-	-	-	-	200	240	240	290	320	320	350	380
per Eligible Driver ($)	-	-	-	-	270	320	310	370	420	410	450	500

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-24. Mobility and Congestion Variables in Los Angeles CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	121,539	127,737	134,250	141,100	148,297	155,993	164,445	171,755	177,655	177,551	180,240	183,460
VKT/lane-kilometer	16,591	17,136	17,817	18,451	19,190	19,855	20,593	20,836	21,098	21,106	20,751	20,813
Principal Arterial Streets												
Daily VKT (000)	92,003	96,930	102,122	107,596	113,360	118,834	125,966	128,486	129,396	131,553	132,825	133,630
VKT/lane-kilometer	5,214	5,424	5,638	5,862	6,065	6,266	6,520	6,552	6,479	6,590	6,600	6,614
Roadway Congestion Index	1.22	1.27	1.32	1.36	1.42	1.47	1.52	1.54	1.55	1.56	1.54	1.54
Hours of Delay												
Total Daily (1000 person-hrs)	1,273	1,459	1,595	1,751	1,987	2,067	2,183	2,271	2,306	2,326	2,367	2,402
Annual per Capita (person-hrs)	32	37	40	42	46	47	49	50	50	49	50	50
Annual per Driver (person-hrs)	41	47	52	54	60	61	63	65	65	64	64	65
Freeway Daily Delay												
Recurring Veh-Hrs	369,790	426,110	446,710	472,910	529,820	562,430	564,510	591,310	611,620	608,410	616,860	626,810
Incident Veh-Hrs	443,750	511,330	536,060	567,490	635,780	674,910	677,420	709,570	733,940	730,090	740,240	752,170
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	97,700	109,250	139,680	171,470	201,980	198,400	240,090	245,800	237,720	248,890	255,580	258,220
Incident Veh-Hrs	107,470	120,180	153,650	188,610	222,180	218,240	264,100	270,380	261,500	273,770	281,140	284,050
Excess Fuel Consumed due to Congestion												
Total (million liters)	1,370	1,562	1,702	1,858	2,081	2,168	2,272	2,364	2,405	2,425	2,466	2,503
per Capita (liters)	138	158	172	177	194	198	204	209	211	206	208	209
per Eligible Driver (liters)	178	203	221	228	250	256	262	269	271	265	267	269
Congestion Cost												
Total ($ million)	-	-	-	-	5,380	5,780	6,350	7,000	7,660	7,900	8,250	8,540
per Capita ($)	-	-	-	-	500	530	570	620	670	670	700	710
per Eligible Driver ($)	-	-	-	-	650	680	730	800	860	860	890	920

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-25. Mobility and Congestion Variables in Louisville KY

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,303	7,140	7,406	7,567	7,704	8,662	9,724	9,885	9,974	10,063	10,513	11,270
VKT/lane-kilometer	9,105	9,856	9,787	9,792	9,570	10,346	10,690	10,496	10,500	10,593	10,793	11,382
Principal Arterial Streets												
Daily VKT (000)	4,226	4,379	4,419	4,436	4,403	4,790	4,605	4,653	4,741	5,023	5,353	5,635
VKT/lane-kilometer	5,357	5,495	5,545	5,510	5,470	5,891	5,608	5,667	5,663	6,000	6,333	6,034
Roadway Congestion Index	0.78	0.82	0.82	0.82	0.80	0.86	0.87	0.86	0.86	0.88	0.90	0.93
Hours of Delay												
Total Daily (1000 person-hrs)	19	21	20	23	23	27	25	25	26	28	35	42
Annual per Capita (person-hrs)	6	7	6	7	7	9	8	8	8	9	11	13
Annual per Driver (person-hrs)	8	9	8	9	9	11	10	10	10	11	13	16
Freeway Daily Delay												
Recurring Veh-Hrs	1,060	1,470	1,530	1,680	1,520	1,660	1,830	1,890	1,780	1,780	1,970	4,320
Incident Veh-Hrs	1,160	1,620	1,690	1,850	1,670	1,820	2,020	2,080	1,960	1,960	2,170	4,750
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	6,230	6,660	5,980	6,960	7,190	8,690	7,590	7,610	8,040	8,780	11,290	11,630
Incident Veh-Hrs	6,850	7,320	6,570	7,650	7,910	9,560	8,350	8,370	8,840	9,650	12,410	12,790
Excess Fuel Consumed due to Congestion												
Total (million liters)	19	22	20	23	23	27	25	25	26	28	35	43
per Capita (liters)	25	28	26	29	29	34	31	32	32	35	43	52
per Eligible Driver (liters)	32	35	33	37	37	44	39	40	41	44	53	65
Congestion Cost												
Total ($ million)	-	-	-	-	60	70	70	80	80	90	120	140
per Capita ($)	-	-	-	-	80	90	90	90	100	110	140	180
per Eligible Driver ($)	-	-	-	-	100	120	110	120	130	140	180	220

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-26. Mobility and Congestion Variables in Memphis TN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,750	4,830	4,854	4,911	5,329	6,005	6,360	6,851	6,987	7,567	8,098	8,292
VKT/lane-kilometer	9,833	9,231	8,868	8,356	9,068	9,816	10,395	11,197	11,128	11,463	11,432	11,319
Principal Arterial Streets												
Daily VKT (000)	5,313	5,474	5,659	5,667	6,054	6,327	65,201	6,633	6,818	7,245	8,066	8,951
VKT/lane-kilometer	4,925	5,000	5,094	4,889	5,116	5,205	5,031	5,055	4,953	4,972	5,112	5,346
Roadway Congestion Index	0.83	0.80	0.79	0.75	0.80	0.84	0.86	0.90	0.89	0.91	0.92	0.93
Hours of Delay												
Total Daily (1000 person-hrs)	15	15	17	17	18	21	23	24	26	29	33	36
Annual per Capita (person-hrs)	5	5	5	5	6	6	7	7	7	9	9	10
Annual per Driver (person-hrs)	7	7	7	7	8	8	9	9	10	11	12	13
Freeway Daily Delay												
Recurring Veh-Hrs	1,420	1,320	1,520	1,450	1,460	1,640	1,740	1,880	2,010	3,250	3,900	4,200
Incident Veh-Hrs	1,560	1,450	1,670	1,600	1,600	1,810	1,920	2,060	2,220	3,570	4,290	4,620
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,360	4,490	4,810	4,870	5,570	6,200	6,940	7,310	7,790	7,980	8,570	9,330
Incident Veh-Hrs	4,790	4,940	5,290	5,350	6,130	6,820	7,640	8,040	8,560	8,770	9,430	10,270
Excess Fuel Consumed due to Congestion												
Total (million liters)	16	16	17	17	19	22	24	25	27	31	34	37
per Capita (liters)	21	21	22	22	24	26	29	29	31	36	39	42
per Eligible Driver (liters)	28	28	30	30	32	35	38	38	41	47	51	54
Congestion Cost												
Total ($ million)	-	-	-	-	50	60	70	70	80	100	110	120
per Capita ($)	-	-	-	-	60	70	80	90	100	120	130	140
per Eligible Driver ($)	-	-	-	-	80	90	100	110	130	150	170	180

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Freeway VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}{\frac{\text{Prin. Art. Str. VKT}}{\text{Freeway VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-27. Mobility and Congestion Variables in Miami FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,580	10,087	10,417	11,447	11,713	11,946	12,695	13,444	13,798	14,136	15,086	15,923
VKT/lane-kilometer	11,553	12,165	12,324	13,167	13,472	13,369	13,713	14,397	14,165	14,276	14,992	15,453
Principal Arterial Streets												
Daily VKT (000)	19,111	19,803	20,125	20,447	20,608	20,930	22,121	23,836	25,446	25,760	27,048	27,370
VKT/lane-kilometer	6,331	6,474	6,494	6,480	6,481	6,500	6,802	7,275	7,617	7,692	7,534	7,539
Roadway Congestion Index	1.05	1.09	1.10	1.13	1.14	1.14	1.18	1.25	1.27	1.28	1.30	1.32
Hours of Delay												
Total Daily (1000 person-hrs)	170	160	166	204	199	211	253	278	288	289	288	312
Annual per Capita (person-hrs)	25	23	24	29	28	30	35	38	39	38	38	40
Annual per Driver (person-hrs)	30	29	29	36	35	37	44	48	49	49	47	51
Freeway Daily Delay												
Recurring Veh-Hrs	16,740	16,560	17,310	20,240	21,680	21,790	30,730	33,290	33,080	33,240	35,530	39,560
Incident Veh-Hrs	25,110	24,840	25,970	30,360	32,520	32,680	46,090	49,940	49,630	49,860	53,290	59,340
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	44,970	41,380	42,630	53,450	49,890	54,630	59,900	66,250	70,480	70,640	67,510	71,590
Incident Veh-Hrs	49,460	45,520	46,900	58,790	54,880	60,090	65,890	72,870	77,530	77,700	74,270	78,740
Excess Fuel Consumed due to Congestion												
Total (million liters)	171	164	169	207	203	215	256	280	291	293	293	316
per Capita (liters)	99	95	97	117	114	121	142	152	157	156	153	163
per Eligible Driver (liters)	122	118	120	146	142	150	178	192	198	196	193	206
Congestion Cost												
Total ($ million)	-	-	-	-	530	580	730	840	940	960	990	1,090
per Capita ($)	-	-	-	-	300	330	400	460	510	510	510	560
per Eligible Driver ($)	-	-	-	-	370	410	500	570	640	650	650	710

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-28. Mobility and Congestion Variables in Milwaukee WI

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,016	9,338	9,467	9,765	10,167	10,980	11,487	12,099	12,381	12,574	12,614	12,622
VKT/lane-kilometer	10,370	10,741	10,789	11,027	11,482	12,400	12,197	12,737	12,924	13,017	13,058	12,959
Principal Arterial Streets												
Daily VKT (000)	6,907	6,891	7,495	7,760	7,567	7,470	7,607	7,511	7,696	7,937	8,372	9,016
VKT/lane-kilometer	4,613	4,553	4,952	5,021	4,845	4,735	4,773	4,665	4,756	4,881	4,906	5,000
Roadway Congestion Index	0.83	0.84	0.87	0.88	0.90	0.95	0.94	0.97	0.99	1.00	1.00	1.00
Hours of Delay												
Total Daily (1000 person-hrs)	32	32	39	44	47	53	55	55	58	60	62	62
Annual per Capita (person-hrs)	7	7	8	9	10	11	11	11	12	12	13	13
Annual per Driver (person-hrs)	9	9	11	12	13	14	15	15	16	16	17	17
Freeway Daily Delay												
Recurring Veh-Hrs	5,910	6,080	7,780	8,330	9,200	12,650	13,800	13,880	14,430	14,520	14,880	14,970
Incident Veh-Hrs	5,910	6,080	7,780	8,330	9,200	12,650	13,800	13,880	14,430	14,520	14,880	14,970
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	6,590	6,450	7,480	8,990	9,100	8,070	7,950	7,880	8,490	8,920	9,400	9,410
Incident Veh-Hrs	7,250	7,090	8,220	9,890	10,010	8,870	8,740	8,670	9,340	9,810	10,340	10,350
Excess Fuel Consumed due to Congestion												
Total (million liters)	34	34	42	47	49	56	59	59	62	63	66	66
per Capita (liters)	28	28	35	39	41	46	48	48	50	52	53	53
per Eligible Driver (liters)	37	37	46	51	54	61	63	64	67	69	70	71
Congestion Cost												
Total ($ million)	-	-	-	-	130	150	160	170	190	200	220	220
per Capita ($)	-	-	-	-	100	120	130	140	160	170	180	180
per Eligible Driver ($)	-	-	-	-	140	160	170	190	210	220	230	240

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-29. Mobility and Congestion Variables in Minn-St. Paul MN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	18,032	19,586	20,930	22,033	23,442	25,148	26,436	27,145	28,642	29,318	30,590	32,200
VKT/lane-kilometer	9,492	10,309	10,569	10,776	11,287	11,237	11,443	11,628	12,020	12,181	12,583	13,030
Principal Arterial Streets												
Daily VKT (000)	6,923	7,165	7,487	7,873	8,211	8,372	8,533	8,678	9,080	9,660	10,948	11,431
VKT/lane-kilometer	4,725	4,837	5,000	5,202	5,368	5,417	5,464	5,472	5,640	5,769	5,913	5,917
Roadway Congestion Index	0.76	0.81	0.84	0.85	0.89	0.89	0.90	0.92	0.95	0.96	0.99	1.02
Hours of Delay												
Total Daily (1000 person-hrs)	51	57	65	71	88	116	119	121	129	134	147	144
Annual per Capita (person-hrs)	7	8	9	10	12	15	15	15	16	16	17	17
Annual per Driver (person-hrs)	9	10	12	12	15	19	19	19	20	20	22	21
Freeway Daily Delay												
Recurring Veh-Hrs	11,330	13,190	14,380	16,900	21,180	31,550	32,220	33,080	34,980	35,220	36,980	37,340
Incident Veh-Hrs	10,200	11,870	12,940	15,210	19,070	28,390	29,000	29,770	31,480	31,700	33,290	33,610
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	9,120	9,640	11,790	11,770	14,520	15,840	16,220	16,160	17,530	19,080	22,380	21,020
Incident Veh-Hrs	10,040	10,600	12,970	12,950	15,980	17,420	17,840	17,780	19,280	20,990	24,620	23,120
Excess Fuel Consumed due to Congestion												
Total (million liters)	55	61	70	75	94	123	126	128	137	142	155	153
per Capita (liters)	32	35	40	42	51	65	66	65	68	69	73	72
per Eligible Driver (liters)	39	44	50	52	64	82	82	82	85	86	92	91
Congestion Cost												
Total ($ million)	-	-	-	-	240	330	350	380	430	460	510	510
per Capita ($)	-	-	-	-	130	170	180	190	210	220	240	240
per Eligible Driver ($)	-	-	-	-	160	220	230	240	270	280	300	300

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \frac{\text{Freeway VKT}}{\text{Total VKT}} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \frac{\text{Prin. Art. Str. VKT}}{\text{Total VKT}}}{\frac{\text{Freeway VKT}}{\text{Total VKT}} + \frac{\text{Prin. Art. Str. VKT}}{\text{Total VKT}}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-30. Mobility and Congestion Variables in Nashville TN

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	5,233	5,313	5,868	6,303	6,843	7,245	7,712	7,905	8,050	8,388	9,660	11,270
VKT/lane-kilometer	9,286	9,429	9,720	9,212	10,000	10,465	10,886	10,229	10,204	10,317	10,909	11,111
Principal Arterial Streets												
Daily VKT (000)	5,716	6,110	6,915	7,382	7,736	7,913	8,670	8,694	8,758	8,791	8,855	9,016
VKT/lane-kilometer	4,494	4,685	5,053	5,210	5,339	5,431	5,885	5,775	5,787	5,747	5,729	5,773
Roadway Congestion Index	0.77	0.79	0.83	0.81	0.86	0.89	0.94	0.90	0.89	0.90	0.92	0.93
Hours of Delay												
Total Daily (1000 person-hrs)	21	24	31	30	37	42	52	51	51	51	49	46
Annual per Capita (person-hrs)	11	12	15	15	18	20	24	23	22	22	21	19
Annual per Driver (person-hrs)	14	15	19	19	23	25	31	29	28	28	26	24
Freeway Daily Delay												
Recurring Veh-Hrs	3,870	3,750	3,870	3,110	3,250	4,480	6,990	6,550	6,360	6,570	7,980	7,860
Incident Veh-Hrs	-	-	-	-	3,570	4,930	7,690	7,200	7,000	7,230	8,780	8,650
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	6,310	7,260	9,940	10,000	10,820	11,380	12,990	12,960	12,990	12,740	10,710	9,550
Incident Veh-Hrs	6,940	7,990	10,940	11,000	11,900	12,510	14,290	14,260	14,290	14,020	11,780	10,510
Excess Fuel Consumed due to Congestion												
Total (million liters)	22	25	32	31	38	43	54	53	53	53	52	48
per Capita (liters)	44	49	62	60	73	81	100	97	94	92	88	80
per Eligible Driver (liters)	57	63	80	77	92	103	125	121	118	115	111	101
Congestion Cost												
Total ($ million)	-	-	-	-	100	120	150	160	170	170	170	160
per Capita ($)	-	-	-	-	190	220	280	280	300	300	290	270
per Eligible Driver ($)	-	-	-	-	240	270	350	360	370	370	360	340

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-31. Mobility and Congestion Variables in New Orleans LA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,279	6,440	6,682	6,891	6,963	7,487	7,664	7,825	8,002	8,114	8,131	8,372
VKT/lane-kilometer	12,000	12,121	12,576	12,970	13,106	14,091	14,000	13,886	13,806	13,808	13,467	13,506
Principal Arterial Streets												
Daily VKT (000)	5,313	5,514	5,812	5,973	6,182	6,529	6,537	6,545	6,601	6,657	6,762	7,084
VKT/lane-kilometer	5,841	6,062	6,389	6,509	6,621	6,540	6,548	6,556	6,560	6,512	6,412	6,286
Roadway Congestion Index	0.98	1.00	1.05	1.07	1.09	1.14	1.13	1.13	1.12	1.12	1.10	1.09
Hours of Delay												
Total Daily (1000 person-hrs)	46	50	70	72	80	83	85	85	85	85	83	85
Annual per Capita (person-hrs)	11	11	16	17	19	20	20	20	20	19	19	19
Annual per Driver (person-hrs)	14	15	22	23	25	26	27	27	26	26	25	25
Freeway Daily Delay												
Recurring Veh-Hrs	7,110	8,290	12,440	12,620	13,910	14,690	14,940	15,760	15,780	15,570	15,470	15,720
Incident Veh-Hrs	12,790	14,910	22,390	22,720	25,030	26,450	26,890	28,370	28,400	28,030	27,850	28,300
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	8,120	7,830	10,170	10,760	11,800	12,140	12,650	11,230	11,350	11,600	10,830	11,430
Incident Veh-Hrs	8,930	8,620	11,190	11,840	12,990	13,360	13,920	12,360	12,490	12,760	11,910	12,580
Excess Fuel Consumed due to Congestion												
Total (million liters)	50	53	73	75	83	87	90	89	90	89	88	90
per Capita (liters)	46	49	68	71	78	82	85	85	83	81	80	82
per Eligible Driver (liters)	62	66	91	94	104	109	113	113	109	107	105	107
Congestion Cost												
Total ($ million)	-	-	-	-	210	230	250	260	280	290	290	300
per Capita ($)	-	-	-	-	200	220	240	250	260	260	260	270
per Eligible Driver ($)	-	-	-	-	270	290	320	330	350	350	350	360

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-32. Mobility and Congestion Variables in New York NY

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	101,704	103,434	105,157	106,349	115,268	118,520	125,588	130,273	133,501	133,147	134,435	138,460
VKT/lane-kilometer	12,055	12,087	11,601	11,712	12,672	12,714	134,266	13,796	14,054	13,970	13,802	13,984
Principal Arterial Streets												
Daily VKT (000)	71,379	74,141	74,688	75,187	76,403	78,069	80,033	81,836	83809	85,362	89,065	88,550
VKT/lane-kilometer	6,617	6,772	6,822	6,868	6,958	7,028	6,992	6,916	6,886	6,958	7,255	7,143
Roadway Congestion Index	1.01	1.02	0.99	1.00	1.06	1.06	1.10	1.12	1.14	1.14	1.14	1.15
Hours of Delay												
Total Daily (1000 person-hrs)	1,310	1,393	1,314	1,432	1,498	1,593	1,723	1,905	1,900	1,903	2,048	2,128
Annual per Capita (person-hrs)	20	21	21	23	24	25	26	29	28	28	30	31
Annual per Driver (person-hrs)	25	27	27	30	31	32	33	37	36	36	38	39
Freeway Daily Delay												
Recurring Veh-Hrs	198,550	209,770	199,350	215,520	226,160	241,130	255,620	294,660	291,820	289,640	302,330	316,050
Incident Veh-Hrs	496,380	524,420	498,360	538,790	565,390	602,830	639,060	736,660	729,560	724,100	755,820	790,140
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	168,100	181,080	168,510	186,300	193,850	205,120	230,520	234,690	237,540	242,140	276,310	284,050
Incident Veh-Hrs	184,910	199,190	185,360	204,930	213,230	225,630	253,570	258,160	261,300	266,350	303,940	312,450
Excess Fuel Consumed due to Congestion												
Total (million liters)	1,397	1,475	1,408	1,516	1,593	1,685	1,818	2,014	2,018	2,020	2,154	2,234
per Capita (liters)	84	89	92	99	104	105	111	123	120	120	127	131
per Eligible Driver (liters)	107	113	117	126	132	134	141	155	151	151	159	165
Congestion Cost												
Total ($ million)	-	-	-	-	-	4,430	5,010	5,880	6,370	6,520	7,170	7,600
per Capita ($)	-	-	-	-	-	280	310	360	380	390	420	450
per Eligible Driver ($)	-	-	-	-	-	350	390	450	480	490	530	560

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-33. Mobility and Congestion Variables in Norfolk VA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,231	6,432	6,722	7,197	7,978	8,316	8,420	8,589	8,775	8,960	9,451	9,620
VKT/lane-kilometer	9,439	9,512	9,709	10,159	11,135	11,478	11,495	11,598	11,720	11,130	10,482	10,391
Principal Arterial Streets												
Daily VKT (000)	5,265	5,321	5,474	5,651	5,844	6,207	6,376	6,569	6,851	7,132	7,688	7,889
VKT/lane-kilometer	4,917	4,933	5,037	5,200	5,223	5,507	5,577	5,628	5,789	5,907	6,367	6,447
Roadway Congestion Index	0.79	0.79	0.81	0.84	0.90	0.93	0.94	0.95	0.96	0.93	0.92	0.92
Hours of Delay												
Total Daily (1000 person-hrs)	43	44	53	63	78	88	90	92	94	93	93	90
Annual per Capita (person-hrs)	14	14	17	20	23	25	25	25	25	24	24	23
Annual per Driver (person-hrs)	18	18	21	25	29	32	32	32	32	31	30	29
Freeway Daily Delay												
Recurring Veh-Hrs	6,240	6,440	8,340	10,700	13,770	15,410	16,040	16,460	16,820	16,250	14,770	13,830
Incident Veh-Hrs	15,610	16,090	20,840	26,760	34,420	38,520	40,090	41,150	42,040	40,620	36,940	34,580
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	6,090	6,180	6,340	6,070	6,610	7,710	7,380	7,620	7,880	8,220	10,900	11,130
Incident Veh-Hrs	6,700	6,800	6,970	6,670	7,270	8,480	8,120	8,380	8,660	9,040	11,990	12,250
Excess Fuel Consumed due to Congestion												
Total (million liters)	47	48	57	67	83	93	94	97	99	98	98	95
per Capita (liters)	61	62	72	84	99	106	105	105	107	103	102	98
per Eligible Driver (liters)	79	79	91	106	126	134	133	133	136	131	128	122
Congestion Cost												
Total ($ million)	-	-	-	-	-	240	260	280	310	320	330	320
per Capita ($)	-	-	-	-	-	280	290	310	340	330	340	330
per Eligible Driver ($)	-	-	-	-	-	350	370	390	430	420	420	410

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-34. Mobility and Congestion Variables in Oklahoma City OK

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	9,378	9,563	9,757	9,942	10,111	10,191	10,658	10,996	11,165	11,471	11,753	12,397
VKT/lane-kilometer	8,759	8,800	8,912	9,015	9,101	9,043	9,390	9,486	9,632	9,828	10,069	10,476
Principal Arterial Streets												
Daily VKT (000)	4,428	4,669	5,361	5,394	5,442	5,579	5,546	5,772	5,772	6,070	6,392	7,245
VKT/lane-kilometer	4,783	4,793	5,286	5,194	5,240	5,290	5,260	5,272	5,272	5,464	5,514	5,625
Roadway Congestion Index	0.72	0.72	0.75	0.75	0.76	0.76	0.78	0.78	0.79	0.81	0.83	0.86
Hours of Delay												
Total Daily (1000 person-hrs)	18	19	24	24	25	24	28	27	27	28	32	35
Annual per Capita (person-hrs)	7	7	9	8	8	8	10	9	9	10	11	11
Annual per Driver (person-hrs)	9	9	11	11	11	11	13	12	12	12	14	14
Freeway Daily Delay												
Recurring Veh-Hrs	1,540	1,580	1,610	1,640	1,670	1,680	3,470	3,520	3,610	3,680	3,820	4,030
Incident Veh-Hrs	1,700	1,730	1,770	1,800	1,830	1,850	3,810	3,880	3,970	4,040	4,200	4,430
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	5,380	5,670	7,600	7,640	7,710	7,340	7,330	6,840	6,670	7,160	8,550	9,430
Incident Veh-Hrs	5,920	6,240	8,360	8,410	8,480	8,080	8,070	7,520	7,340	7,880	9,410	10,370
Excess Fuel Consumed due to Congestion												
Total (million liters)	19	20	25	25	26	24	29	28	28	30	34	37
per Capita (liters)	30	30	36	35	35	33	41	39	38	40	45	46
per Eligible Driver (liters)	39	39	47	45	46	43	53	51	50	52	59	59
Congestion Cost												
Total ($ million)	-	-	-	-	70	60	80	80	90	100	110	120
per Capita ($)	-	-	-	-	90	90	110	110	120	130	150	150
per Eligible Driver ($)	-	-	-	-	120	120	150	150	160	170	200	200

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-35. Mobility and Congestion Variables in Orlando FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	6,955	7,261	7,487	8,420	8,557	8,919	9,314	9,370	9,580	9,732	9,741	10,022
VKT/lane-kilometer	9,191	9,495	9,490	9,962	10,028	10,165	10,423	10,122	10,085	10,075	10,083	10,122
Principal Arterial Streets												
Daily VKT (000)	5,740	5,957	5,699	5,852	5,917	5,949	5,957	6,158	6,601	7,084	7,809	8,372
VKT/lane-kilometer	3,896	3,978	3,649	3,635	3,585	3,587	3,524	3,608	3,832	4,074	4,450	4,685
Roadway Congestion Index	0.72	0.75	0.73	0.76	0.76	0.77	0.78	0.77	0.77	0.78	0.80	0.82
Hours of Delay												
Total Daily (1000 person-hrs)	26	26	31	35	40	42	43	44	46	49	53	66
Annual per Capita (person-hrs)	11	10	12	13	14	14	14	14	14	14	15	18
Annual per Driver (person-hrs)	13	13	15	16	18	17	17	17	17	17	18	22
Freeway Daily Delay												
Recurring Veh-Hrs	4,760	4,970	5,650	7,000	8,220	8,870	9,110	9,020	9,480	9,800	10,560	12,860
Incident Veh-Hrs	7,140	7,450	8,480	10,500	12,330	13,300	13,660	13,530	14,230	14,700	15,840	19,290
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,130	4,120	5,060	5,000	5,450	5,600	5,430	5,850	6,390	6,900	7,680	9,680
Incident Veh-Hrs	4,540	4,530	5,570	5,500	6,000	6,160	5,970	6,430	7,030	7,590	8,440	10,640
Excess Fuel Consumed due to Congestion												
Total (million liters)	28	29	34	38	44	46	47	47	50	53	57	70
per Capita (liters)	46	46	52	57	63	61	59	59	59	60	64	76
per Eligible Driver (liters)	59	58	65	70	79	76	74	73	73	73	79	93
Congestion Cost												
Total ($ million)	-	-	-	-	110	120	130	140	160	170	190	230
per Capita ($)	-	-	-	-	160	160	160	170	180	190	210	250
per Eligible Driver ($)	-	-	-	-	200	200	200	210	230	230	260	310

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-36. Mobility and Congestion Variables in Philadelphia PA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,924	21,655	21,952	22,226	22,741	24,351	26,847	29,423	29,503	30,671	31,218	32,522
VKT/lane-kilometer	9,900	10,591	10,736	10,743	10,865	11,330	11,911	12,143	12,136	12,134	12,006	11,953
Principal Arterial Streets												
Daily VKT (000)	30,590	31,427	31,886	32,852	34,494	36,306	35,605	34,035	34,438	34,808	34,857	34,873
VKT/lane-kilometer	7,037	7,072	7,073	7,036	7,263	7,003	6,847	6,515	6,582	6,632	6,641	6,584
Roadway Congestion Index	1.00	1.03	1.04	1.04	1.06	1.06	1.07	1.05	1.05	1.05	1.05	1.04
Hours of Delay												
Total Daily (1000 person-hrs)	252	242	258	300	312	335	343	339	344	351	369	380
Annual per Capita (person-hrs)	15	15	16	18	19	20	21	20	19	19	18	18
Annual per Driver (person-hrs)	20	19	20	24	25	26	27	26	24	24	23	23
Freeway Daily Delay												
Recurring Veh-Hrs	14,850	16,080	15,570	17,630	18,210	19,980	21,740	24,950	26,220	27,600	31,450	31,570
Incident Veh-Hrs	31,190	33,770	32,690	37,030	38,250	41,950	45,660	52,400	55,070	57,960	66,050	66,290
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	74,150	68,620	75,420	88,090	92,060	98,050	98,760	92,400	92,500	92,820	94,240	98,300
Incident Veh-Hrs	81,570	75,480	82,960	96,900	101,270	107,850	108,640	101,640	101,750	102,100	103,670	108,130
Excess Fuel Consumed due to Congestion												
Total (million liters)	253	246	260	302	315	337	346	344	348	355	371	382
per Capita (liters)	62	60	64	74	77	83	84	81	77	76	74	73
per Eligible Driver (liters)	80	78	82	95	99	106	107	104	98	96	94	93
Congestion Cost												
Total ($ million)	-	-	-	-	-	910	970	1,020	1,120	1,170	1,260	1,320
per Capita ($)	-	-	-	-	-	220	240	240	250	250	250	250
per Eligible Driver ($)	-	-	-	-	-	280	300	310	320	320	320	320

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-37. Mobility and Congestion Variables in Phoenix AZ

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,589	4,685	5,072	5,683	7,438	7,374	9,419	11,351	12,832	14,571	15,698	15,778
VKT/lane-kilometer	13,571	12,652	11,250	12,172	14,903	13,471	11,250	11,653	12,752	13,609	13,929	13,803
Principal Arterial Streets												
Daily VKT (000)	24,037	24,094	24,641	25,285	25,502	26,525	26,855	26,798	28,352	29,004	29,149	29,785
VKT/lane-kilometer	6,020	6,010	6,122	6,232	6,236	6,423	6,000	5,840	5,644	5,595	5,470	5,522
Roadway Congestion Index	1.15	1.13	1.10	1.13	1.20	1.18	1.04	1.03	1.05	1.08	1.08	1.08
Hours of Delay												
Total Daily (1000 person-hrs)	130	128	133	154	176	181	207	212	212	225	240	248
Annual per Capita (person-hrs)	23	21	21	23	25	25	28	28	28	29	30	30
Annual per Driver (person-hrs)	30	28	28	31	34	33	38	37	37	38	39	40
Freeway Daily Delay												
Recurring Veh-Hrs	6,590	7,410	8,990	11,110	20,450	22,340	21,650	27,310	30,990	34,770	39,860	43,140
Incident Veh-Hrs	2,640	2,960	3,600	4,440	8,180	8,940	8,660	10,920	12,390	13,910	15,940	17,260
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	45,140	43,750	44,740	51,240	53,500	53,960	64,430	62,640	60,260	62,360	64,740	65,900
Incident Veh-Hrs	49,660	48,120	49,210	56,360	58,840	59,360	70,880	68,900	66,280	68,590	71,220	72,490
Excess Fuel Consumed due to Congestion												
Total (million liters)	133	132	137	159	180	184	210	216	218	231	245	255
per Capita (liters)	93	87	86	96	104	101	115	115	115	120	121	123
per Eligible Driver (liters)	124	115	116	128	139	134	152	152	152	158	160	162
Congestion Cost												
Total ($ million)	-	-	-	-	470	500	600	640	700	750	820	870
per Capita ($)	-	-	-	-	270	280	330	340	370	390	410	420
per Eligible Driver ($)	-	-	-	-	360	370	430	450	490	520	540	560

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-38. Mobility and Congestion Variables in Pittsburgh PA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,887	9,853	10,401	10,715	11,109	11,576	11,882	12,478	13,194	13,283	14,707	15,054
VKT/lane-kilometer	7,123	7,200	7,468	7,563	7,582	7,690	7,768	7,908	8,195	8,128	8,156	8,130
Principal Arterial Streets												
Daily VKT (000)	14,257	14,385	14,619	15,206	15,786	15,947	17,114	17,332	17,565	17,831	17,871	18,515
VKT/lane-kilometer	5,807	5,637	5,470	5,724	5,836	5,826	6,023	6,082	5,995	5,970	5,984	6,183
Roadway Congestion Index	0.78	0.76	0.76	0.78	0.79	0.79	0.81	0.82	0.82	0.82	0.81	0.82
Hours of Delay												
Total Daily (1000 person-hrs)	75	88	95	101	120	127	142	143	149	146	153	161
Annual per Capita (person-hrs)	10	12	13	14	17	18	19	19	20	20	20	21
Annual per Driver (person-hrs)	13	15	16	17	20	21	24	24	24	24	25	26
Freeway Daily Delay												
Recurring Veh-Hrs	3,650	4,750	5,600	6,180	9,000	9,430	8,530	8,830	10,740	10,870	11,770	11,870
Incident Veh-Hrs	10,580	13,780	16,240	17,940	26,100	27,340	24,740	25,600	31,150	31,510	34,120	34,410
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	21,660	24,680	25,810	27,040	29,040	30,870	38,270	38,270	36,710	35,620	36,380	39,340
Incident Veh-Hrs	23,820	27,150	28,390	29,740	31,940	33,960	42,100	42,100	40,380	39,180	40,020	43,270
Excess Fuel Consumed due to Congestion												
Total (million liters)	77	90	96	103	122	128	142	144	149	148	154	163
per Capita (liters)	42	49	53	57	67	71	77	78	80	79	82	86
per Eligible Driver (liters)	52	61	65	69	82	87	94	95	98	96	100	104
Congestion Cost												
Total ($ million)	-	-	-	-	-	350	400	430	480	490	520	560
per Capita ($)	-	-	-	-	-	190	220	230	260	260	280	290
per Eligible Driver ($)	-	-	-	-	-	230	270	280	320	320	340	360

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-39. Mobility and Congestion Variables in Portland OR

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	7,631	8,654	8,968	9,539	10,183	10,787	11,431	12,027	12,027	12,107	12,832	13,444
VKT/lane-kilometer	10,773	11,198	10,922	11,505	12,048	12,407	13,148	13,582	13,459	13,429	13,861	13,917
Principal Arterial Streets												
Daily VKT (000)	4,468	4,484	4,500	4,774	5,055	5,152	5,281	5,426	5,973	6,166	6,295	7,084
VKT/lane-kilometer	5,388	5,408	5,427	5,702	5,981	6,038	6,074	6,072	6,566	6,547	6,463	6,667
Roadway Congestion Index	0.87	0.90	0.88	0.93	0.97	0.99	1.04	1.07	1.08	1.08	1.10	1.11
Hours of Delay												
Total Daily (1000 person-hrs)	51	53	52	57	62	76	80	87	90	91	109	117
Annual per Capita (person-hrs)	13	13	13	14	15	18	20	21	22	22	26	27
Annual per Driver (person-hrs)	16	16	16	17	18	23	24	26	27	27	32	34
Freeway Daily Delay												
Recurring Veh-Hrs	8,130	8,510	8,710	9,740	10,640	13,160	13,980	15,380	15,230	15,250	20,170	21,270
Incident Veh-Hrs	16,260	17,020	17,410	19,490	21,280	26,320	27,960	30,770	30,460	30,500	40,350	42,540
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	7,670	8,000	7,360	7,620	8,410	10,330	10,630	11,070	12,450	13,010	12,890	14,290
Incident Veh-Hrs	8,440	8,800	8,100	8,380	9,250	11,360	11,700	12,180	13,690	14,310	14,180	15,720
Excess Fuel Consumed due to Congestion												
Total (million liters)	54	57	56	61	66	82	86	92	95	97	116	124
per Capita (liters)	53	57	56	59	64	78	84	90	93	93	109	115
per Eligible Driver (liters)	67	70	69	73	79	97	105	113	115	115	136	143
Congestion Cost												
Total ($ million)	-	-	-	-	170	210	230	270	300	310	380	420
per Capita ($)	-	-	-	-	160	200	230	260	290	300	360	390
per Eligible Driver ($)	-	-	-	-	200	250	290	330	360	370	450	480

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\frac{\textit{Freeway VKT/Ln.-Km.}}{} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-40. Mobility and Congestion Variables in Sacramento CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	8,533	9,338	10,433	11,109	11,914	12,969	13,556	14,249	14,909	15,520	16,285	16,551
VKT/lane-kilometer	8,413	9,206	10,125	10,781	11,385	12,205	12,474	12,123	12,347	12,684	12,644	12,770
Principal Arterial Streets												
Daily VKT (000)	8,042	8,372	8,726	9,097	9,475	9,877	10,715	10,964	11,262	11,270	12,453	12,639
VKT/lane-kilometer	6,018	6,118	6,022	6,011	6,067	6,135	6,338	6,306	6,359	6,278	6,238	6,280
Roadway Congestion Index	0.80	0.84	0.88	0.92	0.95	1.00	1.03	1.01	1.02	1.04	1.04	1.04
Hours of Delay												
Total Daily (1000 person-hrs)	37	39	47	55	57	64	73	83	87	87	92	106
Annual per Capita (person-hrs)	11	12	14	15	15	16	18	20	20	19	19	22
Annual per Driver (person-hrs)	14	15	18	19	19	21	23	26	26	24	25	29
Freeway Daily Delay												
Recurring Veh-Hrs	5,840	6,390	7,970	10,160	10,960	12,750	13,640	14,740	15,200	15,750	16,860	20,300
Incident Veh-Hrs	3,500	3,830	4,780	6,100	6,570	7,650	8,180	8,850	9,120	9,450	10,120	12,180
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	9,610	10,010	11,740	13,280	13,300	14,690	17,360	20,260	21,490	21,140	22,270	24,860
Incident Veh-Hrs	10,570	11,010	12,910	14,610	14,630	16,160	19,090	22,280	23,640	23,250	24,490	27,340
Excess Fuel Consumed due to Congestion												
Total (million liters)	40	42	50	59	61	68	77	87	91	91	97	111
per Capita (liters)	48	51	60	65	64	68	74	82	83	78	81	92
per Eligible Driver (liters)	61	66	78	83	82	88	96	107	108	103	106	121
Congestion Cost												
Total ($ million)	-	-	-	-	160	180	210	260	290	300	320	380
per Capita ($)	-	-	-	-	160	180	210	240	260	250	270	310
per Eligible Driver ($)	-	-	-	-	210	230	270	320	340	330	350	410

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-41. Mobility and Congestion Variables in Salt Lake City UT

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	4,621	4,790	4,862	5,184	5,555	6,134	65,610	8,179	8,581	8,989	9,298	9,757
VKT/lane-kilometer	7,175	7,083	7,190	7,667	7,753	8,106	8,490	9,961	10,451	10,841	11,000	11,327
Principal Arterial Streets												
Daily VKT (000)	2,343	2,455	2,697	2,890	2,938	3,003	3,075	3,140	3,276	3,671	4,146	4,299
VKT/lane-kilometer	5,196	5,259	5,583	5,439	5,448	5,406	5,457	5,493	5,732	5,922	6,059	6,138
Roadway Congestion Index	0.63	0.63	0.65	0.68	0.68	0.70	0.72	0.81	0.85	0.88	0.90	0.92
Hours of Delay												
Total Daily (1000 person-hrs)	10	11	11	12	13	16	16	19	19	23	27	32
Annual per Capita (person-hrs)	4	4	4	4	4	5	5	6	6	7	8	9
Annual per Driver (person-hrs)	5	5	5	5	6	7	6	8	8	9	10	12
Freeway Daily Delay												
Recurring Veh-Hrs	1,690	1,770	1,520	1,810	2,010	3,350	3,260	4,650	4,450	6,480	7,010	9,400
Incident Veh-Hrs	1,010	1,060	910	1,080	1,200	2,010	1,960	2,790	2,670	3,890	4,210	5,640
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	2,480	3,020	3,110	3,190	3,440	3,510	3,510	3,550	3,800	4,010	4,870	5,060
Incident Veh-Hrs	2,730	3,320	3,420	3,510	3,780	3,860	3,870	3,910	4,180	4,410	5,350	5,570
Excess Fuel Consumed due to Congestion												
Total (million liters)	10	12	12	13	14	17	17	20	20	25	29	34
per Capita (liters)	15	17	16	17	18	22	21	25	25	30	33	39
per Eligible Driver (liters)	20	21	21	22	23	28	28	32	33	39	43	50
Congestion Cost												
Total ($ million)	-	-	-	-	40	40	50	60	60	80	90	110
per Capita ($)	-	-	-	-	50	60	60	70	80	100	110	130
per Eligible Driver ($)	-	-	-	-	60	70	80	90	100	120	140	170

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\textit{Freeway VKT/Ln.-Km.} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-42. Mobility and Congestion Variables in San Antonio TX

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	12,236	12,824	13,605	14,619	14,893	14,490	14,571	14,772	14,941	15,094	15,995	17,227
VKT/lane-kilometer	10,000	10,277	10,764	11,350	11,420	11,043	11,037	11,121	11,248	11,295	11,290	113,832
Principal Arterial Streets												
Daily VKT (000)	5,675	5,933	6,311	6,899	7,382	7,728	8,034	8,340	8,436	8,775	9,563	9,660
VKT/lane-kilometer	3,750	3,819	4,000	4,201	4,451	4,571	4,664	4,796	4,807	4,888	5,280	5,310
Roadway Congestion Index	0.77	0.79	0.82	0.87	0.88	0.86	0.86	0.87	0.88	0.89	0.90	0.91
Hours of Delay												
Total Daily (1000 person-hrs)	39	45	50	67	76	77	78	78	78	81	89	99
Annual per Capita (person-hrs)	10	12	13	17	19	18	17	17	17	17	19	21
Annual per Driver (person-hrs)	15	16	18	23	26	25	23	23	22	23	25	28
Freeway Daily Delay												
Recurring Veh-Hrs	14,390	15,080	16,950	22,420	25,660	25,410	24,500	24,120	24,230	24,950	26,390	28,440
Incident Veh-Hrs	15,830	16,590	18,650	24,670	28,230	27,950	26,950	26,530	26,660	27,440	29,030	31,280
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	650	1,880	2,230	3,250	3,420	3,960	5,260	5,550	5,540	5,810	7,560	9,150
Incident Veh-Hrs	710	2,060	2,450	3,570	3,760	4,350	5,790	6,100	6,090	6,400	8,310	10,060
Excess Fuel Consumed due to Congestion												
Total (million liters)	45	50	56	74	82	82	84	84	84	87	95	105
per Capita (liters)	47	52	57	74	80	78	72	72	72	73	80	88
per Eligible Driver (liters)	66	72	79	103	111	107	97	97	97	98	108	118
Congestion Cost												
Total ($ million)	-	-	-	-	210	220	230	240	260	280	310	350
per Capita ($)	-	-	-	-	200	210	200	210	220	230	260	290
per Eligible Driver ($)	-	-	-	-	280	280	270	280	300	310	360	400

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\textit{Roadway Congestion Index} = \frac{\frac{\textit{Freeway VKT/Ln.-Km.}}{} \times \textit{Freeway VKT} + \textit{Prin. Art. Str. VKT/Ln.-Km.} \times \textit{Prin. Art. Str. VKT}}{13{,}000^{1} \times \textit{Freeway VKT} + 5{,}000^{1} \times \textit{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-43. Mobility and Congestion Variables in San Bernardino-Riv CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	18,869	19,079	19,513	19,723	20,399	20,689	21,816	21,928	23,474	24,102	24,327	24,504
VKT/lane-kilometer	14,469	14,540	14,780	14,671	15,083	15,029	15,575	15,477	16,291	16,541	16,604	16,278
Principal Arterial Streets												
Daily VKT (000)	12,365	13,299	13,927	14,104	14,281	14,329	14,732	15,086	16,342	17,147	17,308	17,871
VKT/lane-kilometer	5,408	5,658	5,510	5,544	5,614	5,494	5,446	5,432	5,232	5,108	5,119	5,236
Roadway Congestion Index	1.11	1.12	1.13	1.12	1.15	1.14	1.18	1.17	1.21	1.22	1.22	1.21
Hours of Delay												
Total Daily (1000 person-hrs)	117	120	150	154	198	204	218	223	251	268	284	292
Annual per Capita (person-hrs)	31	32	39	40	50	50	52	51	54	53	55	55
Annual per Driver (person-hrs)	42	43	53	54	68	68	72	70	74	72	76	76
Freeway Daily Delay												
Recurring Veh-Hrs	31,000	31,340	38,800	36,040	49,470	51,820	56,220	58,210	66,940	71,750	75,890	74,210
Incident Veh-Hrs	37,200	37,610	46,560	43,250	59,360	62,180	67,460	69,850	80,330	86,100	91,070	89,050
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	12,140	13,060	16,580	21,060	23,700	23,460	24,070	24,110	25,620	26,930	28,680	33,520
Incident Veh-Hrs	13,360	14,370	18,240	23,170	26,070	25,800	26,480	26,520	28,180	29,620	31,550	36,870
Excess Fuel Consumed due to Congestion												
Total (million liters)	132	135	165	170	213	219	233	238	268	284	298	307
per Capita (liters)	140	143	171	175	215	215	224	216	229	223	230	232
per Eligible Driver (liters)	188	194	232	239	292	292	306	297	316	306	318	320
Congestion Cost												
Total ($ million)	-	-	-	-	540	580	640	700	850	920	990	1040
per Capita ($)	-	-	-	-	550	570	620	630	720	720	760	790
per Eligible Driver ($)	-	-	-	-	750	770	840	870	990	990	1060	1090

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-44. Mobility and Congestion Variables in San Diego, CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	24,271	26,525	29,753	31,637	33,842	37,280	40,306	43,084	44,581	44,597	44,758	44,678
VKT/lane-kilometer	9,918	10,629	11,733	12,320	12,935	14,119	14,770	15,558	16,052	16,058	15,977	15,903
Principal Arterial Streets												
Daily VKT (000)	9,869	10,449	11,407	12,075	126,393	13,170	14,240	14,377	15,037	15,295	15,617	15,537
VKT/lane-kilometer	4,287	4,476	4,787	5,000	5,131	5,244	5,460	5,347	5,462	5,491	5,591	5,562
Roadway Congestion Index	0.78	0.83	0.91	0.95	1.00	1.08	1.13	1.18	1.22	1.22	1.22	1.21
Hours of Delay												
Total Daily (1000 person-hrs)	66	71	97	107	121	159	198	211	211	214	219	210
Annual per Capita (person-hrs)	9	10	13	14	15	19	23	24	23	23	22	21
Annual per Driver (person-hrs)	12	12	17	18	19	24	29	30	29	29	28	26
Freeway Daily Delay												
Recurring Veh-Hrs	26,410	28,240	38,500	42,740	47,280	63,720	81,140	87,940	87,900	88,630	86,330	81,580
Incident Veh-Hrs	15,850	16,940	23,100	25,650	28,370	38,230	48,680	52,770	52,740	53,180	51,800	48,950
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	4,850	5,460	7,580	8,250	10,160	11,840	13,660	13,450	13,280	13,820	17,680	17,850
Incident Veh-Hrs	5,330	6,000	8,340	9,070	11,170	13,020	15,020	14,790	14,610	15,200	19,440	19,640
Excess Fuel Consumed due to Congestion												
Total (million liters)	74	80	106	117	134	173	215	229	230	232	239	231
per Capita (liters)	41	44	58	62	68	84	99	103	100	99	96	91
per Eligible Driver (liters)	53	56	74	79	86	106	125	130	126	124	121	115
Congestion Cost												
Total ($ million)	-	-	-	-	340	450	590	670	720	740	780	770
per Capita ($)	-	-	-	-	170	220	270	300	310	320	320	300
per Eligible Driver ($)	-	-	-	-	220	280	340	380	390	400	400	380

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-45. Mobility and Congestion Variables in San Fran-Oak CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	46,473	48,300	51,866	55,811	59,449	63,724	64,988	67,572	68,570	67,620	68,103	68,828
VKT/lane-kilometer	13,120	13,575	14,577	15,271	16,160	17,171	17,361	17,860	17,820	17,573	17,407	17,556
Principal Arterial Streets												
Daily VKT (000)	15,593	16,462	17,372	18,322	19,320	20,399	21,799	22,073	22,532	22,588	22,830	22,862
VKT/lane-kilometer	5,278	5,527	5,679	5,866	6,076	6,319	6,557	6,407	6,220	6,100	6,112	6,043
Roadway Congestion Index	1.01	1.05	1.12	1.17	1.24	1.31	1.33	1.36	1.36	1.34	1.33	1.33
Hours of Delay												
Total Daily (1000 person-hrs)	420	487	587	633	683	776	794	820	815	807	803	828
Annual per Capita (person-hrs)	32	37	44	47	50	55	55	57	55	54	53	54
Annual per Driver (person-hrs)	39	45	54	58	61	68	67	69	68	66	65	66
Freeway Daily Delay												
Recurring Veh-Hrs	121,970	140,000	169,350	184,190	199,990	229,440	231,090	238,360	236,160	233,560	232,050	236,930
Incident Veh-Hrs	158,560	182,000	220,150	239,440	259,980	298,270	300,420	309,870	307,010	303,630	301,670	308,000
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	26,280	32,230	38,120	39,410	41,040	44,340	49,190	51,140	51,920	51,520	51,880	55,950
Incident Veh-Hrs	28,910	35,450	41,930	43,350	45,140	48,780	54,110	56,250	57,120	56,680	57,070	61,540
Excess Fuel Consumed due to Congestion												
Total (million liters)	454	523	624	672	723	822	841	870	869	859	858	882
per Capita (liters)	138	158	187	201	210	233	233	240	237	231	226	230
per Eligible Driver (liters)	169	194	230	246	258	286	285	294	290	283	276	282
Congestion Cost												
Total ($ million)	-	-	-	-	1,860	2,180	2,330	2,550	2,740	2,770	2,840	2,980
per Capita ($)	-	-	-	-	540	620	650	710	750	740	750	780
per Eligible Driver ($)	-	-	-	-	660	760	790	860	910	910	910	950

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\text{Freeway VKT/Ln.-Km.} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-46. Mobility and Congestion Variables in San Jose CA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,425	20,053	21,316	22,427	22,959	23,490	24,078	25,019	25,406	26,597	26,734	26,807
VKT/lane-kilometer	11,171	11,374	11,821	12,327	12,564	12,798	13,004	13,397	13,603	14,060	13,838	13,648
Principal Arterial Streets												
Daily VKT (000)	8,443	8,710	9,266	9,749	9,966	10,207	10,465	10,876	10,908	10,988	11,914	11,753
VKT/lane-kilometer	4,444	4,490	4,660	4,863	4,952	5,032	5,118	5,257	5,232	5,250	5,362	5,290
Roadway Congestion Index	0.86	0.88	0.91	0.95	0.97	0.99	1.00	1.03	1.05	1.08	1.07	1.05
Hours of Delay												
Total Daily (1000 person-hrs)	117	143	155	181	202	223	230	239	237	246	249	245
Annual per Capita (person-hrs)	24	29	30	35	38	41	42	43	42	41	41	40
Annual per Driver (person-hrs)	33	39	41	47	50	55	56	57	55	54	54	52
Freeway Daily Delay												
Recurring Veh-Hrs	35,840	44,920	46,720	53,240	55,960	61,780	61,630	63,880	63,840	66,580	66,740	68,450
Incident Veh-Hrs	43,010	53,900	56,060	63,890	67,150	74,140	73,950	76,660	76,600	79,890	80,080	82,140
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	7,040	7,270	10,140	13,210	18,170	20,360	23,200	24,070	23,330	24,050	25,000	21,760
Incident Veh-Hrs	7,750	8,000	11,150	14,530	19,990	22,390	25,520	26,480	25,660	26,460	27,500	23,940
Excess Fuel Consumed due to Congestion												
Total (million liters)	126	152	165	193	212	236	243	252	251	262	265	261
per Capita (liters)	105	122	130	149	158	174	178	182	178	174	176	171
per Eligible Driver (liters)	144	165	176	199	212	231	236	240	235	227	230	223
Congestion Cost												
Total ($ million)	-	-	-	-	550	630	680	740	790	840	880	880
per Capita ($)	-	-	-	-	410	460	490	530	560	560	580	580
per Eligible Driver ($)	-	-	-	-	550	610	660	710	740	730	760	750

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-47. Mobility and Congestion Variables in Seattle-Everett WA

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,755	21,083	22,403	23,909	24,955	26,726	27,676	29,302	30,461	30,590	32,643	33,327
VKT/lane-kilometer	12,209	12,652	13,066	13,500	13,964	14,561	15,079	15,690	15,636	15,574	15,965	16,109
Principal Arterial Streets												
Daily VKT (000)	11,004	11,785	12,542	12,977	13,403	14,410	14,192	14,587	14,699	15,810	15,778	15,617
VKT/lane-kilometer	5,101	5,363	5,525	5,597	5,741	6,068	5,976	5,941	5,797	6,138	6,031	5,969
Roadway Congestion Index	0.95	0.99	1.02	1.05	1.09	1.14	1.17	1.20	1.20	1.20	1.22	1.23
Hours of Delay												
Total Daily (1000 person-hrs)	129	163	191	199	221	265	293	322	329	341	369	377
Annual per Capita (person-hrs)	22	28	31	32	35	42	45	48	47	47	50	50
Annual per Driver (person-hrs)	26	33	37	38	41	49	53	56	56	55	59	59
Freeway Daily Delay												
Recurring Veh-Hrs	26,660	35,320	43,170	44,730	51,640	64,830	74,100	83,070	84,080	86,560	95,280	99,580
Incident Veh-Hrs	37,320	49,450	60,430	62,630	72,300	90,770	103,740	116,300	117,720	121,190	133,390	139,420
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	18,540	21,820	23,380	24,780	24,990	26,840	27,050	27,820	29,070	30,800	31,650	29,950
Incident Veh-Hrs	20,390	24,000	25,720	27,260	27,490	29,520	29,750	30,610	31,970	33,880	34,810	32,950
Excess Fuel Consumed due to Congestion												
Total (million liters)	139	174	203	213	237	286	316	344	352	364	392	401
per Capita (liters)	96	118	134	139	151	179	195	205	204	200	213	214
per Eligible Driver (liters)	114	139	158	163	178	210	229	241	240	235	250	251
Congestion Cost												
Total ($ million)	-	-	-	-	600	750	870	1,000	1,110	1,170	1,300	1,350
per Capita ($)	-	-	-	-	390	470	530	590	640	640	710	720
per Eligible Driver ($)	-	-	-	-	450	550	630	700	750	750	830	840

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{13{,}000^{1}} \times \text{Freeway VKT} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{5{,}000^{1}} \times \text{Prin. Art. Str. VKT}}{\text{Freeway VKT} + \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-48. Mobility and Congestion Variables in St. Louis MO

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	19,376	20,986	23,200	23,852	25,148	26,227	27,990	30,139	29,785	30,107	30,477	31,395
VKT/lane-kilometer	9,946	10,512	10,518	10,470	11,000	11,392	11,707	11,110	10,947	11,032	11,135	11,337
Principal Arterial Streets												
Daily VKT (000)	14,418	14,949	15,689	16,519	17,332	18,056	18,467	19,658	19,658	19,884	20,093	20,447
VKT/lane-kilometer	5,330	5,527	5,699	5,931	6,223	6,427	6,573	6,802	6,783	6,749	6,586	6,597
Roadway Congestion Index	0.83	0.87	0.88	0.89	0.93	0.96	0.98	0.96	0.95	0.95	0.95	0.96
Hours of Delay												
Total Daily (1000 person-hrs)	114	118	133	144	143	151	146	173	160	163	160	182
Annual per Capita (person-hrs)	15	16	18	19	18	19	19	22	20	21	20	23
Annual per Driver (person-hrs)	20	21	23	24	24	25	24	29	26	27	26	29
Freeway Daily Delay												
Recurring Veh-Hrs	13,080	14,480	16,120	17,520	16,590	18,800	20,580	22,840	21,730	21,940	20,350	29,110
Incident Veh-Hrs	15,690	17,370	19,350	21,020	19,910	22,560	24,690	27,400	26,080	26,330	24,420	34,930
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	29,690	29,930	33,890	36,430	36,940	37,650	34,130	42,100	38,010	39,160	39,640	38,910
Incident Veh-Hrs	32,660	32,920	37,280	40,070	40,640	41,410	37,550	46,310	41,810	43,080	43,600	42,800
Excess Fuel Consumed due to Congestion												
Total (million liters)	118	123	138	148	148	156	152	178	165	169	167	190
per Capita (liters)	64	66	75	77	77	80	78	91	84	86	84	96
per Eligible Driver (liters)	83	87	96	100	99	104	100	118	109	110	108	123
Congestion Cost												
Total ($ million)	-	-	-	-	500	410	420	530	520	540	550	640
per Capita ($)	-	-	-	-	260	210	220	270	270	280	280	320
per Eligible Driver ($)	-	-	-	-	330	280	280	350	340	360	360	410

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-49. Mobility and Congestion Variables in Tampa FL

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	3,188	3,453	4,089	4,580	4,733	5,313	5,538	5,522	5,844	5,877	6,118	6,360
VKT/lane-kilometer	10,421	11,289	11,545	10,942	10,889	11,786	11,862	11,627	12,100	11,967	12,258	12,344
Principal Arterial Streets												
Daily VKT (000)	5,136	5,418	5,885	6,182	5,877	6,247	6,545	6,730	7,020	7,084	7,487	7,503
VKT/lane-kilometer	5,853	6,174	6,412	6,454	6,083	6,361	6,504	6,635	6,606	6,567	6,643	6,473
Roadway Congestion Index	0.94	1.01	1.03	1.00	0.96	1.02	1.03	1.03	1.05	1.05	1.07	1.06
Hours of Delay												
Total Daily (1000 person-hrs)	36	39	45	49	47	51	58	55	59	62	64	63
Annual per Capita (person-hrs)	16	17	20	21	19	20	22	21	21	22	22	21
Annual per Driver (person-hrs)	21	22	25	27	24	25	27	26	26	28	28	27
Freeway Daily Delay												
Recurring Veh-Hrs	2,580	2,930	3,600	3,860	3,730	4,150	5,360	5,360	5,970	6,030	6,420	5,510
Incident Veh-Hrs	3,860	4,390	5,390	5,790	5,600	6,220	8,040	8,040	8,960	9,050	9,630	8,260
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	10,480	11,410	12,920	14,210	13,310	14,340	15,690	14,570	15,500	16,570	16,840	17,390
Incident Veh-Hrs	11,530	12,550	14,210	15,630	14,640	15,780	17,260	16,030	17,050	18,230	18,530	19,130
Excess Fuel Consumed due to Congestion												
Total (million liters)	36	39	45	49	47	51	58	56	60	65	65	63
per Capita (liters)	66	70	79	85	76	79	88	83	86	92	91	85
per Eligible Driver (liters)	85	89	100	107	98	100	110	105	107	116	114	106
Congestion Cost												
Total ($ million)	-	-	-	-	120	140	170	170	190	210	220	220
per Capita ($)	-	-	-	-	200	210	250	250	280	300	310	290
per Eligible Driver ($)	-	-	-	-	260	270	310	310	340	380	390	370

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \frac{\text{Freeway VKT}}{} + \frac{\text{Prin. Art. Str. VKT/Ln.-Km.}}{} \times \frac{\text{Prin. Art. Str. VKT}}{}}{13{,}000^{1} \times \frac{\text{Freeway VKT}}{} + 5{,}000^{1} \times \frac{\text{Prin. Art. Str. VKT}}{}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

Table F-50. Mobility and Congestion Variables in Washington DC

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Freeway												
Daily VKT (000)	25,897	26,002	29,085	32,015	36,072	36,885	37,996	40,282	40,789	41,466	44,186	46,690
VKT/lane-kilometer	12,972	13,024	13,167	14,306	15,516	15,585	15,850	16,461	16,613	16,404	16,941	17,791
Principal Arterial Streets												
Daily VKT (000)	21,397	21,413	22,347	23,876	25,599	27,434	27,660	27,837	28,755	29,383	29,785	29,624
VKT/lane-kilometer	7,594	7,308	7,155	7,452	7,756	8,114	7,991	7,859	7,938	7,935	7,974	7,830
Roadway Congestion Index	1.12	1.11	1.11	1.19	1.27	1.29	1.30	1.33	1.34	1.33	1.36	1.41
Hours of Delay												
Total Daily (1000 person-hrs)	368	393	450	477	533	580	598	652	673	696	769	789
Annual per Capita (person-hrs)	34	35	40	42	46	49	49	53	54	53	59	58
Annual per Driver (person-hrs)	42	44	49	51	56	59	60	64	66	64	70	70
Freeway Daily Delay												
Recurring Veh-Hrs	51,630	56,270	70,090	74,220	85,500	89,670	93,080	105,440	109,060	113,030	132,070	138,160
Incident Veh-Hrs	113,600	123,800	154,200	163,290	188,110	197,270	204,770	231,970	239,930	248,660	290,550	303,950
Principal Arterial Street Daily Delay												
Recurring Veh-Hrs	61,500	63,900	64,800	68,560	72,700	84,150	85,940	87,630	90,380	92,800	91,710	90,030
Incident Veh-Hrs	67,650	70,290	71,280	75,410	79,970	92,570	94,540	96,390	99,420	102,080	100,880	99,030
Excess Fuel Consumed due to Congestion												
Total (million liters)	390	412	474	505	564	609	628	680	700	721	800	824
per Capita (liters)	144	148	169	177	193	204	207	221	226	220	243	242
per Eligible Driver (liters)	179	183	208	217	236	250	251	268	274	265	293	291
Congestion Cost												
Total ($ million)	-	-	-	-	-	1,620	1,740	2,000	2,230	2,360	2,680	2,790
per Capita ($)	-	-	-	-	-	540	570	650	720	720	820	820
per Eligible Driver ($)	-	-	-	-	-	660	700	790	870	870	980	980

Note: A Congestion Index value above 1.0 indicates an undesirable level of congestion.
" - " denotes data unavailable.

$$\text{Roadway Congestion Index} = \frac{\frac{\text{Freeway VKT/Ln.-Km.}}{} \times \text{Freeway VKT} + \text{Prin. Art. Str. VKT/Ln.-Km.} \times \text{Prin. Art. Str. VKT}}{13{,}000^{1} \times \text{Freeway VKT} + 5{,}000^{1} \times \text{Prin. Art. Str. VKT}}$$

[1] Congestion Indicator Levels—Interstate and Expressway = 13,000 VKT/lane
Principal Arterial = 5,000 VKT/lane

REFERENCES

1 Lomax, Timothy J., Dennis L. Christiansen, and A. V. Fitzgerald. Texas Transportation Institute, "Estimates of Relative Mobility In Major Texas Cities," Research Report 323-1F, 1982.

2 Lomax, Timothy J. Texas Transportation Institute, "Relative Mobility In Texas Cities, 1975 to 1984," Research Report 339-8, 1986.

3 Lomax, Timothy J., Diane L. Bullard, and James W. Hanks, Jr. Texas Transportation Institute, "The Impact Of Declining Mobility In Major Texas and Other U.S. Cities," Research Report 431-1F, 1988.

4 Lomax, Timothy J., Dave Schrank, and Shawn Turner. Texas Transportation Institute, "Urban Roadway Congestion - 1982 to 1992," Research Report 1131-7, September 1995.

5 Federal Highway Administration. "Highway Performance Monitoring System," 1982 to 1993 Data. FHWA-M 5600.1B, August 1993.

6 Lindley, Jeffrey A. "Quantification of Urban Freeway Congestion and Analysis of Remedial Measures," FHWA-RD-87-052, October 1986.

7 Chui, Margaret K., and William E. McFarland. "The Value of Travel Time: New Estimates Developed Using a Speed Choice Model," Research Report 396-2F, Texas Transportation Institute, Research Report 396-2F, January 1987.

8 Houston Chamber of Commerce. "Houston Regional Mobility Plan," 1982.

9 Texas Department of Highways and Public Transportation. "Ten-Year Project Development Plan Documentation and Support Data," 1986.

10 Morris, D. E., and Michael Ogden. "Houston-Galveston Regional Transportation Study," Texas Transportation Institute, January 1990.

11 "Private Truck Counsel of America Cost Index Survey," Houston Post, July 6, 1987.

12 Transportation Research Board, Special Report 209, "Highway Capacity Manual," 1985.

13 Report of the Secretary of Transportation to the United States Congress. "The Status of the Nation's Highways: Condition and Performance," June 1985.

14 American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highways and Streets*, 1984.

15 United States Department of Transportation, Federal Highway Administration, "1980-3R Study."

16 American Automobile Association, "Fuel Gauge Report," 1993.

17 Statistical Abstract of the United States 1994. U.S. Department of Commerce, Bureau of the Census 114th Edition, Washington, D.C., 1994.

18 Texas State Department of Highways and Public Transportation. "Permanent Automatic Traffic Recorder Data—1950-1984."

19 Raus, J. "A Method for Estimating Fuel Consumption and Vehicle Emissions on Urban Arterials and Networks," Report No. FHWA-TS-81-210, April 1981.