TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-92/1235-11		
4. Title and Subtitle THE STATE-OF-THE-PRACTICE IN FORECASTING TURNING FLOWS		5. Report Date February 1993
		6. Performing Organization Code
7. Author(s) Janis L. Piper, David F. Pearson, and George B. Dresser		8. Performing Organization Report No. Research Report 1235-11
9. Performing Organization Name and Address Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135		10. Work Unit No.
		11. Contract or Grant No. 2-10-90-1235
12. Sponsoring Agency Name and Address Texas Department of Transportation Transportation Planning Division P.O. Box 5051 Austin, Texas 78763		13. Type of Report and Period Covered Interim: September 1989 - 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: Improving Transportation Planning Techniques

16. Abstract

The purpose of this project was to develop a better understanding of the process of forecasting turning flows. Review of the literature provided information about the state of the research in the area of turning flow forecasts and provided information about the models available for use in making turning flow forecasts. A telephone survey was performed to obtain information about the state of the practice in forecasting turning flows in the United States. Turning flow proportions were analyzed to show a correlation between turning flow proportion and functional classification, and in doing so, average turning flow proportions were developed.

17. Key Words	18. Distribution Statement
Turning Flow Estimates, Turning Proportions, Approach Volumes	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	174	

Form DOT F 1700.7 (8-69)

THE STATE-OF-THE-PRACTICE IN FORECASTING TURNING FLOWS

by

Janis L. Piper
Student Intern

David F. Pearson
Associate Research Engineer

and

George B. Dresser
Research Scientist

Research Report 1235-11
Research Study Number 2-10-90-1235

Sponsored by

Texas Department of Transportation

in cooperation with the

U.S. Department of Transportation
Federal Highway Administration

Texas Transportation Institute
The Texas A&M University System
College Station, Texas

February 1993

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	2.54	centimeters	cm
ft	feet	0.3048	meters	m
yd	yards	0.914	metere	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	6.452	cenlimeters squared	cm^2
ft^2	square feet	0.0929	meters squared	m^2
yd^2	square yards	0.836	meters squared	m^2
mi^2	square miles	2.59	kilometers squared	km^2
ac	acres	0.395	hectares	ha
		MASS (weight)		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
		VOLUME		
fl oz	fluid ounces	29.57	millimeters	mL
gal	gallons	3.765	liters	L
ft^3	cubic feet	0.0328	meters cubed	m^3
yd^3	cubic yards	0.765	meters cubed	m^3

Note: Volumes greater than 1000 L shall be shown in m^3.

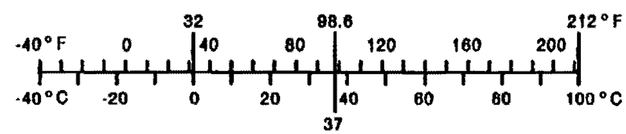
Symbol	When You Know	Multiply By	To Find	Symbol
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

These factors conform to the requirement of FHWA Order 5190.1A

*SI is the symbol for the International System of Measurements

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
yd	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	millimeters squared	0.0016	square inches	in^2
m^2	meters squared	10.764	square feet	ft^2
yd^2	kilometers squared	0.39	square miles	mi^2
ha	hectares (10,000 m^2)	2.53	acres	ac
		MASS (weight)		
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1000 kg)	1.103	short tons	T
		VOLUME		
mL	millimeters	0.034	lluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	meters cubed	35.315	cubic feet	ft^3
m^3	meters cubed	1.308	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



ABSTRACT

The purpose of this project was to develop a better understanding of the process of forecasting turning flows. Review of the literature provided information about the state of the research in the area of turning flow forecasts and provided information about the models available for use in making turning flow forecasts. A telephone survey was performed to obtain information about the state of the practice in forecasting turning flows in the United States. Turning flow proportions were analyzed to show a correlation between turning flow proportion and functional classification, and in doing so, average turning flow proportions were developed.

DISCLAIMER

IMPLEMENTATION STATEMENT

The research documented and presented in this report contains information on the procedures and processes for estimating and forecasting turning flow movements at intersections. Of particular interest and possible use are the relationships presented describing the percentage of turning movements at intersections based on the functional classifications of the intersecting facilities. These relationships may have implementation potential for use by engineers in designing highway and street intersections.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Accurate turning flow estimates are important to developing and designing new or expanded facilities. Errors in estimates can lead to over- or under-design and could cost the agency involved both time and money.

Turning flow estimates have an impact on the design process. Evaluating the need for one or more left-turn bays or for three- or four-phase signal timing, adding right-turn bays, or constructing a grade-separated intersection are all considerations which, in some way, are based on turning flow volumes.

This research attempts to offer a better understanding of the methods available for making turning flow forecasts as well as the methods currently in use. By providing information on the methods available for forecasting turning flows and the current state of the practice and providing estimates of standard turning proportions based on the functional classification of the intersecting roads, it is possible to reduce some of the risks involved in forecasting turning flows for new facilities and to improve the intersection design process as a whole.

The main objective of this study was to compile intersection turning flow forecast information. The state of the practice for forecasting turning flows was determined by interviewing representatives from 10 states in order to achieve diversity as well as to develop information that would relate to the needs of the state of Texas. The results of this survey are reported below in the section entitled, "State of the Practice." The second major area covered in this study is the development of average turning flow proportions based on the functional classifications of the intersecting roadways, while showing a correlation between functional classification and turning flow proportion. Data were collected and separated by functional classification; turning proportions were analyzed in three different ways. The results are reported in the sectiond "Development of Average Turning Proportions." A recommendation is made to use one set of proportions and the reasoning is described. The purpose of the second part of the study is to show a relationship between turning flow proportion and functional classification and to provide some general form of historical information that can be used as initial input for various models that estimate turning flows.

This study represents a small portion of a larger study involving the corridor analysis process. In the corridor analysis process, groups of intersections are evaluated and turning flows at each are determined. Turning flows determined in this manner take into consideration not only forecasted approach and departure volumes, but also the effect that each intersection has on the others around it, and the effect of nearby facilities and developments on the operation of the facility in question.

PROBLEM STATEMENT

Analyzing turning flows is a requirement when designing or upgrading intersections. In the case of an upgrade, existing conditions can be analyzed and future turning flows can be predicted. When considering the development of a new intersection where existing information is not available, it is necessary to use other methods for forecasting turning flows. This may also be the case in an area where an agency's budget limits the ability to obtain physical counts at an existing location. The methods available to make these predictions are diverse and little is known about state of the practice in this realm of traffic forecasting.

LITERATURE REVIEW

Many attempts have been made to reduce or eliminate the need for labor-intensive, manual counting of intersection turning flow volumes. Some of these methods are very simple mathematical solutions while others are complicated algorithms and iterative processes. Few of the methods were designed with forecasting specifically in mind.

Some of the methods documented are based on simple algorithms, while others are extremely complex. This complexity, however, does not necessarily relate to improvements in accuracy. Many of the procedures involve iterative processes, and most require some knowledge of expected turning proportions. Some of the procedures have been field tested, and the results can be obtained. Others are theoretical with no testing documented outside the laboratory.

Marshall (1) offered an option for reducing the number of observations necessary for counting intersection turning flow volumes. The method requires one-way volumes into and out of the intersection. By using the one-way traffic volumes and the manual turning flow counts at some of the approaches to the intersection, the remaining turning flow counts can be estimated by following a series of simple mathematical equations. Marshall offered a method for reducing the need for observers to count turning traffic but did not address the problem of forecasting turning flows.

Jeffreys (2) and Norman (3) published articles that discuss a non-iterative method which works on the principal of developing a "realistic" set of turning flows. The method uses linear programming and elementary "rook's tours" to develop a set of turning flows for an intersection. The method was referred to as the "ordered rook's tour" method. The first article presents the method and examples of its application. The second article, which further develops the ideas of the first paper, presents two alternatives related to this idea and performs a comparison between the methods and the entropy maximization method. Conclusions were that the methods yielded similar results when the prior information available was close to balancing the given situation. Otherwise, it was felt that the method could be improved by going through a few iterations using the Furness balancing factor model (4) before applying the method.

National Cooperative Highway Research Program (NCHRP) Report #255 (5) presents several methods for predicting turning flow volumes which are dependent on the available information. Three factoring procedures, the ratio method, the difference method, and the combined method, are available. Each requires the following directional or nondirectional information: future year turning flow forecast, base year turning flow assignment, and base year turning flow counts. If base year turning flow volumes are not available, approach link volumes taken from traffic forecasting models may be substituted in the ratio method only, which offers a solution to the forecasting problem. Iterative procedures are offered for four-way intersections when either directional or nondirectional future year link volumes are known. Non-iterative procedures are offered for the development of turning flows at three-way intersections, for either directional or nondirectional link volumes.

Mekky (6) discussed a log-linear method for estimating turning flows at intersections. The forecasting matrix developed can be solved through a series of iterations similar to the Furness iteration method (4) or the bi-proportional method (7). Mekky introduced his method and stated that it "may be worth considering and testing by experimental evidence." The method was later referred to as the entropy maximization method (3). Bell (8) further discussed Mekky's procedure, offering standard errors and confidence intervals for the estimates developed using this model. The article discusses the sampling approach to obtaining prior information and looks at estimating, rather than forecasting, turning flows.

Articles by van Zuylen (9), Hauer et al. (10), and Schaefer (11) discuss the use of the iterative technique developed by Kruithof (Kruithof's algorithm) to balance possible turning flows at an intersection. Van Zuylen offered an information-minimizing method while Hauer offered a maximum likelihood method, also referred to as the bi-proportional method. Schaefer summarized the efforts of van Zuylen and Hauer in his article which concentrates mainly on the work of Hauer. Schaefer concluded that Hauer's method was a "useful tool for developing intersection turning movement estimates," but that "selection of an appropriate estimate of the intersection turning proportions is key to developing an accurate estimate of the actual flows."

Maher (12) presented a non-iterative method in which the development of turning flow estimates is approached by using Bayesian Statistical Inference. At the time of the article, no detailed tests had been performed to compare the method to other methods available, but it was thought to be comparable to the maximum entropy approach and minimum information approach previously discussed. Maher published a second article (13) where he compared the information-minimizing method and the maximum likelihood method with his own Bayesian method. In presenting the maximum likelihood method, he stated that "Hauer et al. claimed to have presented a maximum likelihood formulation of the same method [information minimizing method], but this is incorrect; the estimates produced should properly be described as modal values." Conclusions were that the Bayesian model appeared to be the most appropriate choice to estimate turning flows at intersections. A third article (14) comparing the information-minimizing method, the Bayesian method, and a modification of the Bayesian method reached a similar conclusion.

More recently, Furth (15) has developed a method which works on the principal developed by Hauer. Furth detailed the development of a turning propensity model and the factors affecting turning flows. The propensity matrix produced by this model can then be applied as the initial input of expected turning flows in another model. He stated that "the overall performance of the propensity model is very encouraging," and that the average prediction error in the model was of similar magnitude to the day-to-day variations in turning flows.

Other research includes work by Luk (16) on the bi-proportional solution to the information-minimizing method. Adebisi (17) and Buehler (18) offered comparisons between the various models and provided some results of testing performed on the models for accuracy.

Most of the methods described above require an estimate of the approach and departure volumes at the intersection as well as some historical information about turning proportions at the location. The work involved in many of the papers included methods for acquiring this historical information.

Standard turning flow proportions are a form of historical information that can be provided for an intersection in its development stages. The 1965 Highway Capacity Manual (19) indicated that estimates of 10 percent left, 10 percent right, and 80 percent through traffic is considered the average condition for an urban intersection. Hauer reported that differences in turning flow proportions could be attributed to the functions of the intersecting roads as well as time of day, direction of movement, and location in the urban area. A major portion of the differences in turning flow proportions, Hauer thought, could be attributed to the functional classification of the intersecting roads.

STATE OF THE PRACTICE

In order to develop an understanding of the state of the practice for forecasting turning flows, a telephone survey was conducted to determine the methods being used by various state transportation agencies. The literature review provided an overview of the methods available but gave little indication of the acceptance of the methods in actual practice. Transportation agencies from 10 states were surveyed, including the Texas Department of Transportation (TxDOT). Results of the interviews are summarized in this report. A copy of the question format can be found in Appendix A. Some questions may not have applied to the state being interviewed, and discretion was used to determine whether the response was complete or if further questioning was necessary in order to acquire a full understanding of the methods being described.

ARIZONA (20, 21)

Following an interview with representatives from the Arizona Department of Transportation (DOT) and the city of Phoenix, it was determined that there were two methodologies used in Arizona. The Arizona DOT evaluates turning flows from a regional planning perspective. The department currently uses the Urban Transportation Planning System (UTPS) as a traffic model and uses the turning flows directly from the model output as the future turning flow forecasts. The flows were often adjusted based on existing information or professional judgment, but the output of the traffic model was the sole source of turning counts outside of physically counting the intersections in question. The accuracy of the output was unknown and was considered suspect by the Department. Previously, PlanPak, developed by the Federal Highway Administration (FHWA), was used as the traffic forecasting model. This model allowed the planner to input constraints on the turning flows. Representatives of the Arizona DOT interviewed considered these turning flow estimates to be more accurate than the current estimates being produced by UTPS.

The city of Phoenix looked at turning flows in a more localized manner. The geometry and signal timing at intersections were used with the turning flow estimates to develop a level of service (LOS) estimate. Two programs currently are being used by the city to develop turning flow forecasts. The first is a program called TURNFLOW which can be purchased through the Center for Microcomputers in Transportation (McTrans) in Gainesville, Florida. The second is a mathematical algorithm which uses an iterative process to determine the turning flows from the approach and departure volumes and the initial turning estimates input into the program. The program, developed on a Lotus spreadsheet by a staff member working for the city of Phoenix, is based on the algorithm reported in Transportation Research Record (TRR) 795 (10). Both programs require that initial estimates of turns, as well as average daily traffic (ADT) approach and departure volumes be input.

The ADT traffic volumes were obtained from the Arizona DOT's Transportation Planning Office and were the output of the UTPS model. Different turning flow proportions are used as the initial input to the intersection analysis program. The initial estimates vary based on the peak-hour approach volume in question and the quadrant in the city where the intersection is located. On the average, these proportions were 10 to 12 percent left and right turns based on the total approach volume. Turning flows were considered to be heavier in the peak and lighter in the off-peak hour, assuming that when the directional distribution was heavier in one direction the turning flows would also be heavier in that direction. The proportions were based on historical information and actual turning counts and were developed by the Phoenix Department of Transportation Planning. Field turning flow counts were also available for a number of intersections, and the proportions from an intersection with similar characteristics may have been used in the absence of any other information.

Both TURNFLOW and the mathematical algorithm were used by the city of Phoenix, and neither was considered more accurate than the other. If the results of either program were not considered plausible, they were adjusted manually taking into consideration the impact of related facilities and other environmental considerations. Most of the work was limited to the intersections of arterial streets. Analysis of intersections with collector and local streets was generally considered less critical. Phoenix and Tucson, two major cities where the analyses were conducted, had arterial streets spaced approximately one mile apart. This provided for regular traffic flow patterns. Because the predictions being made were 20-year projections, it was difficult for the city of Phoenix to judge the accuracy of the output, but the transportation planning department considered the results to be acceptable.

CALIFORNIA (22, 23)

Interviews with a representative of the California Department of Transportation (CALTRANS) and a representative from one of the state's regional planning agencies provided information on turning flow forecasting practices in California.

At the state level, TRANPLAN and UTPS were used as traffic forecasting programs. The output of turning flows from the models was analyzed and often required adjustment. In order to "smooth out" the output, a very localized hand assignment was done. At the state level, the planning analysis encompassed large areas and generally was not localized to a single intersection. Base year calibration was completed on the model output by comparing the base year output to actual counts; and the future traffic volumes, therefore, were considered to be accurate.

At the regional level, the turning flows were estimated by several traffic forecasting programs including the Maximum Entropy Matrix Estimation (ME2) program, TRANPLAN, UTPS, and others. Traffic engineering studies, including link forecasts as well as turn predictions, were frequently subcontracted to an engineering firm. The firm generally used a traffic forecasting model to analyze the traffic volumes, including turning flows. The turning flows generated by the traffic forecasting programs were then manipulated to account for predicted land use and other localized factors. The volumes were looked at for "reasonableness" and manually corrected until the engineer considered them to be reasonable. Any more specialized form of turning flow forecasting was considered to be trivial because there were few new intersection developments in California.

FLORIDA (24, 25)

Conversations with representatives of District 4 of the Florida Department of Transportation provided an overview of the procedures used by that district to forecast turning flows. Although each district acts independently, the representatives interviewed concurred that the methods used in the other districts would be similar, if not identical, to those described below.

Turning flow forecasts were used to determine whether an intersection would be applicable for the given location or if a grade-separated interchange or a partial interchange would be required. The geometry of the intersection was also determined using the turning flow forecasts. The traffic modeling program used by the state was the Florida Standard Urban Transportation Model System (FSUTMS) which was a modification of PlanPak. Turning flows were developed through the program's assignment model. If existing counts were available, the output was analyzed and manually adjusted to reflect the existing conditions. If it was a new development or existing counts were unavailable, the model output was used directly. The turning flow estimates were then delivered to the design department where adjustments may have been made.

District 4's planning section delivered the FSUTMS output to the traffic operations section. The data were analyzed and compared to existing conditions. A growth factor was developed, and it was assumed that the entire corridor would grow at the same rate. If there was an isolated development nearby, volumes were approximated for that development using the Institute of Transportation Engineer's (ITE) manual, Trip Generation, and were added to the future count estimates at the affected locations.

ILLINOIS (26)

A representative of the Illinois Department of Transportation (DOT), District 5 responded to the survey questions. There are nine districts in Illinois, but Lee Bates, Traffic Policy Engineer of Central Bureau of Traffic, Illinois DOT, felt that one response would adequately represent the procedures used throughout the districts.

Turning flow estimates were used to determine intersection geometry and signal timing. Illinois did not conduct isolated intersection analyses unless they were preparing an isolated site impact study. For the local, small scale situation, use of a computer program was not felt to be necessary. For the large scale situation, Illinois DOT used the Quick Response System (QRS) Site Impact Analysis program. The Transportation Planning Modeling Software (TRANPLAN) developed by the Urban Analysis Group was expected to be implemented in urban areas, but assignment and analysis was done by hand. The

Illinois DOT used historical trends, trip generation rates, and other known factors to predict link volumes and then distributed the volumes manually throughout the system. Intersections were balanced by hand, first analyzing two-way link volumes, then analyzing the directional distribution to develop turning flows. Environmental factors were taken into account at the same time. Once traffic volumes and turning flows had been generated for the base year, a straight-line increase in volume was used to generate 20-year predictions. It was assumed that if the directional split and the total volume at the intersection approaches were known, it was possible to calculate one, and only one, reasonable set of numbers that would balance the intersection. It was also assumed that the current manual assignment process accomplished this goal. In some cases, when an existing count was not available, a nearby intersection having similar characteristics was used to approximate the turning traffic for the base year. The respondent personally recorded the results of this process and said that "it [the manual turning flow forecasting process] is as accurate as the traffic counting process." By checking the results of the manual calculations against actual traffic counts, the respondent refined the skills necessary to make accurate predictions.

INDIANA (27, 28)

Representatives of the Indiana Department of Highways were interviewed to determine the state of the practice in forecasting turning flows in that state. Turning flow forecasts were used to determine intersection geometry, signal system timing, capacity analysis, and LOS. Indiana did not have a statewide traffic forecasting model. In rural areas, forecasting was done as a straight-line projection. In urban areas, Metropolitan Planning Organizations (MPOs) provide the state with main-line link volumes, which were manipulated manually to develop flows through the corridors. In the future, the state plans to implement TRANPLAN as a forecasting model.

For existing intersections, turning flows were forecast using a growth rate consistent with the link projections. If a major traffic generator existed in the area, traffic from that generator was forecast separately and added to the rest of the corridor projections; and the turns at the intersections were adjusted accordingly. For intersections which were developed as a part of new construction, the traffic forecasts were reviewed and an attempt was made, using professional judgment, to predict how traffic would move through the system. Turning flows were developed based on the path the traffic was expected to follow through the system. The Indiana Department of Highways often relied on manual counts at similar intersections to forecast how traffic would move at the new intersection. No records were kept to assure the accuracy of any of the estimates.

MASSACHUSETTS (29, 30)

Interviews with two representatives of the Central Transportation Planning Staff (CTPS) of the Massachusetts Department of Transportation provided information on turning flow forecasting from two viewpoints. In terms of network modeling (i.e., analyzing projects at a regional level), converting the traffic volume at an existing intersection to future turning flows when the network was changing drastically was considered difficult. The best approach was to make the models as accurate as possible and give the network modeling output to the traffic engineers who could perform a more localized analysis. There was an ongoing project in Boston, the Central Artery Project, where I-93 was to be completely removed and relocated, resulting in the need to redesign 100 to 150 intersections. The methods used to develop the turning flow counts for the new intersections, some of which would be completely relocated, were to look at the base year counts compared to the traffic forecasting model output, develop a correction factor for the model output to match the existing counts, and apply the same correction factors to the future year outputs with the new intersections in place in the model. The two main traffic forecasting models used at this level were UTPS and TRANPLAN.

For corridor planning studies and more localized studies, trip tables were generated directly using The Highway Emulator (THE). The model was developed by Edward Bromage while employed by CTPS. The program uses the maximum entropy approach of Willumsen and van Zuylen (31), and is available through McTrans. Daniel Beagan, Deputy Director of CTPS, stated that standard errors for this program were in the two to three percent range.

Programs were also available which analyzed turning flows specifically. The most basic of these programs looked at one intersection only. It was developed in part by E.

Pagitsas (formerly of Toronto, Canada, and currently employed by CTPS) and is described in TRR 795 (10). Old turning flow counts or small sample count were used to develop turning flow percentages for input, and directional volumes were available through actual counts or model output. Another program developed by Peter Furth at Northeastern University and funded by CTPS to expand on the methodology of Pagitsas' program, added the ability to input information about the geometry and the location of the site in the urban area. The program also gave the user the ability to describe the relationship of the site to other facilities. Although complete and available for purchase through McTrans, the program had not been implemented by CTPS.

If no counts were available, 10 percent left and right turns were sometimes used as a rule of thumb as input to the model developed by Pagitsas (10). The results of the Toronto work included some average turning proportions based on functional classification. The method was considered to be fairly accurate based on citation in two separate articles (10, 18). Typically, the transpose of the AM peak counts was used for the PM, and vice versa in using the program to develop turning estimates. This eliminated the additional effort required to get counts for both periods.

MICHIGAN (32)

An interview with a representative of the Michigan Department of Transportation indicated an effort was underway in Michigan to develop better turning flow estimates. In areas where there were congestion problems, accurate turning information was considered to be imperative. It was thought that using an average turning proportion or any other standardized estimate might be a costly mistake, and for that reason, counts were ordered as a matter of course on all major projects. It was felt that using average turning flow proportions opened an avenue for the project to be challenged during the public hearing process and that it would be less expensive in the long run to have crews make manual counts at the intersections. For urban projects, turning flows were considered to be important in designing the intersection from the lane configuration all the way to the signal timing. For rural projects, through volumes were more important than turning flows. Turning flows were checked only at high volume intersections along a rural route.

TRANPLAN is currently being used as a traffic modeling program. For a new or proposed intersection in an urban area, the model output provided a prediction of turning flows as well as through traffic. For rural intersections, assumptions were made based on the nearest intersection to predict how the traffic would flow. Michigan had implemented an extensive traffic counting program in order to develop growth factors. Growth factors were applied to the turning flow estimates to get future year turning flows.

A program is currently being developed in the Bureau of Transportation Planning, Michigan Department of Transportation, to refine the process of forecasting turning flows. The NCHRP Report #255 (5) software was modified to use an iterative process to balance base year ADT turning flows. A Lotus-based spreadsheet then applied the growth factors and allowed for the increase or decrease of any of the turning flows due to nearby developments or other environmental influences on the traffic. The results were verified by checking them against the results of manual estimates. The results of the two methods were within five to 15 vehicles of each other. Otherwise, the accuracy of the counts was not checked, but the estimates were kept as historical information.

NEW YORK (33)

A telephone interview with a representative of the New York State Department of Transportation provided information on the methods used for forecasting turning flows. Turning flow estimates were considered necessary in designing new intersections (including items such as provision for turning lanes), and better estimates of vehicle queue lengths could be developed based on a more accurate turning flow estimate.

Turning flow forecasts for a given highway intersection came from the system forecasts developed through the traffic modeling process. In general, link level forecasts were used in combination with existing turning flow distributions to generate future turning flow distributions.

Traffic modeling was previously done by the state using a state developed mainframe program. Currently, the state of New York encourages its MPOs to use the Transportation Modeling System (TMODEL2) available through McTrans. This program allows the user to record and recall turning flow information at any intersection. The program also has a corresponding software package that does the Highway Capacity Manual (HCM) signalized intersection analysis. Other programs used throughout the state include TRANPLAN and UTPS.

TMODEL2 was considered inaccurate for turning flow estimates on a regional planning basis, because little was done in regional planning to calibrate the turning flows. In the corridor analysis process, more emphasis was put on the calibration of the turning flows. For site impact studies, trip generation and manual turn assignment were used. The traffic was then added to the existing traffic in order to study the impact. For future highway development, reasonable judgment was used, and traffic volumes were followed throughout the system to develop turning flows. Some effort was being made to analyze the relationship between functional classification and the capacity of intersections, but the respondent was not aware of any work in the area of turning flows per se. No effort was made to check the accuracy of the estimates.

OHIO (34, 35)

The Ohio Department of Transportation (DOT) currently uses turning flow estimates in the development and planning phases for new intersections, especially in the area of intersection geometry.

The traffic modeling program used by the state was the FHWA version of PlanPak. The program assigns traffic volumes on a minimum time path through the network, and turning flows are estimated based on the assignment of the traffic volumes. By using the model in conjunction with existing ground counts, the Ohio DOT calibrates the model to balance the estimated turns with the existing conditions. If a new development was being considered, the model estimates were more likely to be used. A professional judgment of how traffic would flow through the system was developed by the user, and the turning flows were adjusted accordingly. According to the respondent they "haven't found anything better than PlanPak [to provide them with turning flow forecasts]." In order to check the accuracy of the estimates, the original output was kept as historical information, and traffic volumes were checked against it. The Ohio DOT considered the results of this type of turning flow forecasting to be very good.

TEXAS (36)

A telephone conversation with a representative of TxDOT revealed that turning flow counts were forecast for use in the design process. The turning flow estimates were computed manually. Each approach at the intersection was studied separately and was assigned a different turning proportion. If there was known information available for any approach at the intersection, that approach was analyzed first. Known information included observed turning flows, familiarity with the area, or information from previous, similar projects. If nothing at all was known about the intersection, a proportional method was used. In the proportional method, a ratio was used where each approach was assigned a ratio equal to the ratio of its volume over the total volume at the intersection. Turning flows were assigned by applying these ratios. For instance, if the first approach carried one-third of the total traffic volume at the intersection, then one-third of the traffic at each of the other approaches would be assigned to turn onto the first approach. Some engineering judgment was used to adjust these numbers, particularly at new intersections.

When turning flows were generated through a traffic model, they were manually adjusted by a traffic engineer familiar with how intersections operate, how to compare roadways in terms of their operation, and traffic in general. Considerations when adjusting the model output included where the development was located, access points to the existing system, and the type of traffic that the location was expected to generate.

Computer programs for generating turning flow forecasts that were promoted by FHWA at their workshops and short courses were considered, but manual methods were considered to be quicker and more efficient. The respondent considered the manual estimates to be accurate to within plus or minus 10 percent and stated that work has been done to check the accuracy of the estimates.

SUMMARY

It can be concluded from the telephone survey results that the state of the practice in forecasting turning flows is widely diversified. The information on alternative methods for forecasting turning flows is available, and many of the agencies involved in the survey were aware of this availability. It appears that although a few states are implementing turning flow forecasting programs, most rely heavily on professional judgment to develop turning flow forecasts. Interest in the area was varied; and it is felt that as interest increases, more of the methods will be tested, implemented, and improved.

DEVELOPMENT OF AVERAGE TURNING PROPORTIONS

The objective of this portion of the research is to demonstrate a correlation between turning flow proportions and functional classification. Average turning flow proportions were also calculated for possible use in turning flow forecasting models. In relating turning flow proportions to functional classification, the assumption was made that turning flow proportions were not directly related to approach volume. This assumption was tested and the results are shown in the section, "Turning Proportion vs. Approach Volume."

AM and PM peak turning flow proportions were compared to look for differences in the mean turning flow proportions by functional classification. The AM peak counts were then analyzed in three different ways, yielding three slightly different turning proportions. The three methods are described and an explanation is given why one set of proportions is recommended over the other two. The analyses were made on four-way signalized intersections only and, with no further information, can be considered valid only for four-way signalized intersections.

FUNCTIONAL CLASSIFICATION

Four functional classifications were analyzed in this research: major arterial, minor arterial, collector, and local road. Data were collected from a number of urban areas, mainly in Texas, based on the following definitions (37):

> Major Arterial - serves major through movements between important centers of activities in a metropolitan area and a substantial portion of trips entering and leaving the area. In smaller urban areas (under 50,000), its importance is derived from the service provided to traffic passing through the urban area. Service to abutting land is subordinate to the function of moving through traffic.
>
> Minor Arterial - a facility that connects and supports the major arterial system. Although its main function is still traffic mobility, it performs this function at a somewhat lower level and places more emphasis on land access than the major arterial.
>
> Collector Street - provides both land access and traffic circulation service within residential, commercial, and industrial areas. Access function is more important than that of arterials.

Local Street - any roadway not described in the other categories.

It is assumed that the roads were accurately classified. Table 1 shows the distribution of the data collected from the various urban locations over the range of classifications.

TURNING PROPORTION VS. APPROACH VOLUME

Although by definition functional classification gives some indication of the relative volume of traffic on the roadway, a major arterial in a city of 2 million people would be expected to carry a higher volume than a major arterial in a city of 70,000. Major arterials are classified as such because of the type of traffic they carry and the amount of access provided to abutting properties. To analyze turning flow proportions on the basis of functional classification, it was necessary to demonstrate that the approach volume and turning flow proportion were not directly related. This allows the use of the same turning flow proportion for the same functional classification regardless of the size of the city or the traffic volumes at that location.

Two methods were used to demonstrate that turning flow proportion was not directly related to approach volume. The first was to plot the approach volume vs. turning flow proportion for each functional classification and each type of turning flow. The plots are shown in Appendix B and illustrate the random quality of the data. The second method was to calculate the coefficient of correlation between approach volume and turning flow proportion for each functional classification and each turning movement (63). The results are shown in Table 2, and the formula used for the calculation can be found in Appendix C. The correlation coefficient, a number between -1 and +1, demonstrates how closely the data approximate a linear relationship. As the coefficient approaches the lower or upper limit of the range, the data approximate a negative or positive linear relationship, respectively. The results shown in Table 2 indicate a non-linear relationship between approach volume and turning proportion. It was, therefore, assumed that the average turning flow proportions discussed in subsequent sections could be considered valid in any metropolitan area, regardless of the approach traffic volumes.

Table 1
Data Sources
Number of Approaches Analyzed per Category

City / Source	Number of Approaches Analyzed													
	M-M	M-A	M-C	M-L	A-M	A-A	A-C	A-L	C-M	C-A	C-C	L-M	L-A	L-L
San Antonio, TX (38, 39)	36	28	50	12	28	12	6	0	50	6	0	12	0	0
Duncanville, TX (40)	12	2	2	0	2	0	0	0	2	0	0	0	0	0
Euless, TX (41)	4	4	6	0	4	0	0	0	6	0	0	0	0	0
Garland, TX (42, 43)	20	16	2	4	16	0	10	4	2	10	0	4	4	0
Corpus Christi, TX (44, 45)	0	2	0	0	2	32	10	2	0	10	0	0	2	0
Fort Worth, TX (46, 47)	12	10	20	6	10	0	0	0	20	0	0	6	0	0
Hurst, TX (48, 49)	0	2	0	0	2	0	6	0	0	6	0	0	0	0
College Station, TX (50, 51)	4	4	0	4	4	0	0	0	0	0	0	4	0	0
Arlington, TX (52, 53)	8	10	10	2	10	8	14	0	10	14	16	2	0	0
San Angelo, TX (54, 55)	0	12	12	6	12	4	14	6	12	14	20	6	6	12
Austin, TX (56, 57)	12	8	18	16	8	0	0	0	18	0	0	16	0	0
Addison, TX (58, 59)	8	6	8	0	6	8	10	0	8	10	0	0	0	0
Corsicana, TX (60, 61)	0	0	0	0	0	0	2	4	0	2	0	0	4	16
Dauphin County, PA (62)	0	0	0	0	0	0	2	0	0	2	0	0	0	0

M - Major Arterial
A - Minor Arterial
C - Collector
L - Local Road

Table 2
Correlation Coefficients of
Approach Volumes Compared to Turning Flow Proportions

FUNCTIONAL CLASSIFICATION	LEFT TURN	THROUGH	RIGHT TURN
MAJOR ARTERIAL TO MAJOR ARTERIAL	-0.18	0.32	-0.29
MAJOR ARTERIAL TO MINOR ARTERIAL	-0.21	0.28	-0.18
MAJOR ARTERIAL TO COLLECTOR	-0.37	0.43	-0.28
MAJOR ARTERIAL TO LOCAL ROAD	-0.09	0.21	-0.20
MINOR ARTERIAL TO MAJOR ARTERIAL	-0.02	-0.05	0.09
MINOR ARTERIAL TO MINOR ARTERIAL	-0.13	0.36	-0.50
MINOR ARTERIAL TO COLLECTOR	-0.09	0.16	-0.13
MINOR ARTERIAL TO LOCAL ROAD	-0.27	0.36	-0.33
COLLECTOR TO MAJOR ARTERIAL	0.01	0.18	-0.25
COLLECTOR TO MINOR ARTERIAL	0.03	-0.09	0.10
COLLECTOR TO COLLECTOR	-0.16	0.34	-0.30
LOCAL ROAD TO MAJOR ARTERIAL	-0.28	0.10	0.20
LOCAL ROAD TO MINOR ARTERIAL	0.26	-0.12	-0.11
LOCAL ROAD TO LOCAL ROAD	-0.04	0.03	-0.02

AVERAGE TURNING FLOW PROPORTION ANALYSIS

The data analyzed were from various urban areas (mainly in Texas) and consisted of 988 intersection approaches from 247 different intersections. The data are shown in Appendix D. A list of the data sources and the number of approaches from each can be found in Table 1. All of the data analyzed were from four-way signalized intersections, and the analysis was done without regard to the size of the city, traffic volumes, or location in the urban system (e.g., Central Business District). AM and PM peak counts were compared using the Student's t-Test (63) and were found to be similar populations. The formula used is shown in Appendix C, and the results of the tests can be seen in Appendix E. The results allow the assumption to be made that the turning proportion generally remains the same regardless of the directional distribution of the traffic, and this eliminates the need to analyze the PM peak counts separately. Further investigation would be required to assure that the proportions are also valid for the noon peak hour or the off-peak hour traffic. Three methods of analysis were used to develop turning proportions. Standard deviations and confidence intervals were calculated for two of the methods. The third method provides another option, but time limitations prohibited the calculation of any information other than the mean.

Method 1

It was shown in the previous section that the turning proportions were not related to the approach volume. In order to eliminate regard for the approach volume, the data were converted to turning proportions. Left turns, right turns, and through movements were analyzed separately. The population analyzed was a set of proportions for each functional classification. One proportion was calculated for each turning flow movement at each intersection approach. Histograms were plotted for each turning flow and each functional classification and can be found in Appendix F. Because the sample sizes were considered large, a normal distribution was assumed for analysis purposes. The main potential error in assuming normality is that the limits of the proportion are 0 to 1 (i.e., it is a fixed-end distribution). The limits of a normal distribution are negative to positive infinity. A method is available for converting a fixed-end distribution to a normal distribution, and it is discussed as Method 2 below.

The calculated proportions were analyzed as a normal distribution. Mean, variance, standard deviation, and the 90 percent confidence interval were calculated for each turning flow movement for each functional classification. The results are listed, along with the number of approaches analyzed for each functional classification, in Tables 3 to 8.

Method 2

In order to eliminate the fixed-end distribution and approximate a normal distribution, the following formula was used to transform each proportion (64):

$$Arcsin(\sqrt{p})$$

Where:

p = turning flow proportion.

The transformed data were analyzed as in Method 1, and the resulting mean and confidence interval were transformed to the original distribution by reversing the process of the transformation. Results are shown in Tables 3 to 8.

Method 3

The third estimate of a mean proportion is actually a ratio estimate (i.e., weighted average). This method used the turning volumes directly rather than the turning proportions. By adding the turning volumes for each approach and dividing the sum by the sum of the total of all the approach volumes, a ratio estimate was calculated. This estimate gives more weight to the intersections with higher approach volumes. Although it was already pointed out that the approach volume and turning proportion are unrelated, it is still valid to weigh the approaches in this manner. A larger sample of vehicles should more closely approximate the mean turning proportion, and the turning proportions for the approaches with heavier volumes are not statistically different from those of approaches with lower volumes. It is reasonable, therefore, to weigh the higher volumes more to approximate

Table 3
Turning Flow Proportion Estimates
Left Turning Flow

FUNCTIONAL CLASSIFICATION	MEAN PROPORTION	WEIGHTED AVERAGE	MEAN DEVELOPED THROUGH TRANSFORMATION
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.1662	0.1522	0.1489
MAJOR ARTERIAL TO MINOR ARTERIAL	0.0868	0.0790	0.0759
MAJOR ARTERIAL TO COLLECTOR	0.0697	0.0521	0.0559
MAJOR ARTERIAL TO LOCAL ROAD	0.0502	0.0474	0.0397
MINOR ARTERIAL TO MAJOR ARTERIAL	0.2546	0.2518	0.2346
MINOR ARTERIAL TO MINOR ARTERIAL	0.1494	0.1395	0.1247
MINOR ARTERIAL TO COLLECTOR	0.0971	0.0925	0.0804
MINOR ARTERIAL TO LOCAL ROAD	0.0746	0.0551	0.0632
COLLECTOR TO MAJOR ARTERIAL	0.2614	0.2625	0.2457
COLLECTOR TO MINOR ARTERIAL	0.2066	0.2112	0.1824
COLLECTOR TO COLLECTOR	0.1460	0.1300	0.1229
LOCAL ROAD TO MAJOR ARTERIAL	0.3464	0.2922	0.3337
LOCAL ROAD TO MINOR ARTERIAL	0.2603	0.3026	0.2470
LOCAL ROAD TO LOCAL ROAD	0.1303	0.1283	0.1111

Table 4
Turning Flow Proportion Estimates
Through Traffic Flow

FUNCTIONAL CLASSIFICATION	MEAN PROPORTION	WEIGHTED AVERAGE	MEAN DEVELOPED THROUGH TRANSFORMATION
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.6719	0.7097	0.6803
MAJOR ARTERIAL TO MINOR ARTERIAL	0.8110	0.8290	0.8237
MAJOR ARTERIAL TO COLLECTOR	0.8627	0.8931	0.8768
MAJOR ARTERIAL TO LOCAL ROAD	0.9082	0.9171	0.9204
MINOR ARTERIAL TO MAJOR ARTERIAL	0.5202	0.5123	0.5180
MINOR ARTERIAL TO MINOR ARTERIAL	0.6973	0.7400	0.7124
MINOR ARTERIAL TO COLLECTOR	0.8109	0.8217	0.8246
MINOR ARTERIAL TO LOCAL ROAD	0.8152	0.8626	0.8285
COLLECTOR TO MAJOR ARTERIAL	0.4454	0.4764	0.4357
COLLECTOR TO MINOR ARTERIAL	0.5311	0.5119	0.5246
COLLECTOR TO COLLECTOR	0.6671	0.7162	0.6780
LOCAL ROAD TO MAJOR ARTERIAL	0.2990	0.3171	0.2757
LOCAL ROAD TO MINOR ARTERIAL	0.4591	0.4367	0.4525
LOCAL ROAD TO LOCAL ROAD	0.6669	0.6699	0.6762

Table 5
Turning Flow Proportion Estimates
Right Turning Flow

FUNCTIONAL CLASSIFICATION	MEAN PROPORTION	WEIGHTED AVERAGE	MEAN DEVELOPED THROUGH TRANSFORMATION
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.1619	0.1522	0.1424
MAJOR ARTERIAL TO MINOR ARTERIAL	0.1022	0.0920	0.0865
MAJOR ARTERIAL TO COLLECTOR	0.0676	0.0547	0.0554
MAJOR ARTERIAL TO LOCAL ROAD	0.0416	0.0355	0.0320
MINOR ARTERIAL TO MAJOR ARTERIAL	0.2252	0.2359	0.2066
MINOR ARTERIAL TO MINOR ARTERIAL	0.1532	0.1205	0.1364
MINOR ARTERIAL TO COLLECTOR	0.0921	0.0857	0.0760
MINOR ARTERIAL TO LOCAL ROAD	0.1102	0.0823	0.0995
COLLECTOR TO MAJOR ARTERIAL	0.2932	0.2611	0.2794
COLLECTOR TO MINOR ARTERIAL	0.2623	0.2768	0.2446
COLLECTOR TO COLLECTOR	0.1869	0.1538	0.1697
LOCAL ROAD TO MAJOR ARTERIAL	0.3546	0.3907	0.3453
LOCAL ROAD TO MINOR ARTERIAL	0.2806	0.2607	0.2540
LOCAL ROAD TO LOCAL ROAD	0.2028	0.2018	0.1922

Table 6
90 Percent Confidence Intervals
Left Turning Flow

FUNCTIONAL CLASSIFICATION	AVERAGE PROPORTION		MEAN DEVELOPED THROUGH TRANSFORMATION	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.1471	0.1853	0.1312	0.1676
MAJOR ARTERIAL TO MINOR ARTERIAL	0.0767	0.0971	0.0664	0.0861
MAJOR ARTERIAL TO COLLECTOR	0.0613	0.0831	0.0456	0.0672
MAJOR ARTERIAL TO LOCAL ROAD	0.0380	0.0624	0.0302	0.0503
MINOR ARTERIAL TO MAJOR ARTERIAL	0.2235	0.2857	0.2043	0.2664
MINOR ARTERIAL TO MINOR ARTERIAL	0.1229	0.1759	0.1000	0.1516
MINOR ARTERIAL TO COLLECTOR	0.0790	0.1152	0.0657	0.0965
MINOR ARTERIAL TO LOCAL ROAD	0.0502	0.0990	0.0415	0.0891
COLLECTOR TO MAJOR ARTERIAL	0.2366	0.2870	0.2206	0.2716
COLLECTOR TO MINOR ARTERIAL	0.1759	0.2373	0.1527	0.2142
COLLECTOR TO COLLECTOR	0.1115	0.1805	0.0917	0.1580
LOCAL ROAD TO MAJOR ARTERIAL	0.3003	0.3925	0.2451	0.4287
LOCAL ROAD TO MINOR ARTERIAL	0.1973	0.3233	0.1375	0.3762
LOCAL ROAD TO LOCAL ROAD	0.1019	0.1587	0.0759	0.1520

Table 7
90 Percent Confidence Intervals
Through Traffic Flow

FUNCTIONAL CLASSIFICATION	AVERAGE PROPORTION		MEAN DEVELOPED THROUGH TRANSFORMATION	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.6438	0.7000	0.6499	0.7101
MAJOR ARTERIAL TO MINOR ARTERIAL	0.7929	0.8289	0.8054	0.8412
MAJOR ARTERIAL TO COLLECTOR	0.8381	0.8725	0.8229	0.9220
MAJOR ARTERIAL TO LOCAL ROAD	0.8911	0.9255	0.9040	0.9353
MINOR ARTERIAL TO MAJOR ARTERIAL	0.4841	0.5563	0.4780	0.5579
MINOR ARTERIAL TO MINOR ARTERIAL	0.6577	0.7369	0.6695	0.7535
MINOR ARTERIAL TO COLLECTOR	0.7877	0.8339	0.8016	0.8465
MINOR ARTERIAL TO LOCAL ROAD	0.7710	0.8594	0.7801	0.8719
COLLECTOR TO MAJOR ARTERIAL	0.4191	0.4865	0.3996	0.4721
COLLECTOR TO MINOR ARTERIAL	0.4879	0.5743	0.4743	0.5747
COLLECTOR TO COLLECTOR	0.6176	0.7168	0.6249	0.7288
LOCAL ROAD TO MAJOR ARTERIAL	0.2550	0.3432	0.1546	0.4166
LOCAL ROAD TO MINOR ARTERIAL	0.3879	0.5303	0.2603	0.6523
LOCAL ROAD TO LOCAL ROAD	0.6164	0.7174	0.5901	0.7566

Table 8
90 Percent Confidence Intervals
Right Turning Flow

FUNCTIONAL CLASSIFICATION	AVERAGE PROPORTION		MEAN DEVELOPED THROUGH TRANSFORMATION	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
MAJOR ARTERIAL TO MAJOR ARTERIAL	0.1416	0.1814	0.1241	0.1617
MAJOR ARTERIAL TO MINOR ARTERIAL	0.0866	0.1178	0.0737	0.1002
MAJOR ARTERIAL TO COLLECTOR	0.0613	0.0837	0.0451	0.0667
MAJOR ARTERIAL TO LOCAL ROAD	0.0292	0.0540	0.0240	0.0413
MINOR ARTERIAL TO MAJOR ARTERIAL	0.1968	0.2536	0.1800	0.2347
MINOR ARTERIAL TO MINOR ARTERIAL	0.1309	0.1755	0.1151	0.1592
MINOR ARTERIAL TO COLLECTOR	0.0749	0.1093	0.0620	0.0913
MINOR ARTERIAL TO LOCAL ROAD	0.0823	0.1379	0.0721	0.1308
COLLECTOR TO MAJOR ARTERIAL	0.2635	0.3131	0.2545	0.3049
COLLECTOR TO MINOR ARTERIAL	0.2311	0.2935	0.2129	0.2778
COLLECTOR TO COLLECTOR	0.1490	0.2248	0.1350	0.2075
LOCAL ROAD TO MAJOR ARTERIAL	0.3122	0.3970	0.2618	0.4338
LOCAL ROAD TO MINOR ARTERIAL	0.2131	0.3483	0.1423	0.3852
LOCAL ROAD TO LOCAL ROAD	0.1677	0.2381	0.1399	0.2508

the true mean. The calculation procedure is further explained in Appendix C, and results are shown in Tables 3 to 5.

SUMMARY

In summarizing the results, it is necessary to qualify the validity of the mean turning proportions calculated for the functional classification categories containing few observations, particularly those with less than 30 approaches. In the local road to local road intersection category, 28 approaches represent only 7 intersections. The results could be influenced by the qualities of a data set this small.

Method 1, the average of the proportions, is recommended for use as the average turning flow proportion estimate. The left- and right-turn proportions and their accuracies are shown in Table 9 at the end of this section. This set was chosen for a number of reasons. There is no statistical proof that the distributions do not approximate a normal distribution. The limited testing was inconclusive, and no tests were attempted to approximate any other type of distribution. The results of the transformation were not considered adequate because the left, through, and right proportions did not sum to 1. Without a correction, these were considered invalid. Choosing the average proportion eliminates the approach volume as a factor in the calculation.

The proportions from the three methods were not drastically different, based on visual observation. Having clarified the choice of the average proportion as the recommended value, it is possible to respond to the question raised in the objective portion of this research: "Is there a direct relationship between turning flow proportion and functional classification?" Although limited statistical analysis yielded inconclusive results in comparing the mean proportions with each other, observation of the data in Table 9 shows an obvious trend which appears to indicate that there is a strong correlation between functional classification and turning flow proportion.

Table 9
Left and Right Turning Flow Proportions and Accuracy of the Estimates

FUNCTIONAL CLASSIFICATION	NUMBER OF APPROACHES ANALYZED	AVERAGE TURNING PROPORTIONS			
		LEFT	ACCURACY	RIGHT	ACCURACY
MAJOR ARTERIAL TO MAJOR ARTERIAL	116	0.1662	0.019	0.1619	0.020
MAJOR ARTERIAL TO MINOR ARTERIAL	104	0.0868	0.010	0.1022	0.016
MAJOR ARTERIAL TO COLLECTOR	128	0.0697	0.011	0.0676	0.011
MAJOR ARTERIAL TO LOCAL ROAD	50	0.0502	0.012	0.0416	0.012
MINOR ARTERIAL TO MAJOR ARTERIAL	104	0.2546	0.031	0.2252	0.028
MINOR ARTERIAL TO MINOR ARTERIAL	64	0.1494	0.027	0.1532	0.022
MINOR ARTERIAL TO COLLECTOR	74	0.0971	0.018	0.0921	0.017
MINOR ARTERIAL TO LOCAL ROAD	16	0.0746	0.024	0.1102	0.028
COLLECTOR TO MAJOR ARTERIAL	128	0.2614	0.025	0.2932	0.025
COLLECTOR TO MINOR ARTERIAL	74	0.2066	0.031	0.2623	0.031
COLLECTOR TO COLLECTOR	36	0.1460	0.034	0.1869	0.038
LOCAL ROAD TO MAJOR ARTERIAL	50	0.3464	0.046	0.3546	0.042
LOCAL ROAD TO MINOR ARTERIAL	16	0.2603	0.063	0.2806	0.068
LOCAL ROAD TO LOCAL ROAD	28	0.1303	0.028	0.2028	0.035

Note: accuracy estimates are based on 90 percent confidence interval

RESULTS AND RECOMMENDATIONS

The literature review revealed a variety of approaches to predict turning flows at intersections. Some of these can be applied to forecasting, while others simply offer an option for reducing the labor-intensive effort of counting turning flows. In the state-of-the-practice portion of this research, the telephone survey revealed that the amount of interest in and knowledge of the availability of these methods varied. It is felt, however, that interest will increase and the methods will be used and improved as the necessity is recognized. Further testing of the available methods is recommended, specifically with respect to forecasting turning flows for future intersection developments.

Analysis of turning flow proportion with respect to functional classification revealed that turning flow proportions appear to be related to functional classification. The average turning flow proportions presented in the report are an option when an engineer is interested in making a quick estimate of the turning traffic at an intersection or as initial input into one of the available turning flow forecasting models. The most important benefit of this information is the potential elimination of the labor-intensive manual counting of intersection turning flows. Further statistical analysis is recommended to verify the recommended proportions. It is also recommended that they be tested in the turning flow forecasting models for accuracy.

REFERENCES

1. Marshall, M.L. "Labour-saving Methods for Counting Traffic Movements at Three- and Four-arm Junctions." *Traffic Engineering and Control*. April 1979.

2. Jeffreys, Martyn and Michael Norman. "On Finding Realistic Turning Flows at Road Junctions." *Traffic Engineering and Control*. January 1977.

3. Norman, M. and N. Hoffman. "Non-iterative Methods for Generating a Realistic Turning Flow Matrix for a Junction." *Traffic Engineering and Control*. December 1979.

4. Furness, K.P. "Time Function Iteration." *Traffic Engineering and Control*, 7(7), pp. 458-460. November 1965.

5. Pederson, N.J. and D.R. Samdahl. "Highway Traffic Data for Urbanized Area Project Planning and Design." *NCHRP Report 255*. Washington D.C.: Transportation Research Board. December 1982.

6. Mekky, Ali. "On Estimating Turning Flows at Road Junctions." *Traffic Engineering and Control*. October 1979.

7. Bacharach, M. *Biproportional Matrices and Input Output Change*. Cambridge University Press. 1970.

8. Bell, M.G.H. "The Estimation of Junction Turning Volumes from Traffic Counts: The Role of Prior Information." *Traffic Engineering and Control*. May 1984.

9. van Zuylen, Henk J. "The Estimation of Turning Flows on a Junction." *Traffic Engineering and Control*. November 1979.

10. Hauer, E., E. Pagitsas, and B.T. Shin. "Estimation of Turning Flows from Automatic Counts." *Transportation Research Record 795*. 1981.

11. Schaefer, Mark C. "Estimation of Intersection Turning Movements from Approach Counts." *ITE Journal*. October 1988.

12. Maher, M.J. "Inferences on Trip Matrices from Observations on Link Volumes: A Bayesian Statistical Approach." *Transportation Research*, 17B (6), December 1983, pp. 435-447.

13. Maher, M.J. "Estimating the Turning Flows at a Junction: A Comparison of Three Models." *Traffic Engineering and Control*. May 1984.

14. Mountain, Linda J., M. Maher, and S. Maher. "The Estimation of Turning Flows from Traffic Counts at Four-Arm Intersections." *Traffic Engineering and Control.* October 1986.

15. Furth, Peter G. "A Model of Turning Movement Propensity." TRB Preprint. Paper No. 89-0580. December 1, 1989.

16. Luk, J.Y.K. "Estimation of Turning Flows at an Intersection from Traffic Counts." Australian Road Research Board. Research Report ARR No. 162. June 1989.

17. Adebisi, Olusegun. "Improving Manual Counts of Turning Traffic at Road Junctions." *Journal of Transportation Engineering.* May 1987.

18. Buehler, Martin G. "Forecasting Intersection Traffic Volumes." *Journal of Transportation Engineering.* July 1983.

19. Highway Research Board. *Highway Capacity Manual.* Special Report 87. Washington, D.C.: Highway Research Board. 1965.

20. Johnson, Terry, Americopa Association of Governments Transportation Planning Office. Telephone interview to get information on the state-of-the-practice in Arizona. July 1991.

21. Herp, Don, Head of Transportation Planning, City of Phoenix. Telephone interview to get information on the state-of-the-practice in Arizona. July 1991.

22. Chenu, Charles, Chief of the Regional Travel Forecasting Branch, California Department of Transportation. Telephone interview to get information on the state-of-the-practice in California. July 1991.

23. Divine, George, Senior Civil Engineer in Transportation and Developments, County of Monterey, California. Telephone interview to get information on the state-of-the-practice in California. July 1991.

24. O'Hara, Doug, Manager of Transportation Statistics, District 4 Planning Office, Florida Department of Transportation. Telephone interview to get information on the state-of-the-practice in Florida. July 1991.

25. LeDew, Chris, Safety Engineer in Traffic Operations, District 4, Florida Department of Transportation. Telephone interview to get information on the state-of-the-practice in Florida. July 1991.

26. Ponder, Steve, Traffic Study Supervisor, District 5, Illinois Department of Transportation. Telephone interview to get information on the state-of-the-practice in Illinois. July 1991.

27. Poturalski, Jim, Traffic Design Manager, Indiana Department of Highways. Telephone interview to get information on the state-of-the-practice in Indiana. July 1991.

28. Nagle, John, Division of Program Management, Indiana Department of Highways. Telephone interview to get information on the state-of-the-practice in Indiana. July 1991.

29. Lisco, Tom, Manager of Systems Analysis, Central Artery Project, CTPS, Massachusetts Department of Transportation. Telephone interview to get information on the state-of-the-practice in Massachusetts. July 1991.

30. Beagan, Dan, Deputy Director of CTPS, Massachusetts Department of Transportation. Telephone interview to get information on the state-of-the-practice in Massachusetts. July 1991.

31. van Zuylen, H. J. and L. G. Willumsen. "The Most Likely Trip Matrix Estimated from Traffic Counts." *Transportation Research*. v. 14B, pp. 281-293. 1980.

32. Lotszinski, Hank, Transportation Planning Supervisor, Bureau of Transportation Planning, Michigan Department of Transportation. Telephone interview to get information on the state-of-the-practice in Michigan. July 1991.

33. Poorman, John, Acting Director of Urban Planning Section, New York State Department of Transportation. Telephone interview to get information on the state-of-the-practice in New York. July 1991.

34. Burgett, Bob, Planner Supervisor, Bureau of Technical Services, Ohio Department of Transportation. Telephone interview to get information on the state-of-the-practice in Ohio. July 1991.

35. Pancher, Tim, Planning Administrator, Bureau of Technical Services, Ohio Department of Transportation. Telephone interview to get information on the state-of-the-practice in Ohio. July 1991.

36. Jurak, Bob, Program Administrator III, Texas Department of Transportation, Division 10, Texas. Telephone interview to get information on the state-of-the-practice in Texas. July 1991.

37. *Highway Capacity Manual*. Special Report 209. Washington D.C.: Transportation Research Board. 1985

38. "Traffic Light Synchronization Program, San Antonio, Texas: Existing Evaluation Report - S. Flores System, Broadway System, West Side System." Prepared by: Signal Systems Section, Public Works Department, Traffic Division of the City of San Antonio, Texas. June 29, 1990.

39. Pearson, David, Texas Transportation Institute, Texas A&M University System (formerly of San Antonio, Texas). Discussion to obtain information on the functional classifications for the intersections in San Antonio. June 1991.

40. "Traffic Light Synchronization Program: 'Before' Study Results for Main St. and Santa Fe Trail from Camp Wisdom Rd. to Danieldale Rd." Prepared by Barton-Aschman Associates, Inc., for the City of Duncanville, Texas. April 1990.

41. "Traffic Light Synchronization Program: Reduction of Fuel Consumption Through Improved Traffic Signal Retiming in Euless, Texas - A Study of Existing Traffic Operations." Prepared by DeShazo, Starek & Tang, Inc., for the City of Euless, Texas. July 6, 1990.

42. "Traffic Light Synchronization Program: 'Before' Study Results for the Garland Central Area Systems." Prepared by Barton-Aschman Associates, Inc., for the City of Garland, Texas. July 1990.

43. Timbrill, Dave, City of Garland, Texas. Discussion to obtain information on the functional classifications for the intersections in Garland, Texas. June 1991.

44. Seiler, David V. and Ray Latham. "Traffic Light Synchronization Preliminary Study ('Before' Field Evaluation Report)." Prepared for the City of Corpus Christi.

45. Teniente, Mary Frances, City of Corpus Christi. Discussion to obtain information on the functional classifications for the intersections in Corpus Christi. June 1991.

46. "Traffic Light Synchronization (TLS) Program: Before Study for North Main St. from 28th St. to 5th St., 28th St. from Cliff St. to Industrial Rd., Camp Bowie Rd. from IH 30 Frontage Rd. to Clover St./Crestline Rd." Prepared by Traffic Engineers, Inc., for the City of Fort Worth, Texas. July 1991.

47. Marks, Sharla, City of Fort Worth. Discussion to obtain information on the functional classifications for the intersections in Fort Worth, Texas. July 1991.

48. "Traffic Light Synchronization (TLS) Program: Before Study Results for SH 10 (Hurst Blvd.) from Booth-Calloway Rd. to Bell Spur, Pipeline Rd. from Hurstview Drive to Bellaire Drive." Prepared by Traffic Engineers, Inc., for the City of Hurst, Texas. July 1991.

49. Sparks, Jim, City of Hurst. Discussion to obtain information on the functional classifications for the intersections in Hurst, Texas. July 1991.

50. Unpublished study from the ITE Student Chapter, Texas A&M University, College Station, Texas. June 1991.

51. "Functional Classification Map of the City of College Station." Prepared by the Traffic Engineering Section, revised by the Planning Division. March 27, 1989.

52. "Cycle Two of Traffic Light Synchronization Program Downtown Arlington Project, Green Oaks Boulevard/ Little Road Project, Bowen Road/Pioneer Parkway/Park Row Drive Project: Before Study Report." Prepared by City of Arlington, Department of Transportation, Arlington, Texas. March 1991.

53. Van DeWalle, Brian, MAPSCO. Discussion to obtain information on the functional classifications for the intersections in Arlington, Texas. June 1991.

54. "Traffic Light Synchronization Program: 'Before' Study Results for the San Angelo CBD System, the Bryant Boulevard System." Prepared by Barton-Aschman Associates, Inc., for the City of San Angelo, Texas.

55. Robinson, Tommy, City of San Angelo. Discussion to obtain information on the functional classification for the intersections in San Angelo, Texas. June 1991.

56. Unpublished data from the City of Austin, Urban Transportation Department. June 1991.

57. Balke, Kevin, Assistant Research Engineer, Texas Transportation Institute, College Station, Texas. Discussion to obtain information on the functional classifications for the intersections in Austin, Texas. June 1991.

58. "Traffic Light Synchronization Program: 'Before' Study Results for the Town of Addison System." Prepared by Barton-Aschman Associates, Inc., for the Town of Addison, Texas.

59. Baumgartner, John, Town of Addison. Discussion to obtain information on the functional classifications for the intersections in Addison, Texas. July 1991.

60. "Traffic Light Synchronization Program: 'Before' Study Results for the Corsicana CBD System." Prepared by Barton-Aschman Associates for the City of Corsicana, Texas.

61. Anderson, Gary, City of Corsicana. Discussion to obtain information on the functional classifications for the intersections in Corsicana, Texas. July 1991.

62. Unpublished data obtained through Grove Miller Engineering, Inc., Harrisburg, Pennsylvania. July 1991.

63. Miller, Irwin and John E. Freund. *Probability and Statistics for Engineers*. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1965.

64. Hinshaw, Wanda, Assistant Research Statistician, Texas Transportation Institute, College Station, Texas. Discussion held with author. June 1991.

Appendix A

Telephone Survey

TELEPHONE SURVEY

Background:

Hello, my name is Janis Piper and I am doing research in the Undergraduate Fellowship Program at the Texas Transportation Institute at Texas A&M University.

My research this summer involves compiling information on the state of the practice in estimating and forecasting turning movements.

It is essential to my research to find out which methods are currently being used by the State Departments of Transportation in this country. I would appreciate it if you would be willing to answer a few questions of the current practices of your department in predicting turning movement volumes.

Questionnaire:

1a. For documentation purposes, could I have your name and title?

1b. Do you currently use turning movement estimates in the development and planning phases for new intersections?

2. If so, do you have a particular method by which you develop these estimates?

3. If so, is the method documented?

4. If so, could you send me a copy of that documentation?

5. Does the method involve the use of a computer program?

6. If so, was the program developed in house?

7. If so, would it be possible for me to get a copy or a listing of the program? If not, could I have the name of the program and the company through which it was purchased?

8. Do you have any record or indication of the accuracy of the estimates made in this manner?

9. Are there any other areas where you feel that having the ability to estimate turning movements is a benefit to your department?

10. Is there anything you would like to add which you feel might be beneficial to my research?

Closing:

Thank you for your time. If you have any further information which might help me along, you can reach me at (409)845-5202. I would be happy to send you information on the results of this study if you have an interest in this area.

Names and Phone numbers of Departments:

California (8:00-5:00 PST) - Department of Transportation - (916) 445-2201

New York (8:00-5:00 EST) - New York State Department of Transportation - (518) 457-4422

Michigan (7:30-4:30 EST) - Michigan Department of Transportation - (517) 373-2090

Pennsylvania (8:00-4:30 EST) - Department of Transportation - (717) 787-5574

Florida (8:15-5:15 EST) - Florida Department of Transportation - (904) 488-3111

Illinois (8:00-4:30 CST) - Illinois Department of Transportation - (217) 782-6953

Ohio (7:30-4:30 EST) - Ohio Department of Transportation - (614) 466-2335

Indiana (8:15-4:45 EST) - Indiana Department of Highways - (317) 232-5526

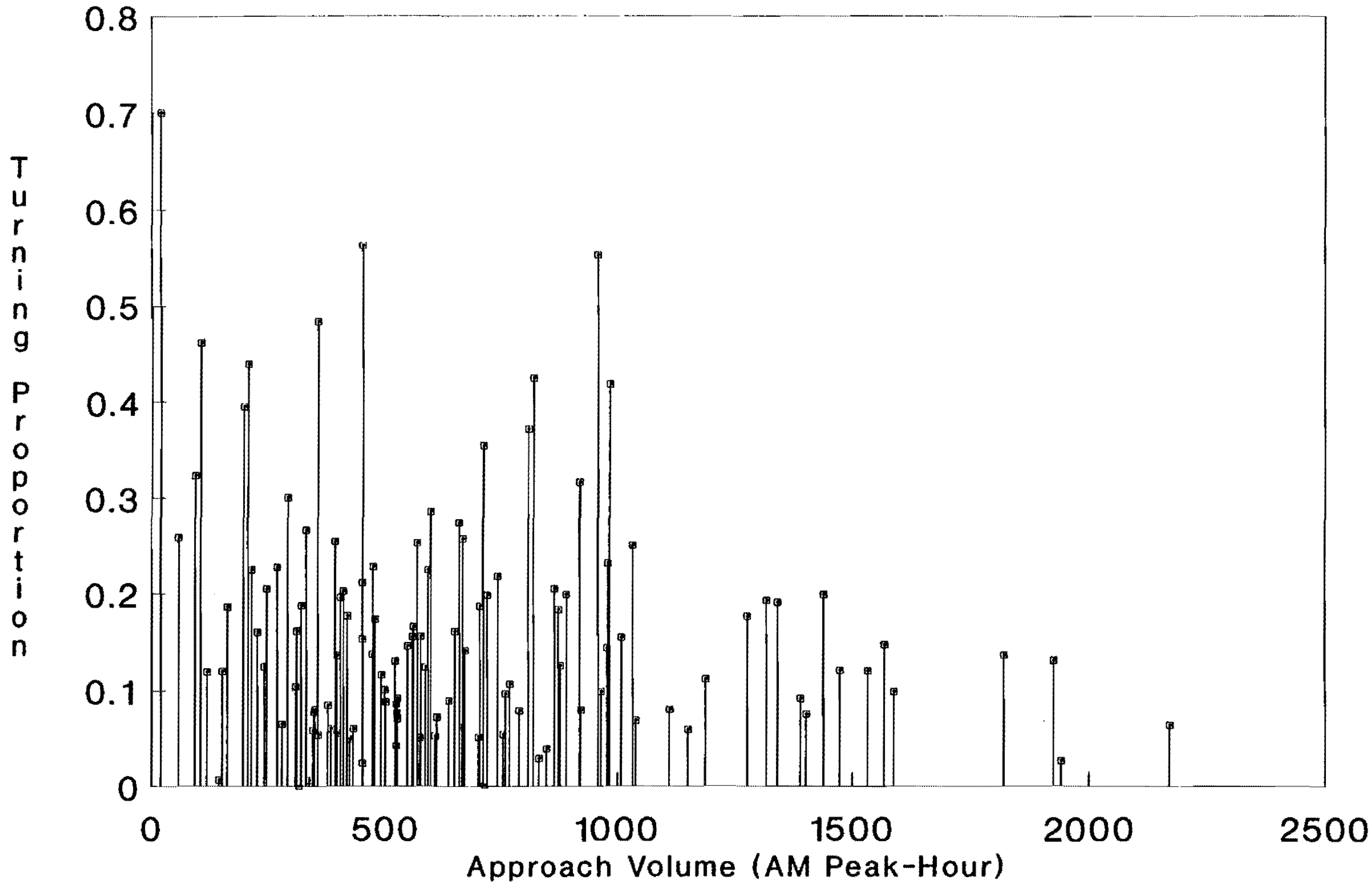
Arizona (8:30-5:00 MST) - Arizona Department of Transportation - (602) 255-7011

Appendix B

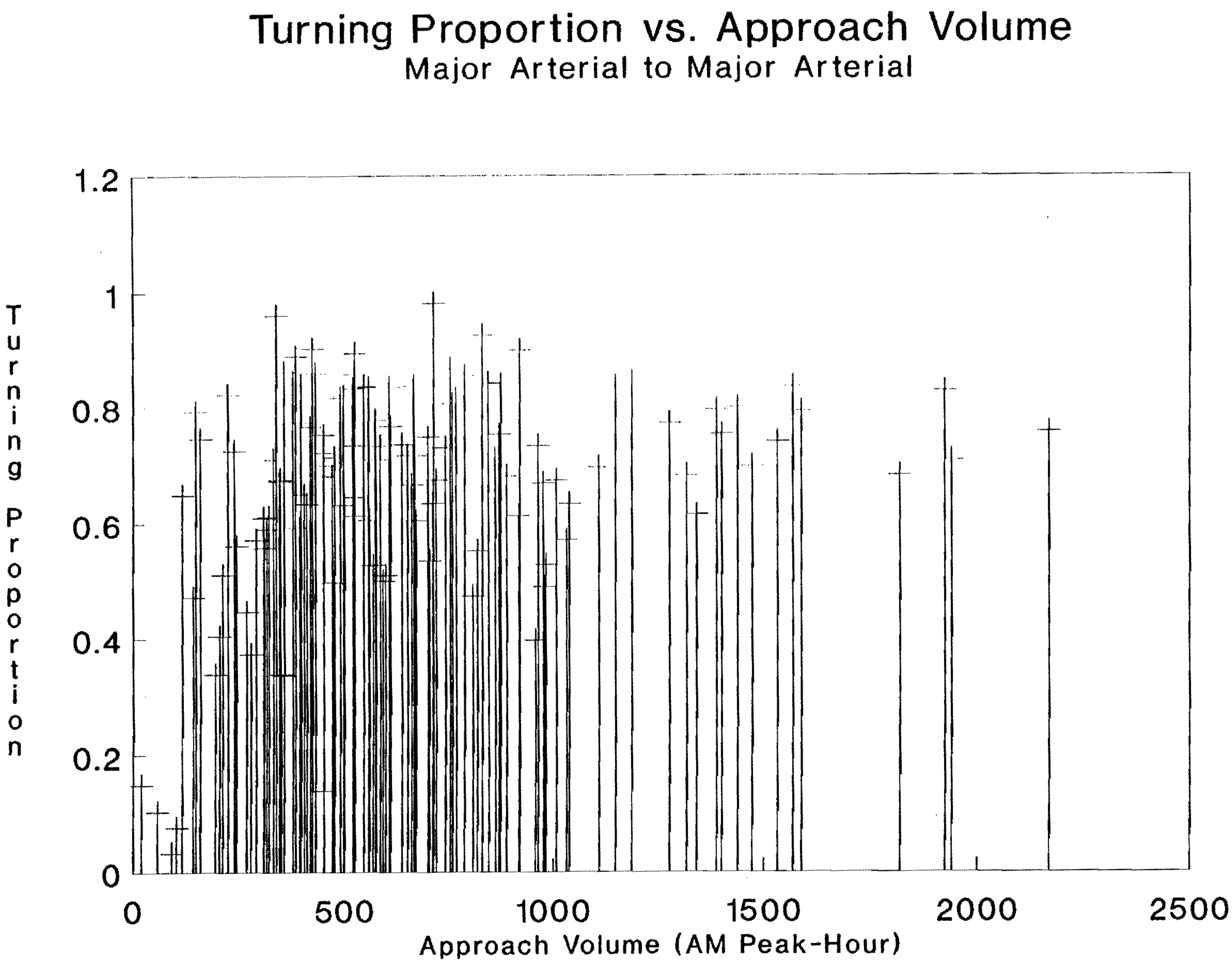
Approach Volume vs. Turning Flow Proportion

Turning Proportion vs. Approach Volume

Major Arterial to Major Arterial



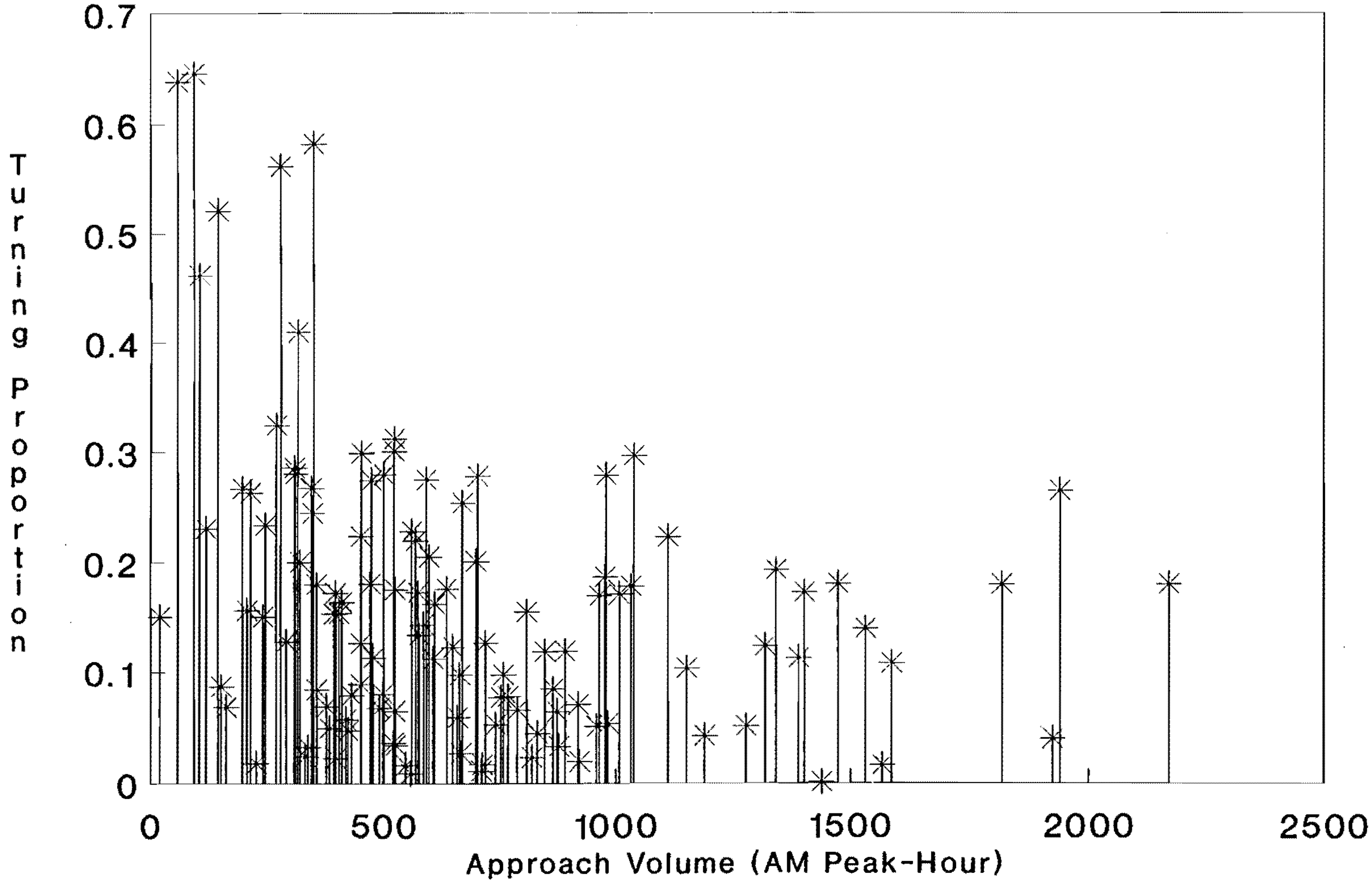
Left-Turning Traffic



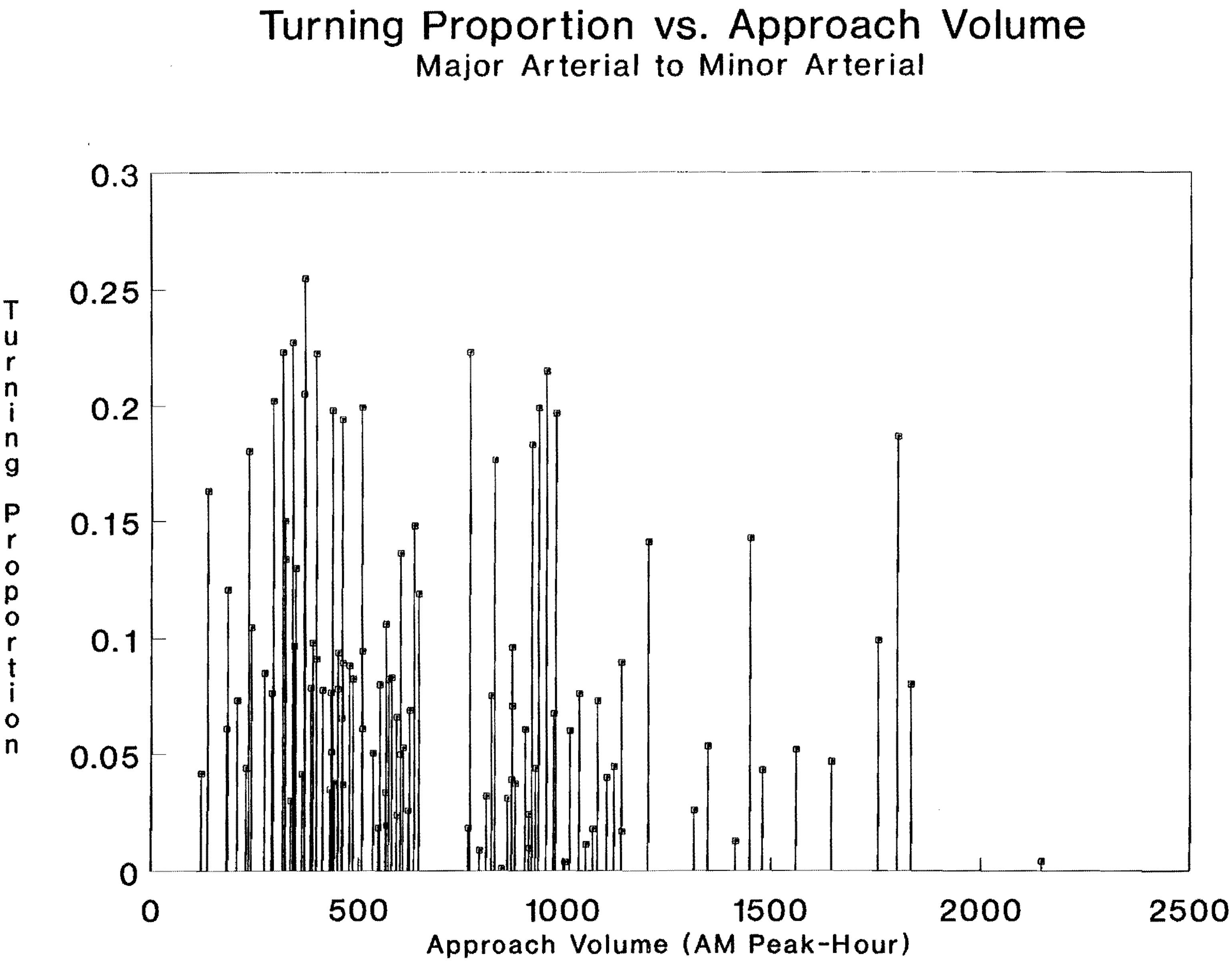
Through Traffic

Turning Proportion vs. Approach Volume

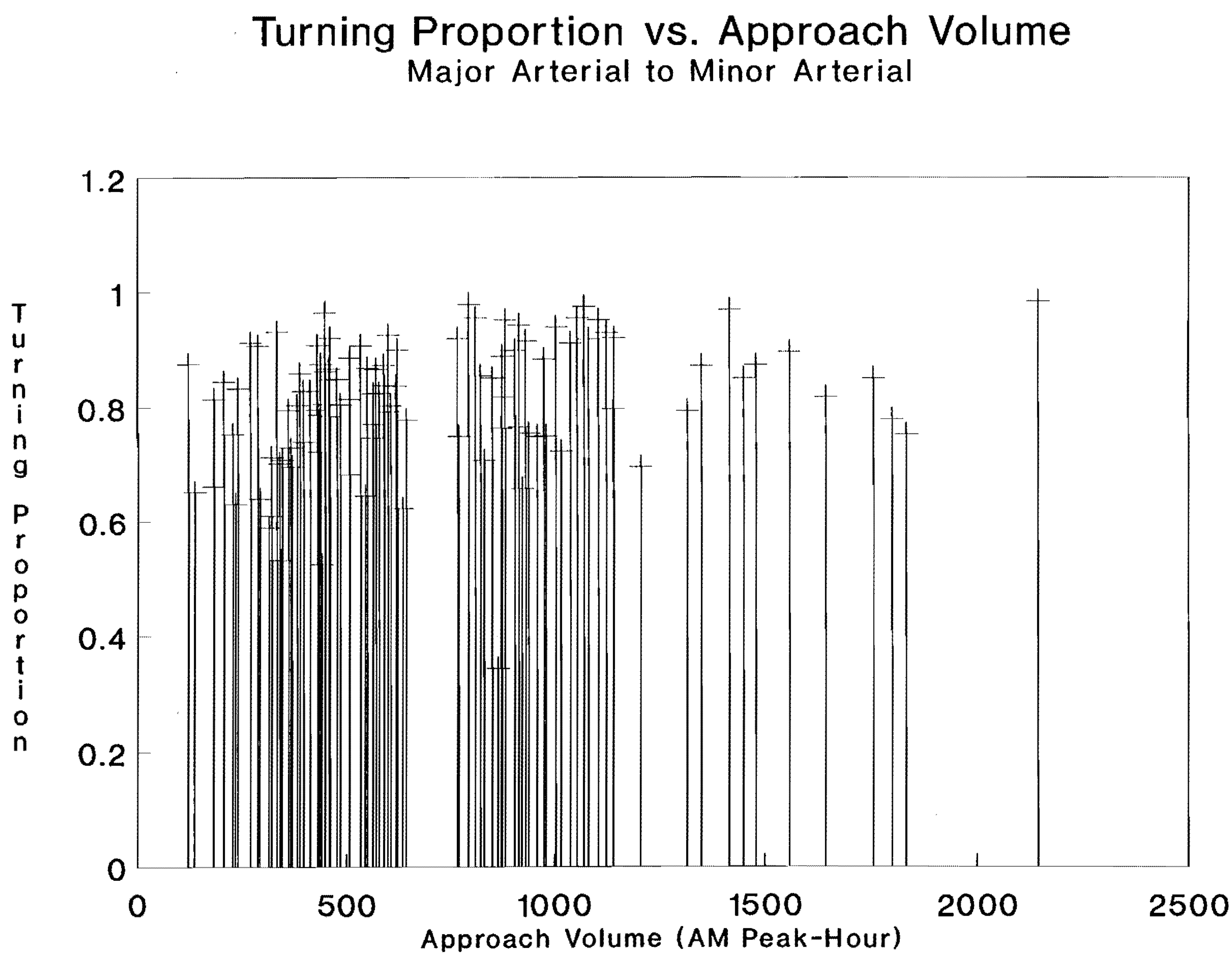
Major Arterial to Major Arterial



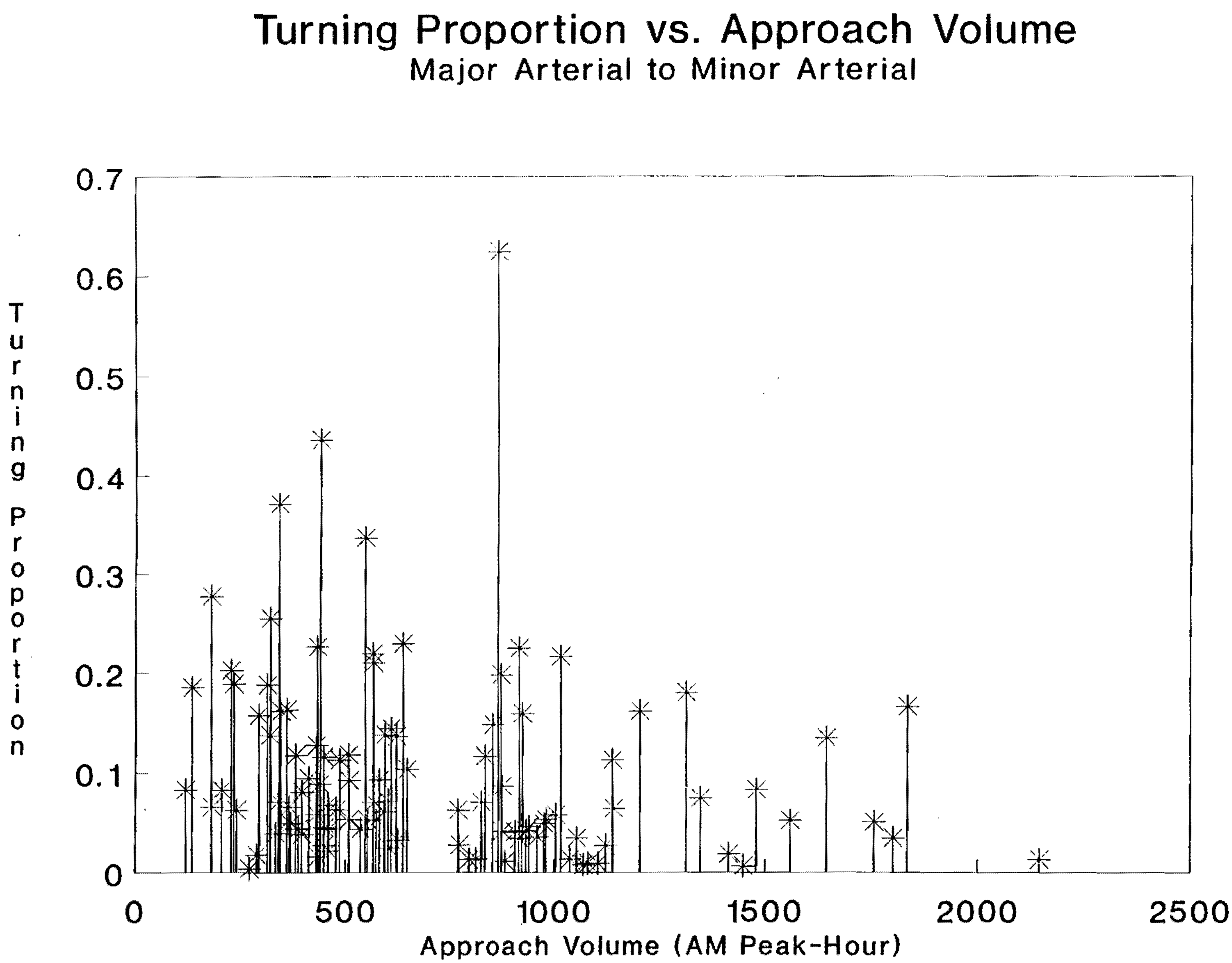
Right-Turning Traffic



Left-Turning Traffic



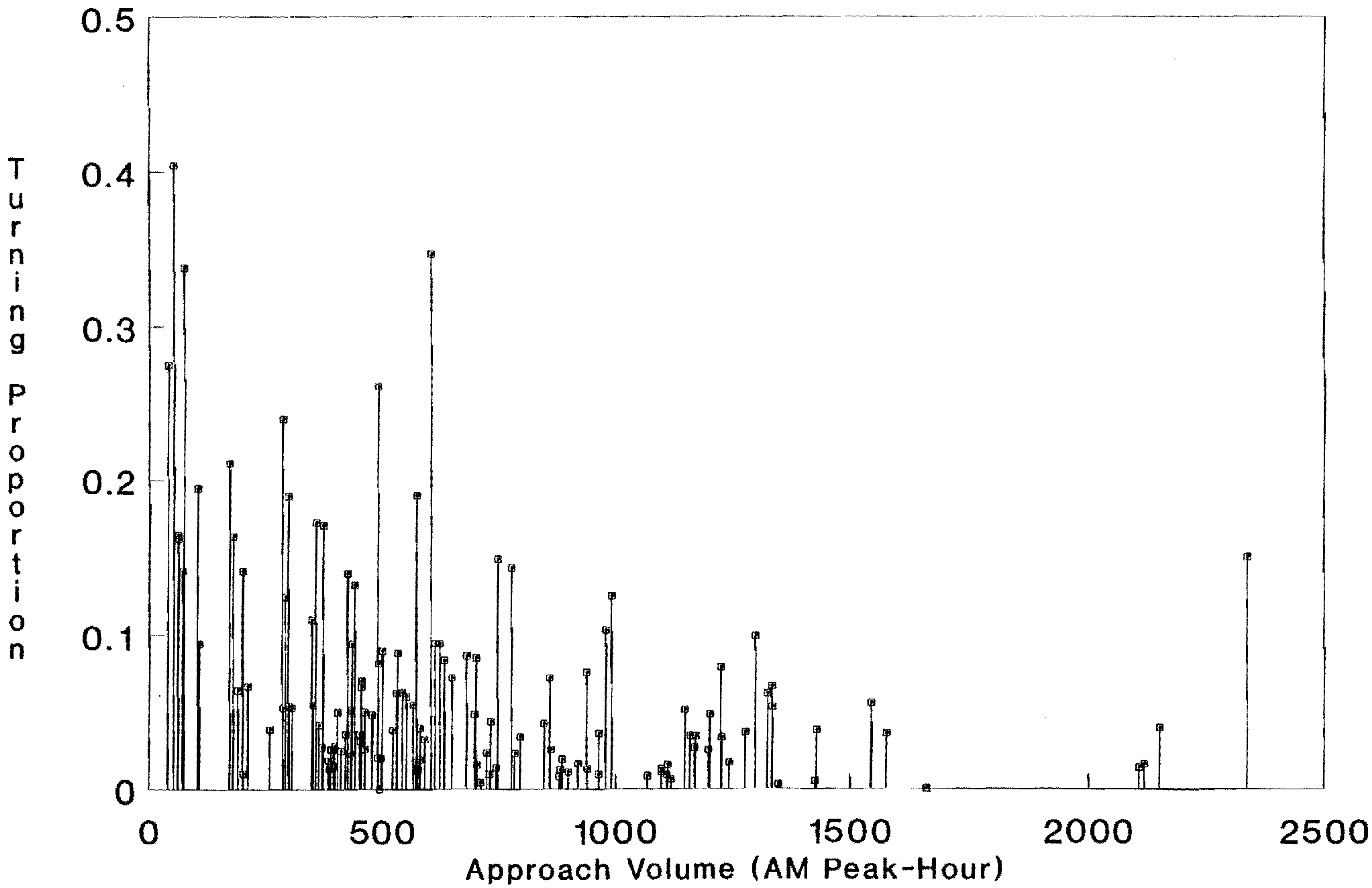
Through Traffic



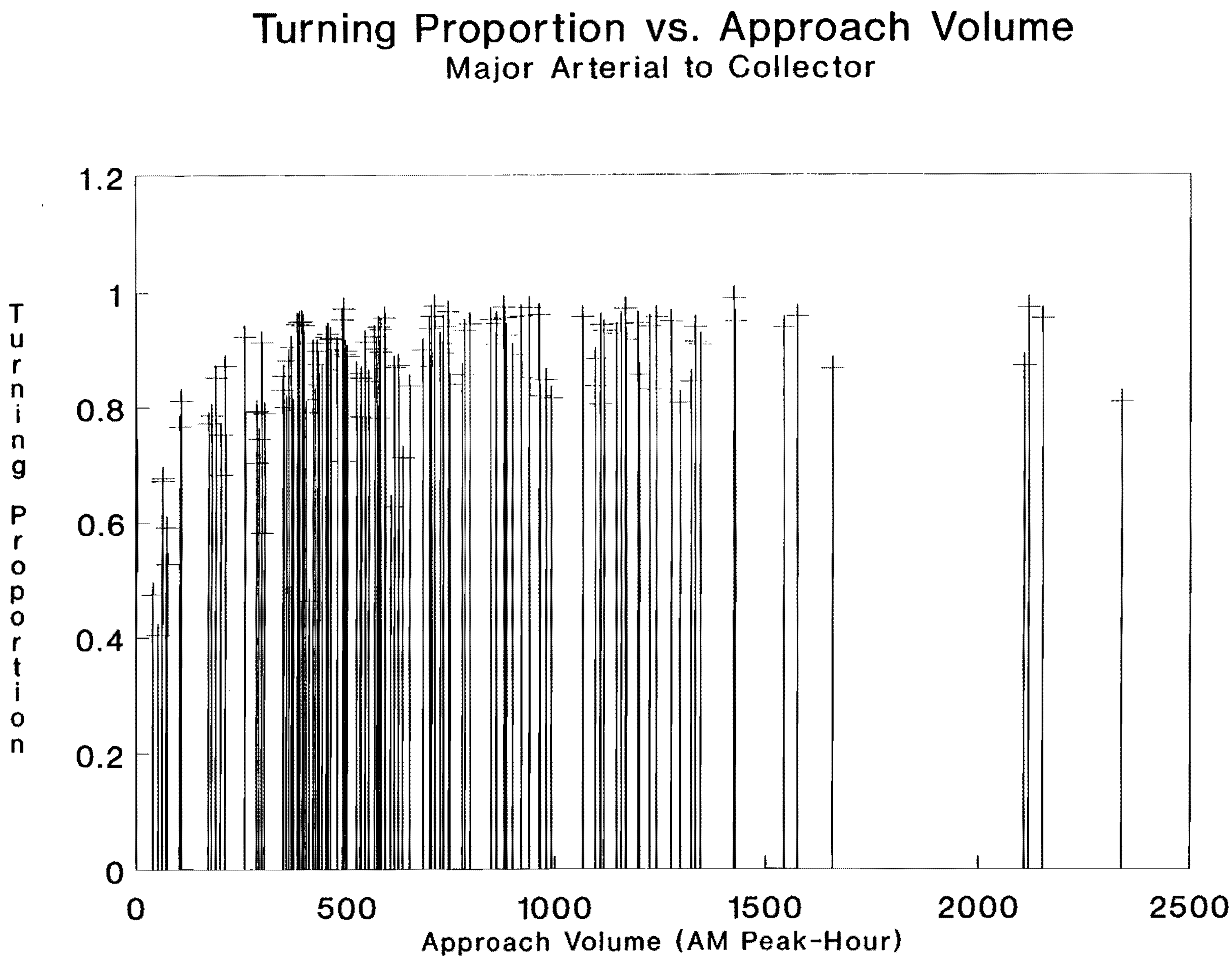
Right-Turning Traffic

Turning Proportion vs. Approach Volume

Major Arterial to Collector

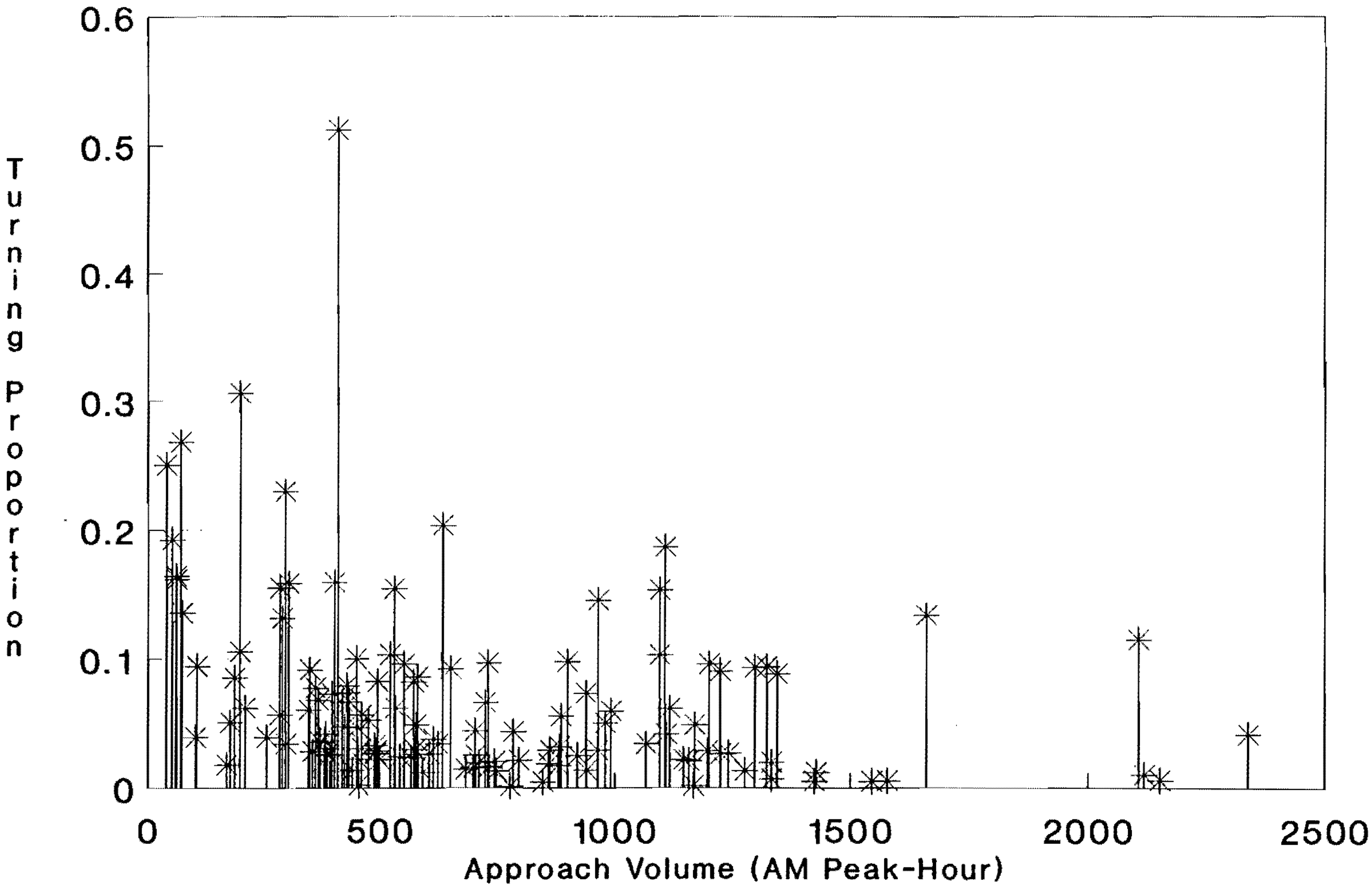


Left-Turning Traffic



Through Traffic

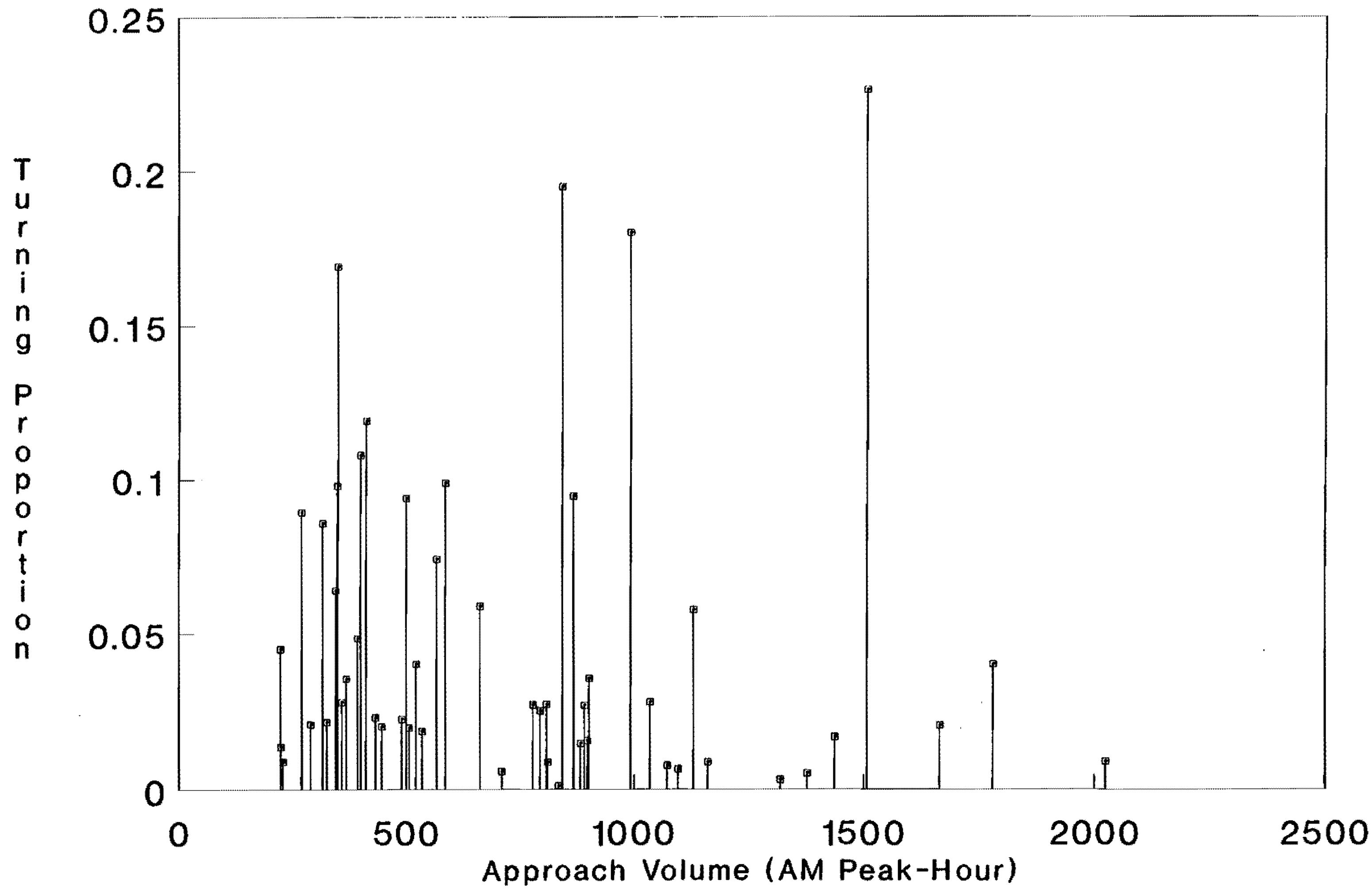
Turning Proportion vs. Approach Volume
Major Arterial to Collector



Right-Turning Traffic

Turning Proportion vs. Approach Volume

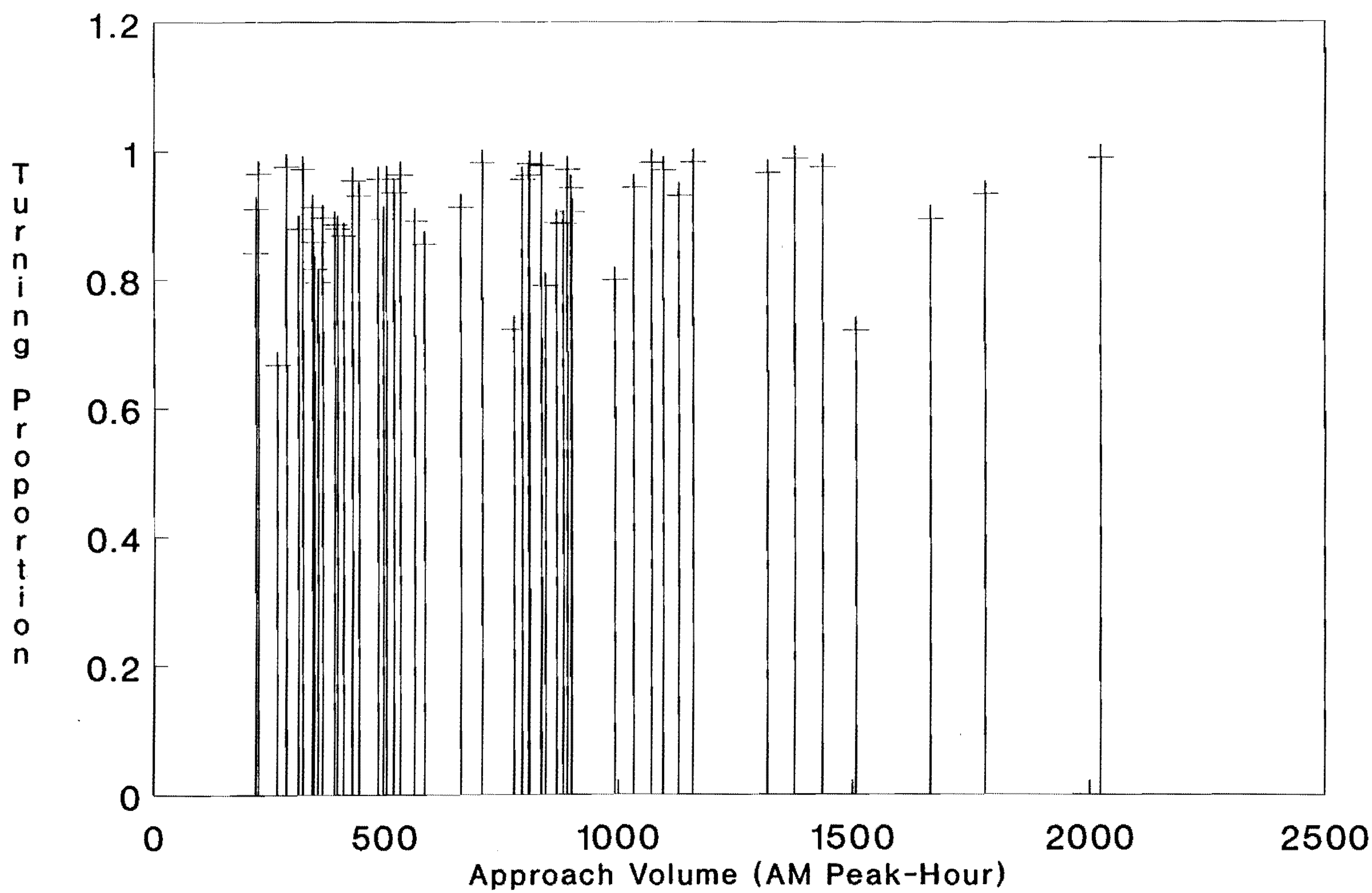
Major Arterial to Local Road



Left-Turning Traffic

Turning Proportion vs. Approach Volume

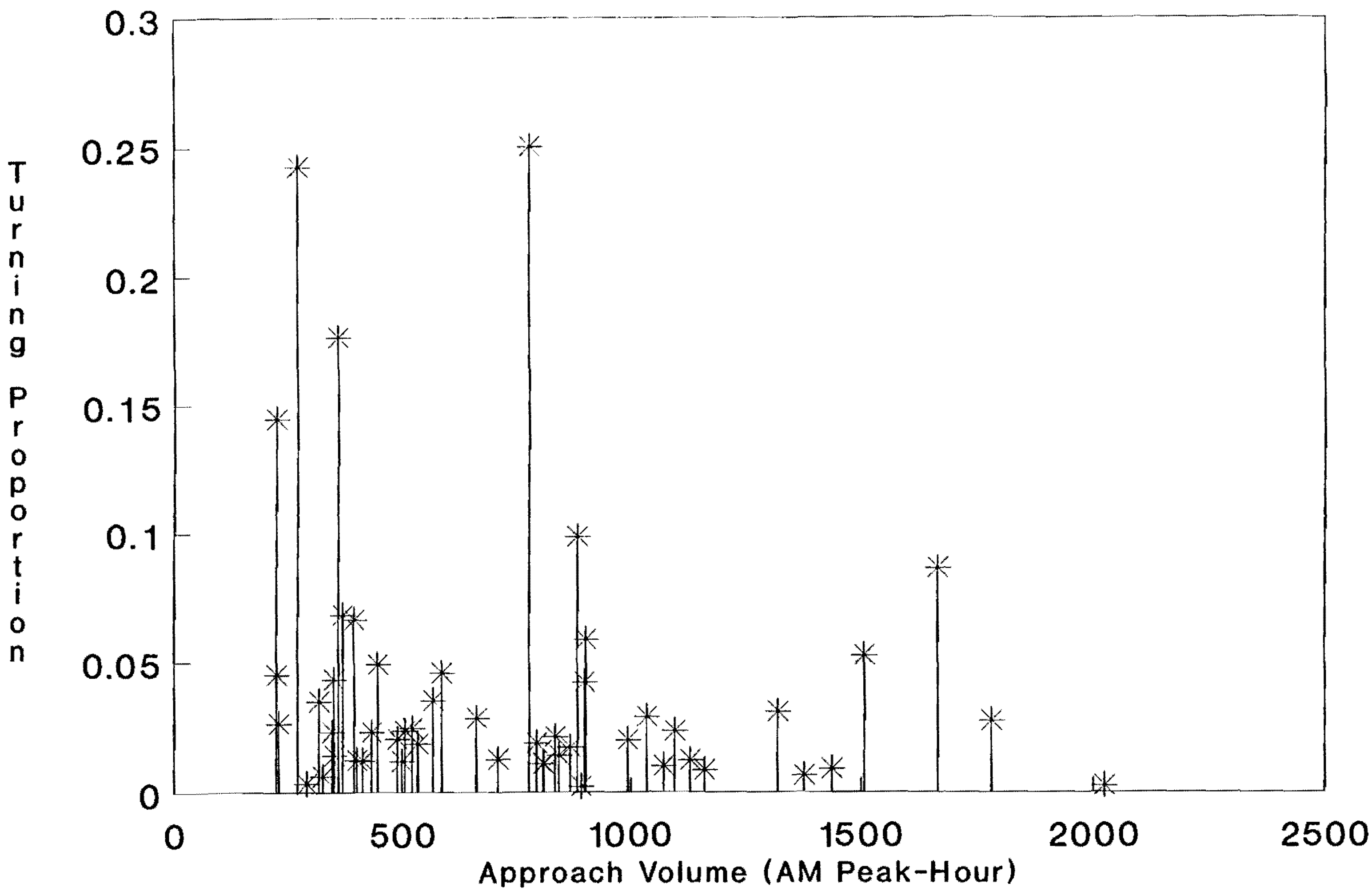
Major Arterial to Local Road



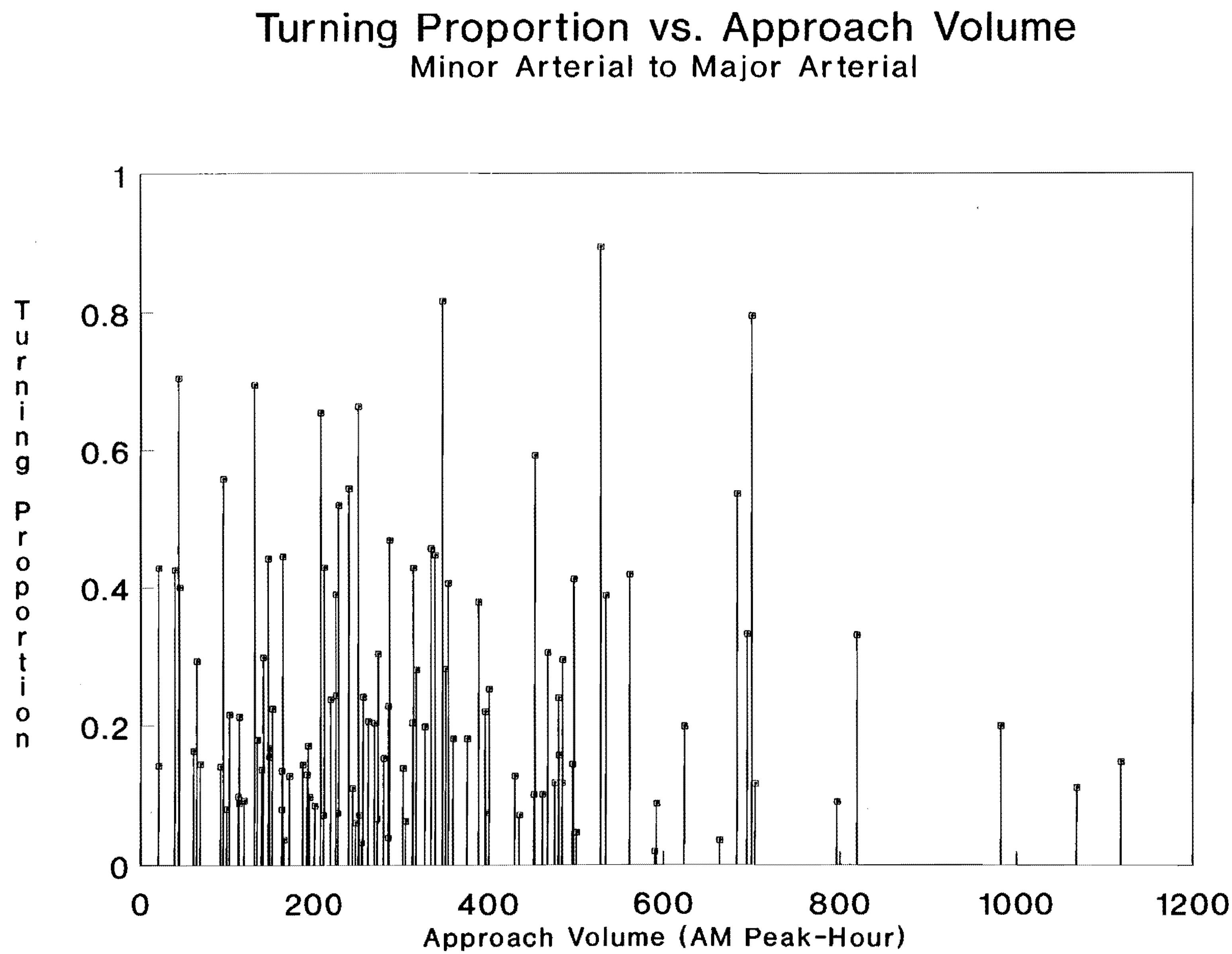
Through Traffic

Turning Proportion vs. Approach Volume

Major Arterial to Local Road



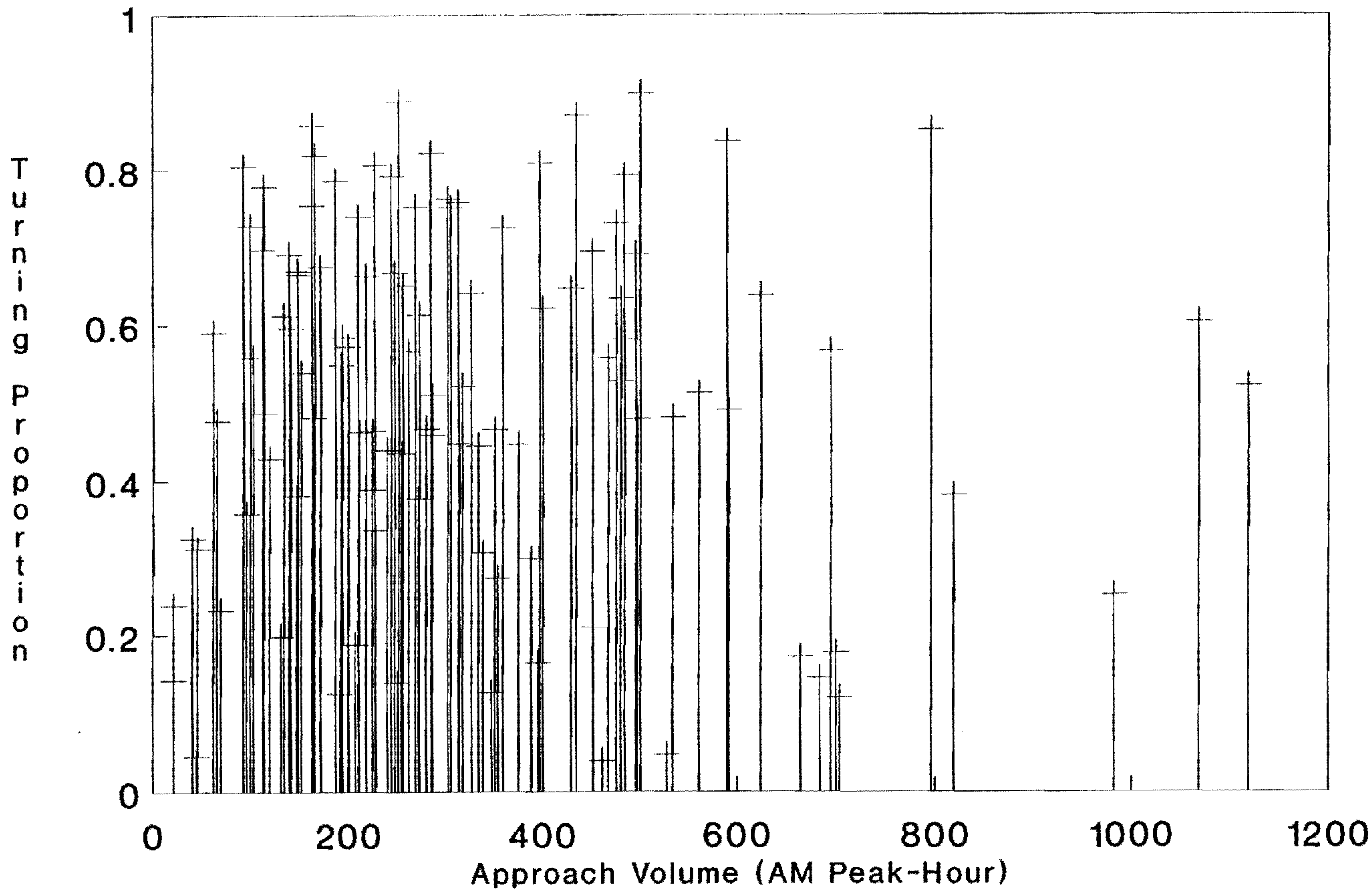
Right-Turning Traffic



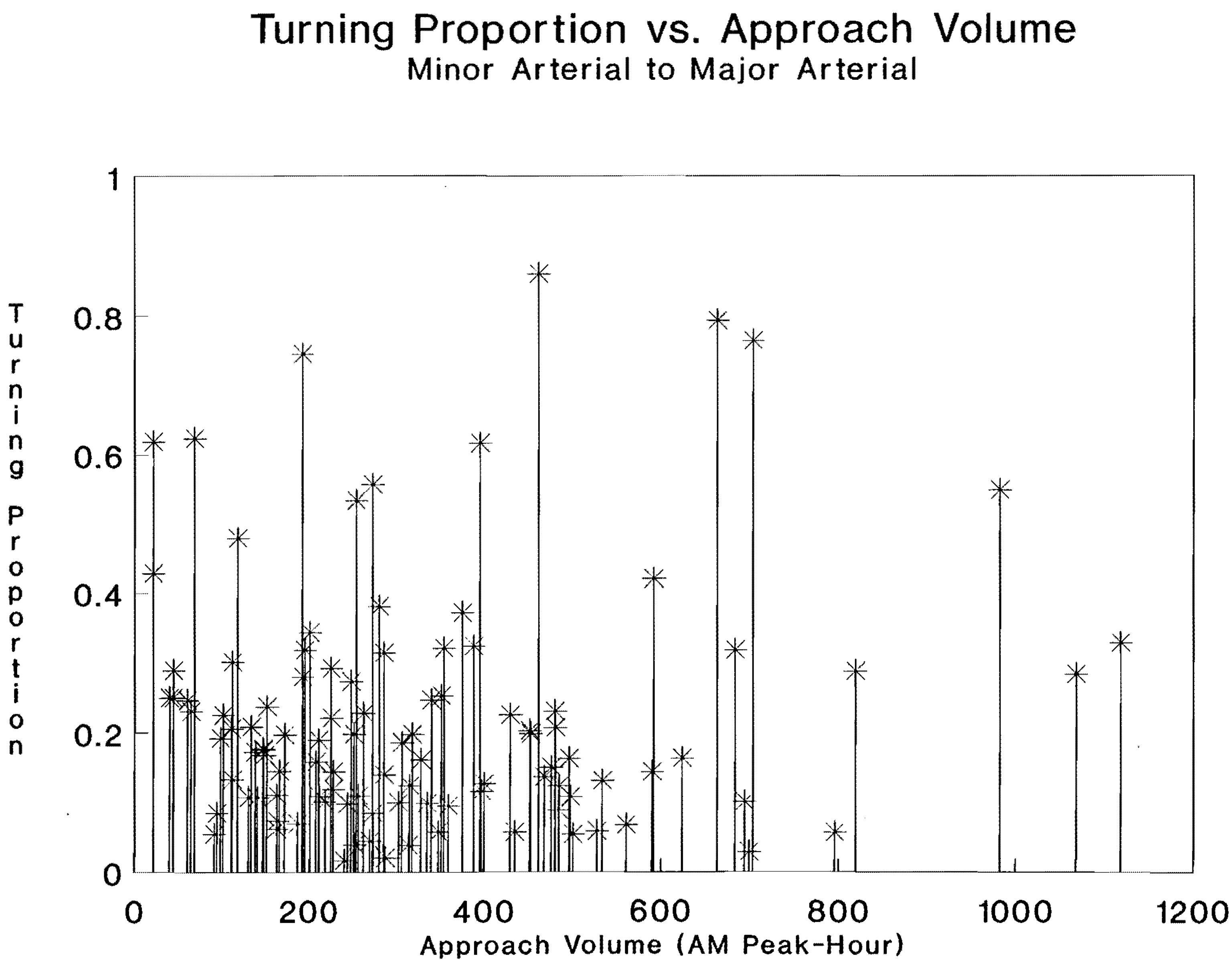
Left-Turning Traffic

Turning Proportion vs. Approach Volume

Minor Arterial to Major Arterial



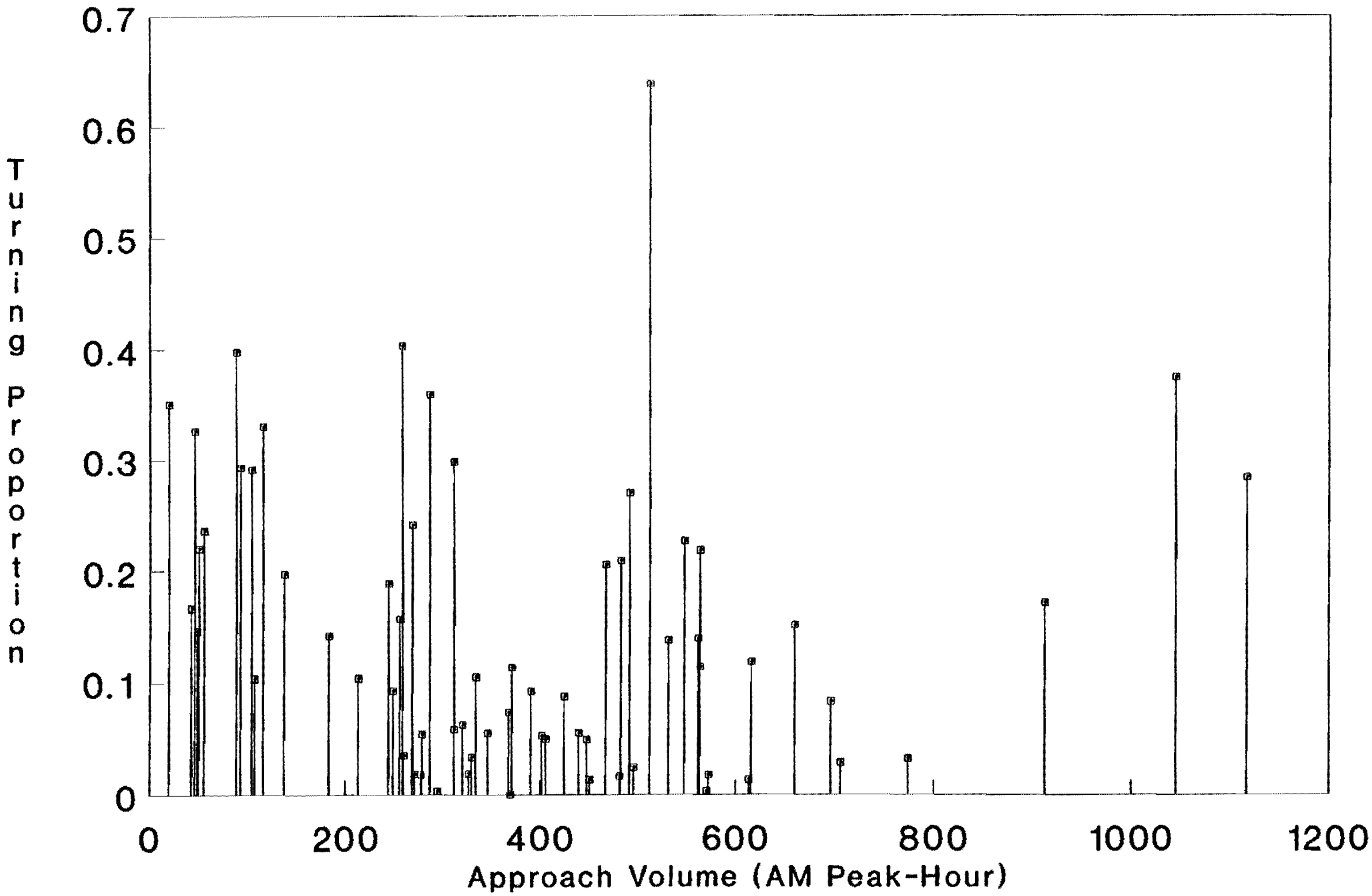
Through Traffic



Right-Turning Traffic

Turning Proportion vs. Approach Volume

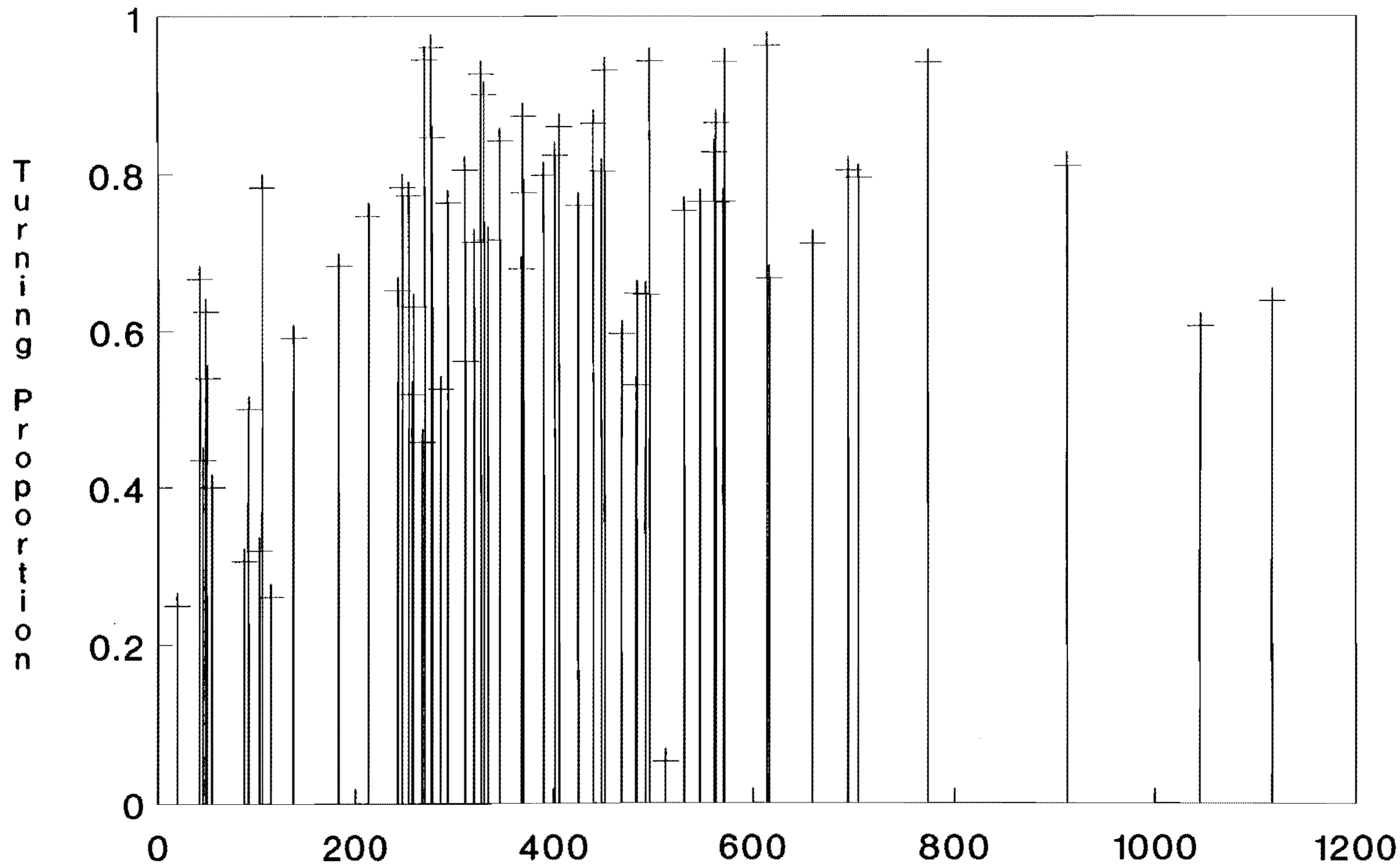
Minor Arterial to Minor Arterial



Left-Turning Traffic

Turning Proportion vs. Approach Volume

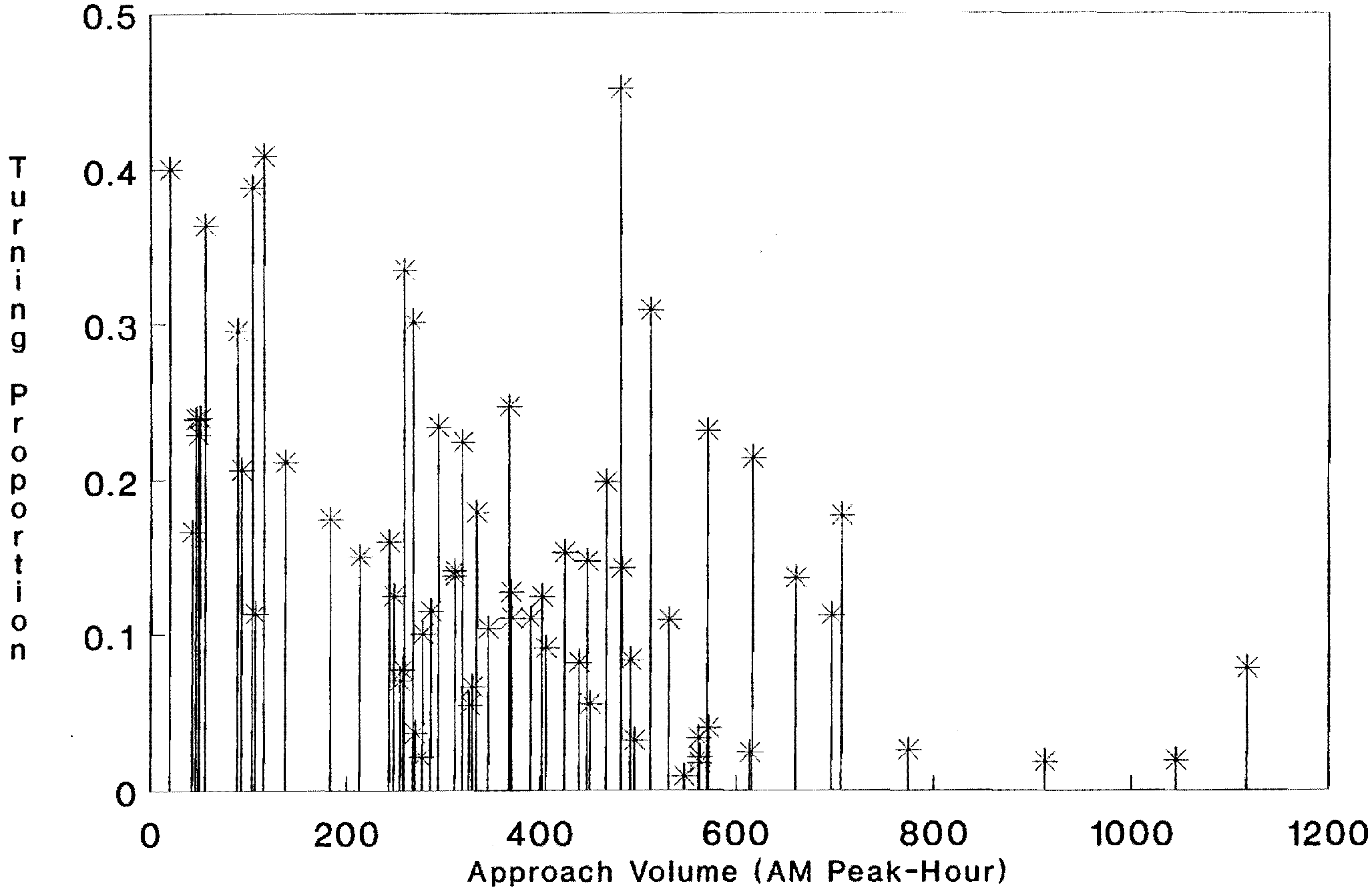
Minor Arterial to Minor Arterial



Through Traffic

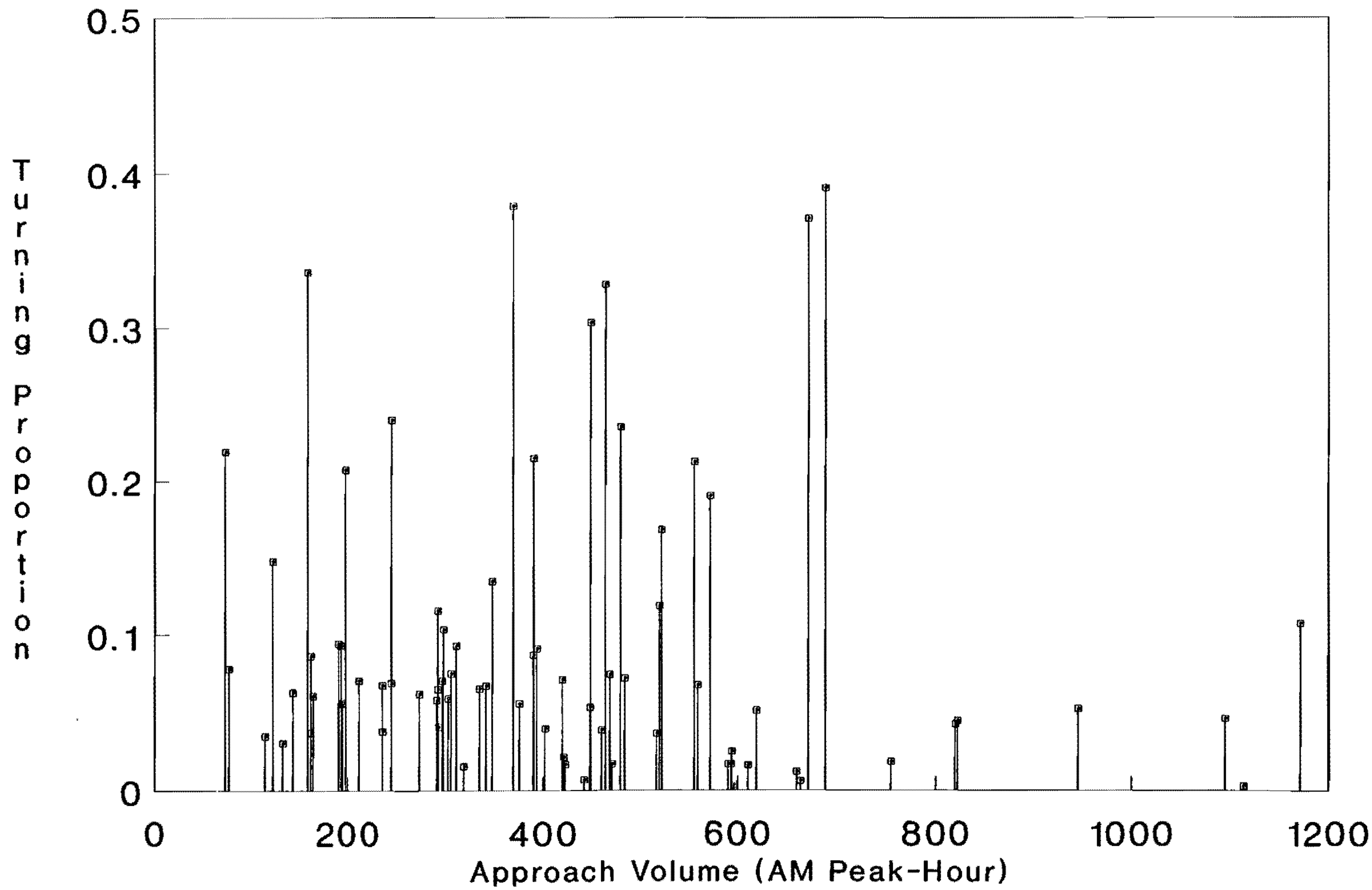
Turning Proportion vs. Approach Volume

Minor Arterial to Minor Arterial

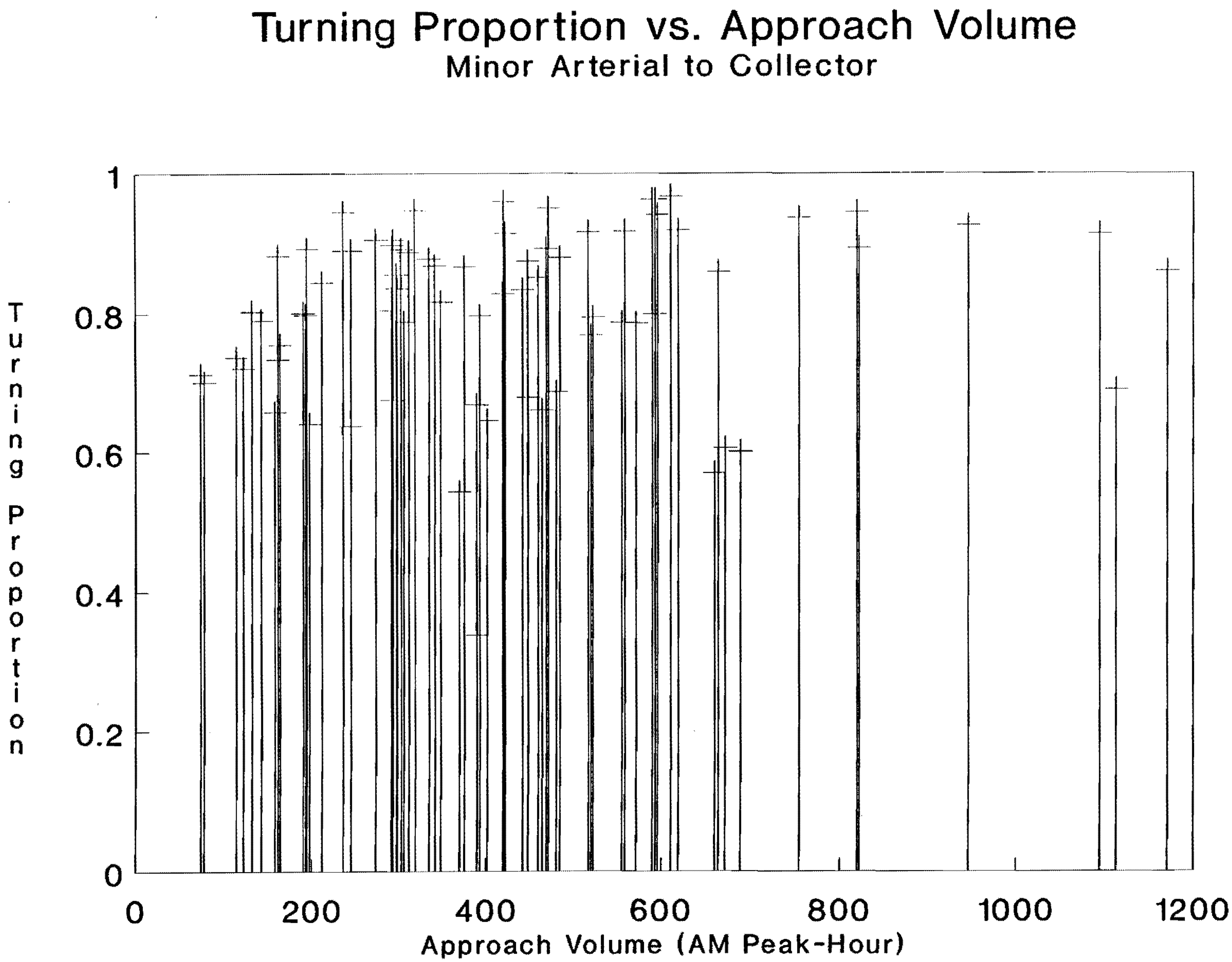


Right-Turning Traffic

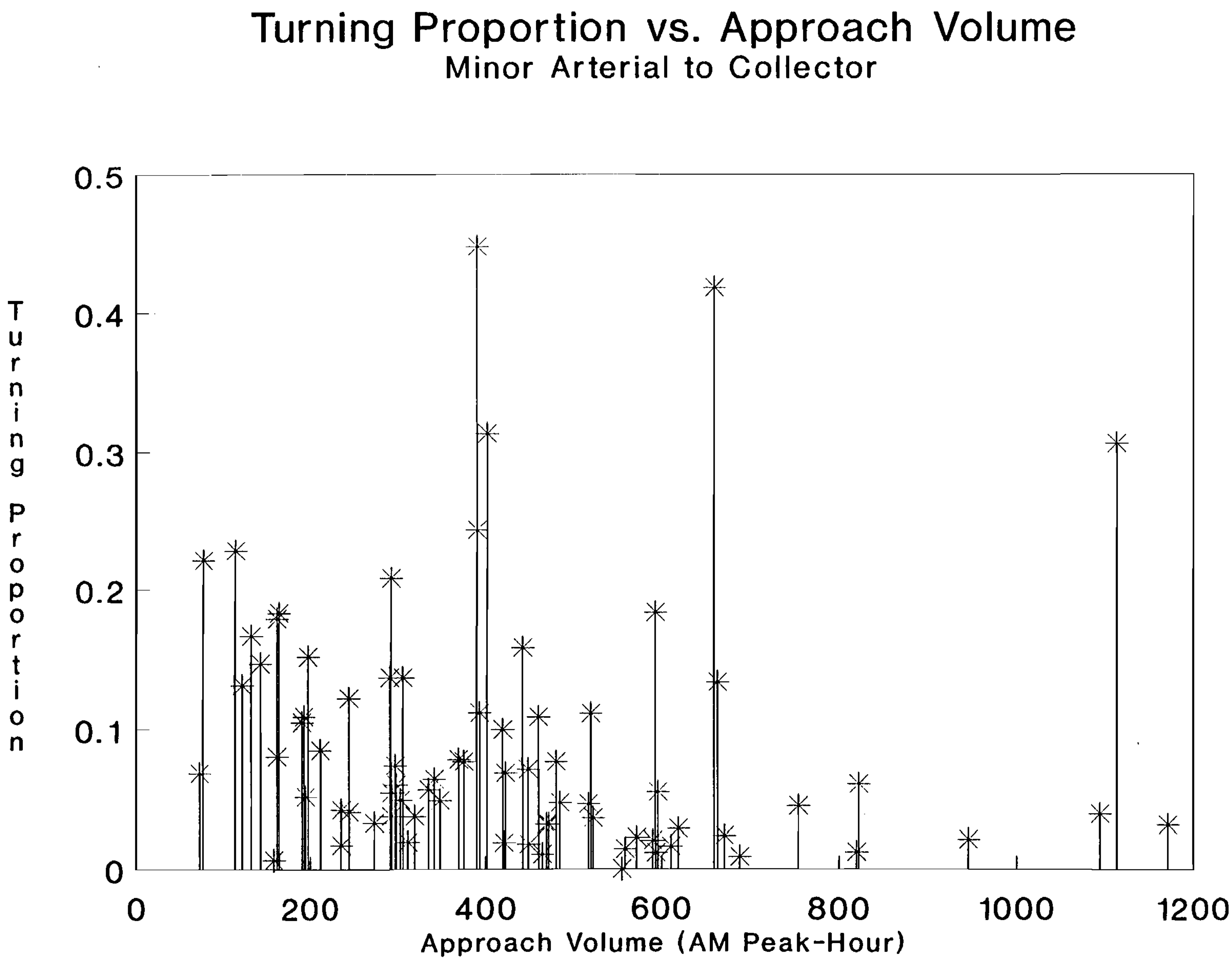
Turning Proportion vs. Approach Volume
Minor Arterial to Collector



Left-Turning Traffic

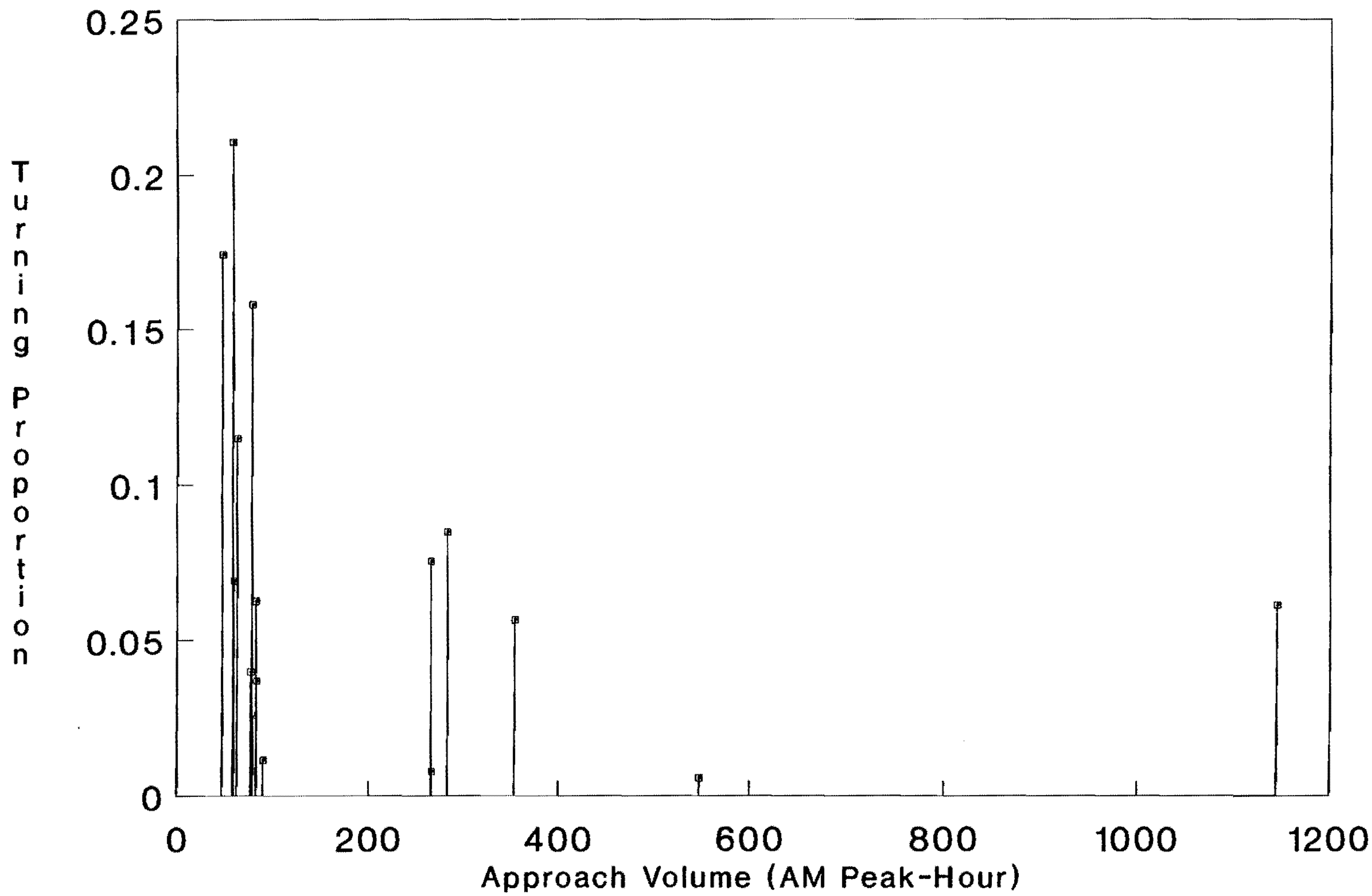


Through Traffic

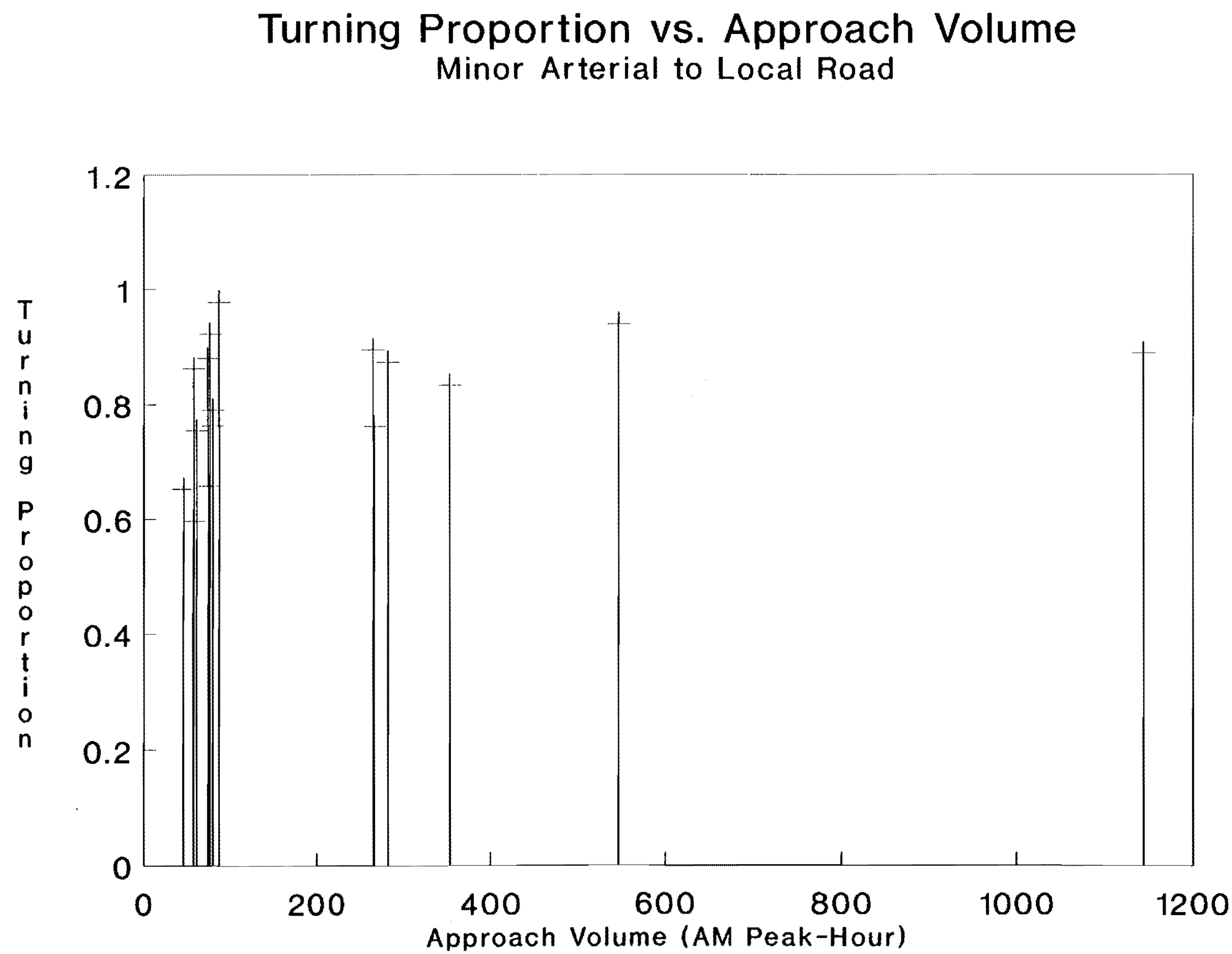


Right-Turning Traffic

Turning Proportion vs. Approach Volume
Minor Arterial to Local Road



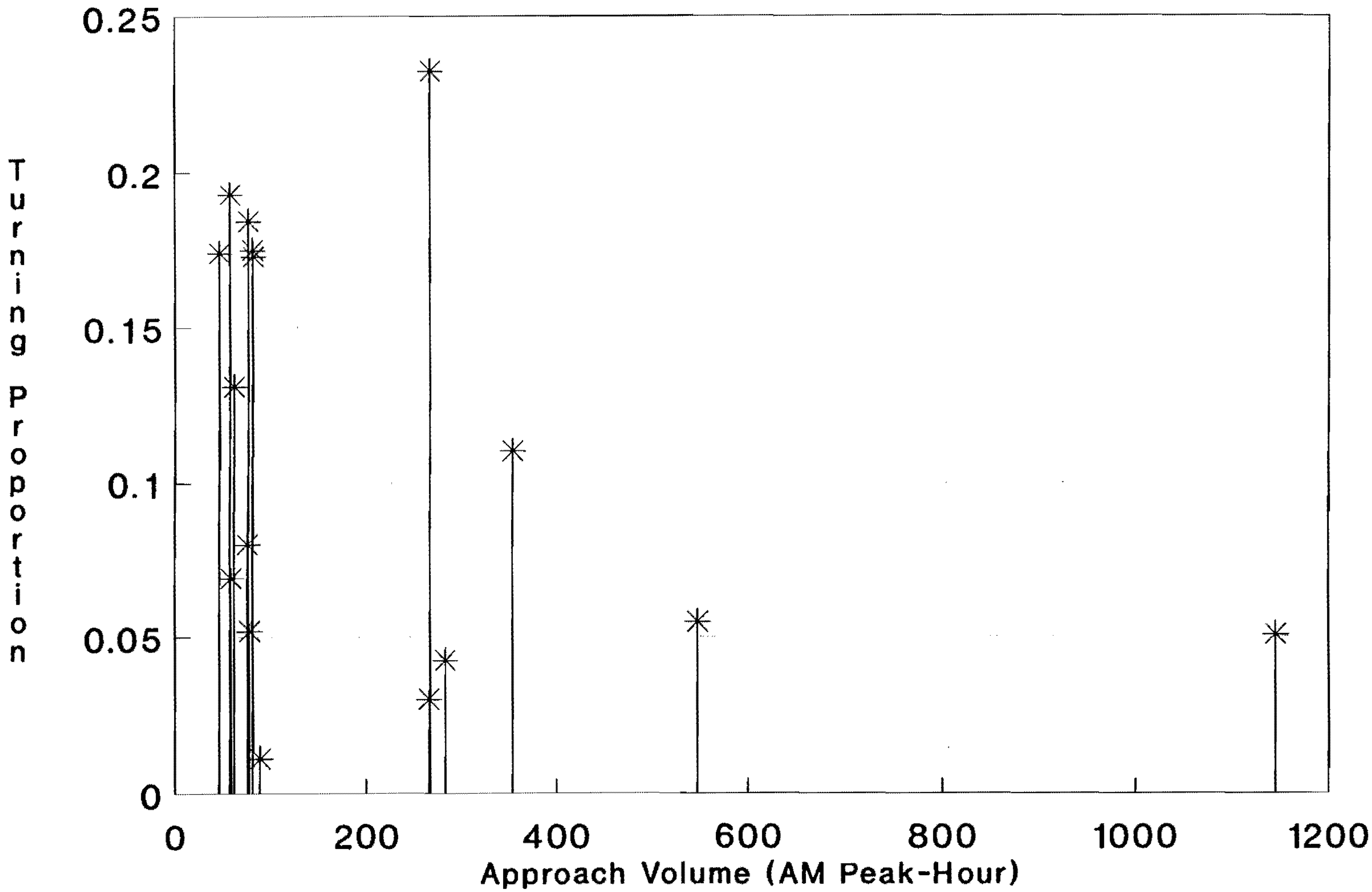
Left-Turning Traffic



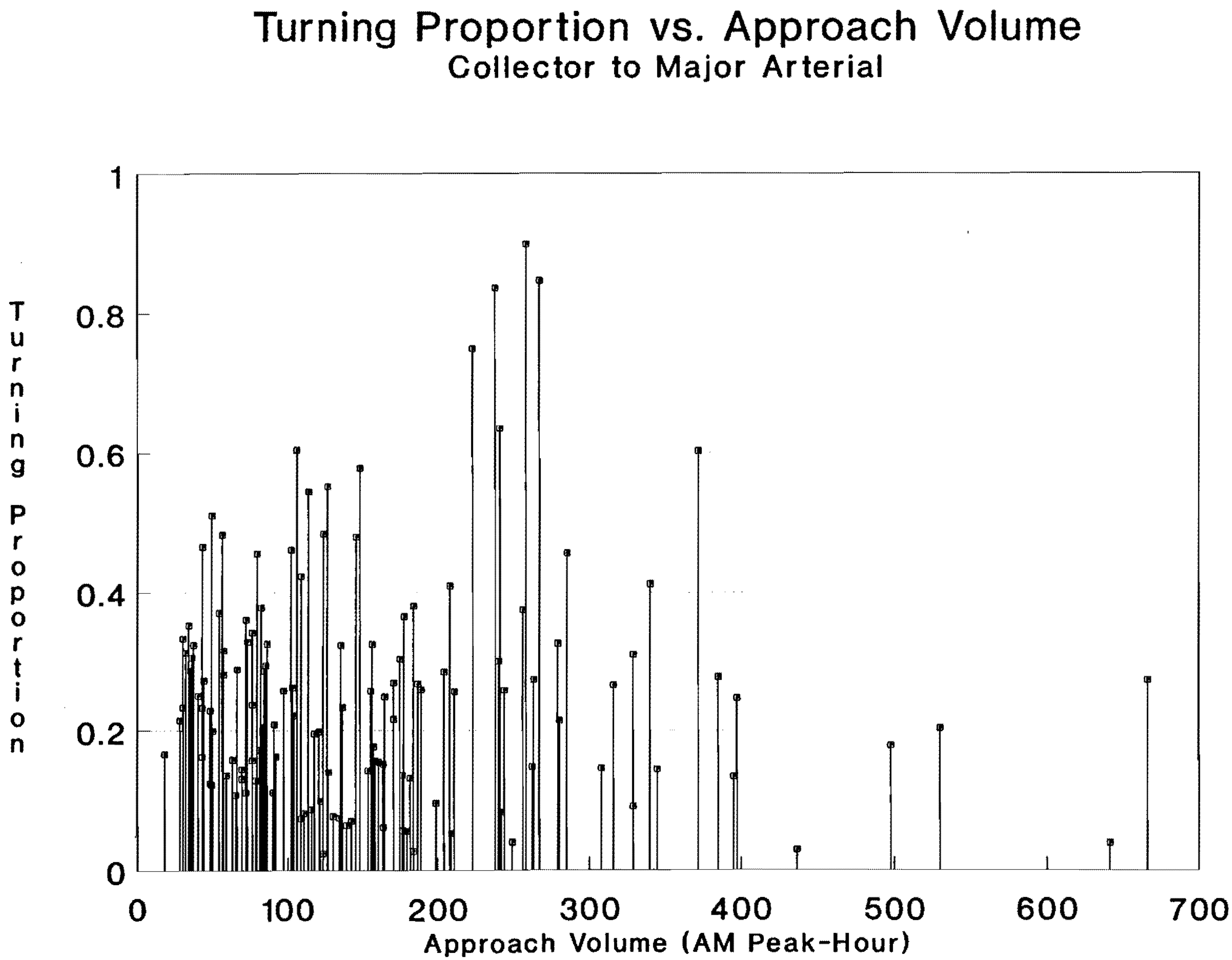
Through Traffic

Turning Proportion vs. Approach Volume

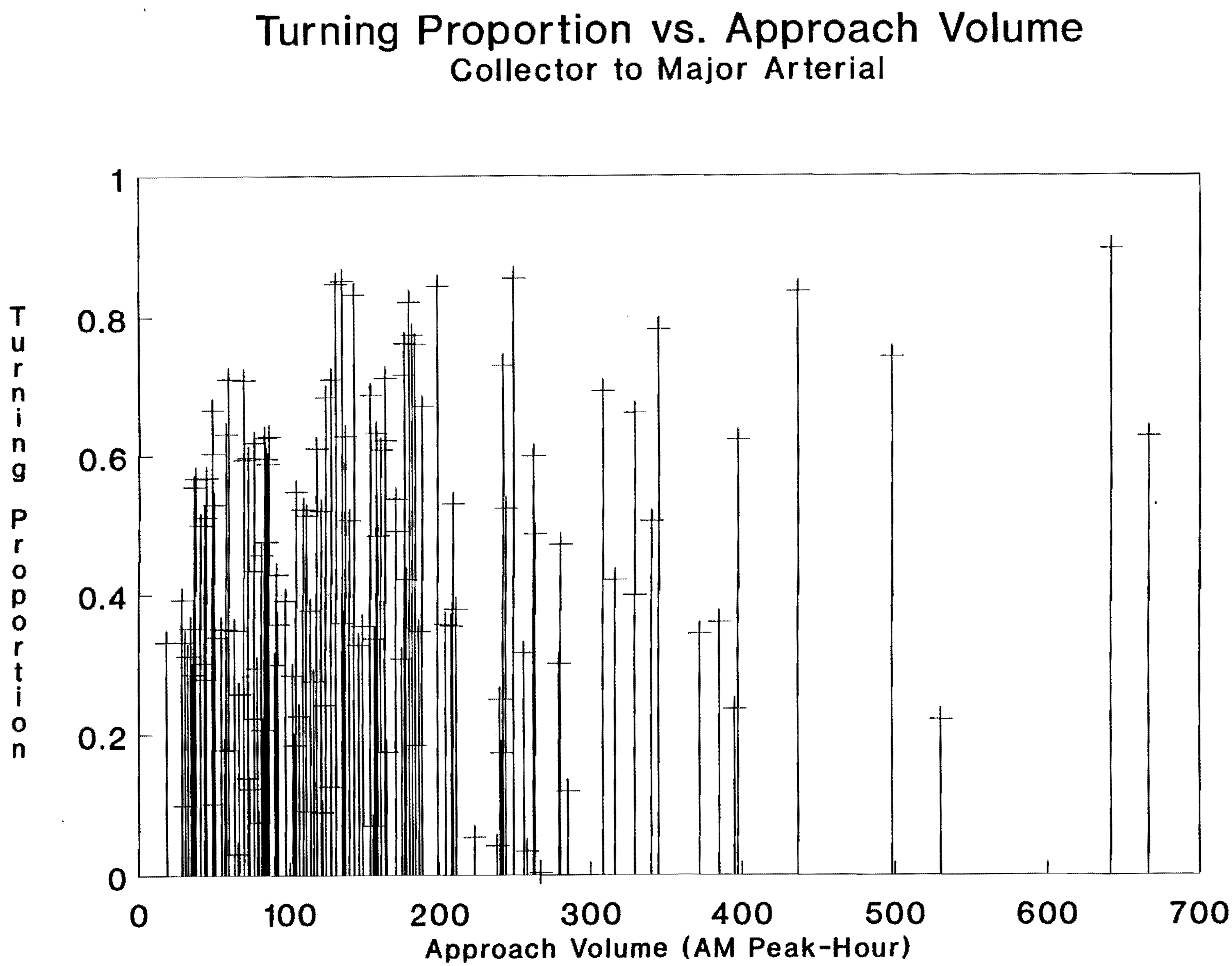
Minor Arterial to Local Road



Right-Turning Traffic



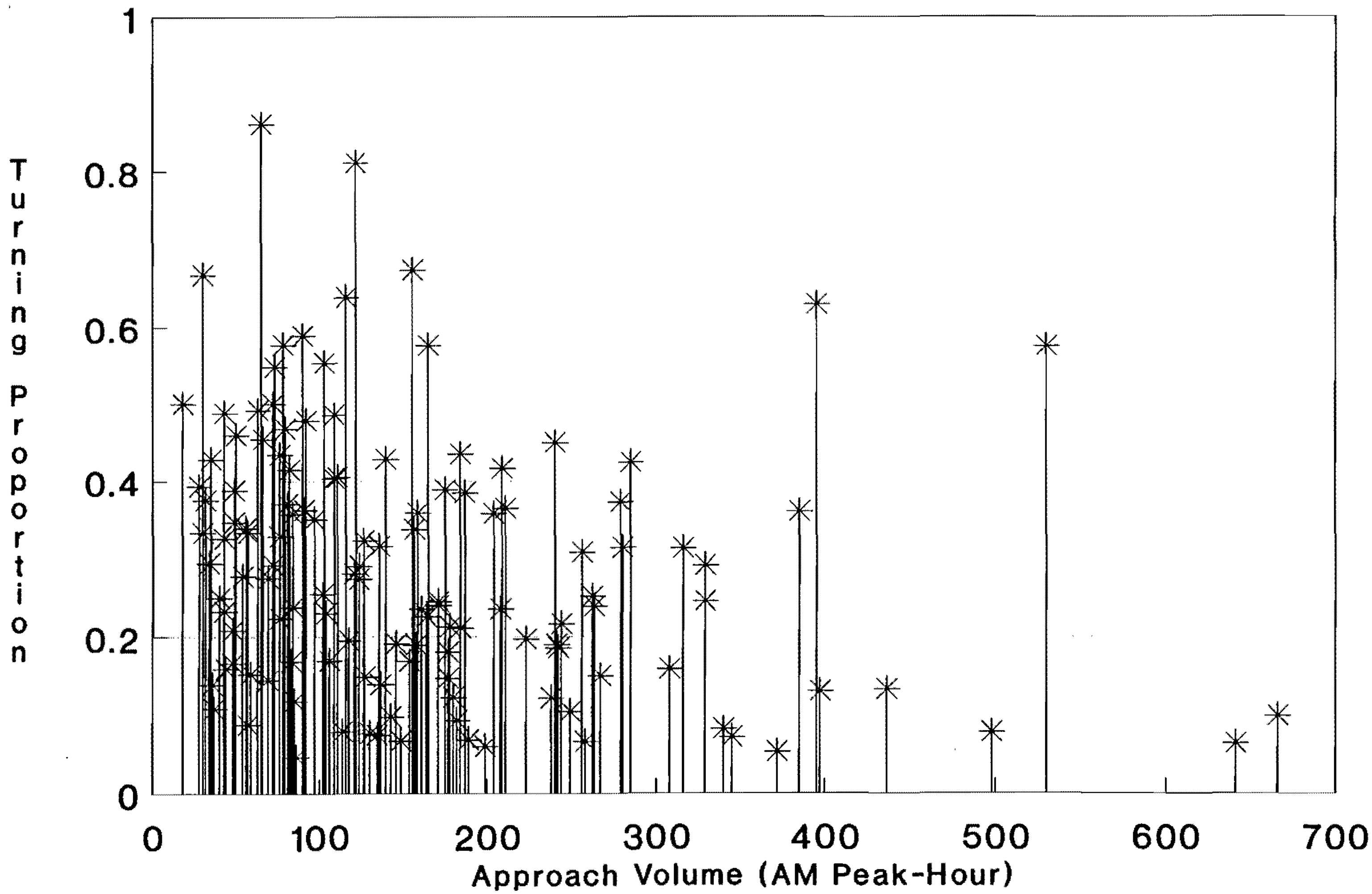
Left-Turning Traffic



Through Traffic

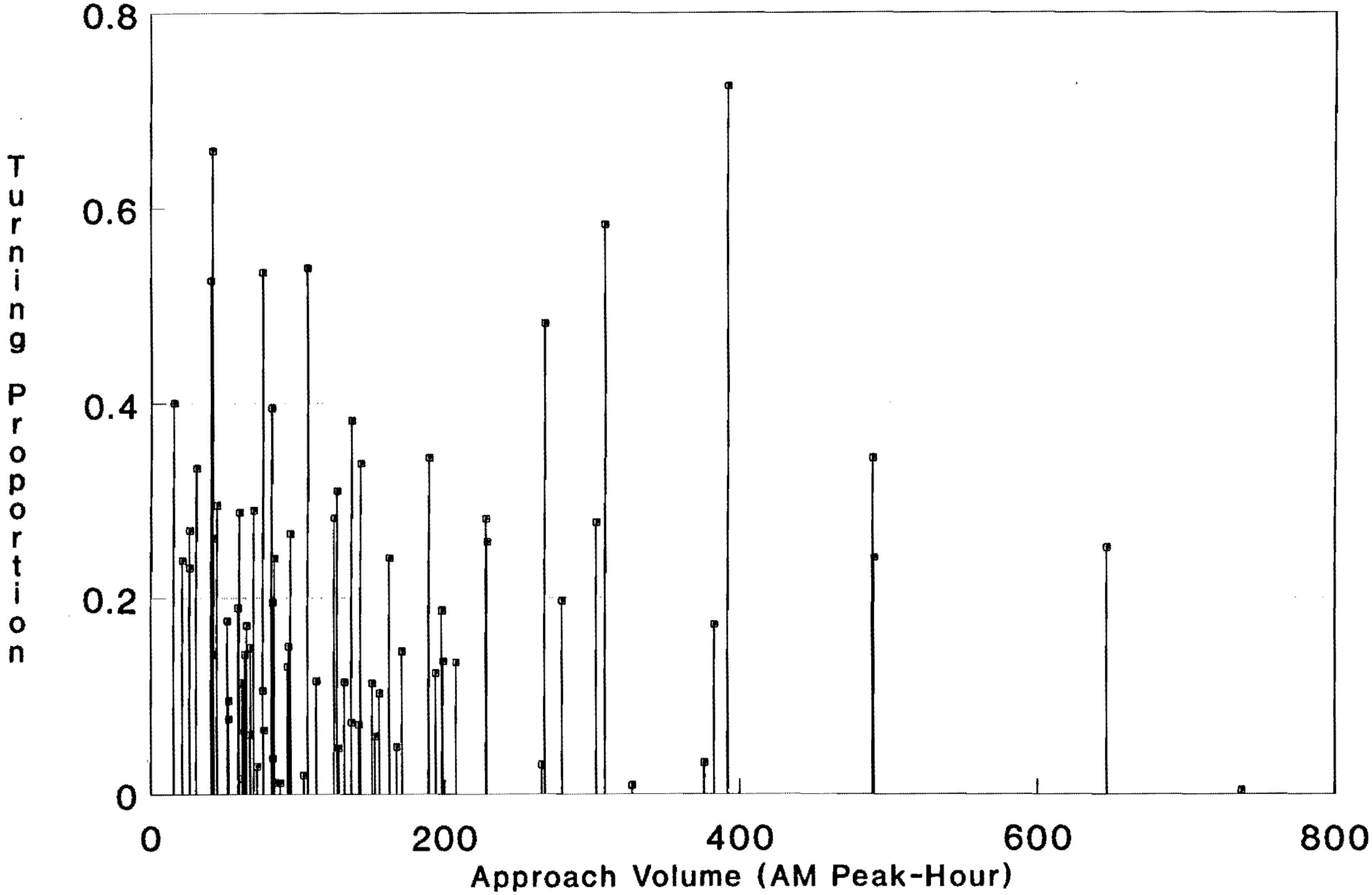
Turning Proportion vs. Approach Volume

Collector to Major Arterial



Right-Turning Traffic

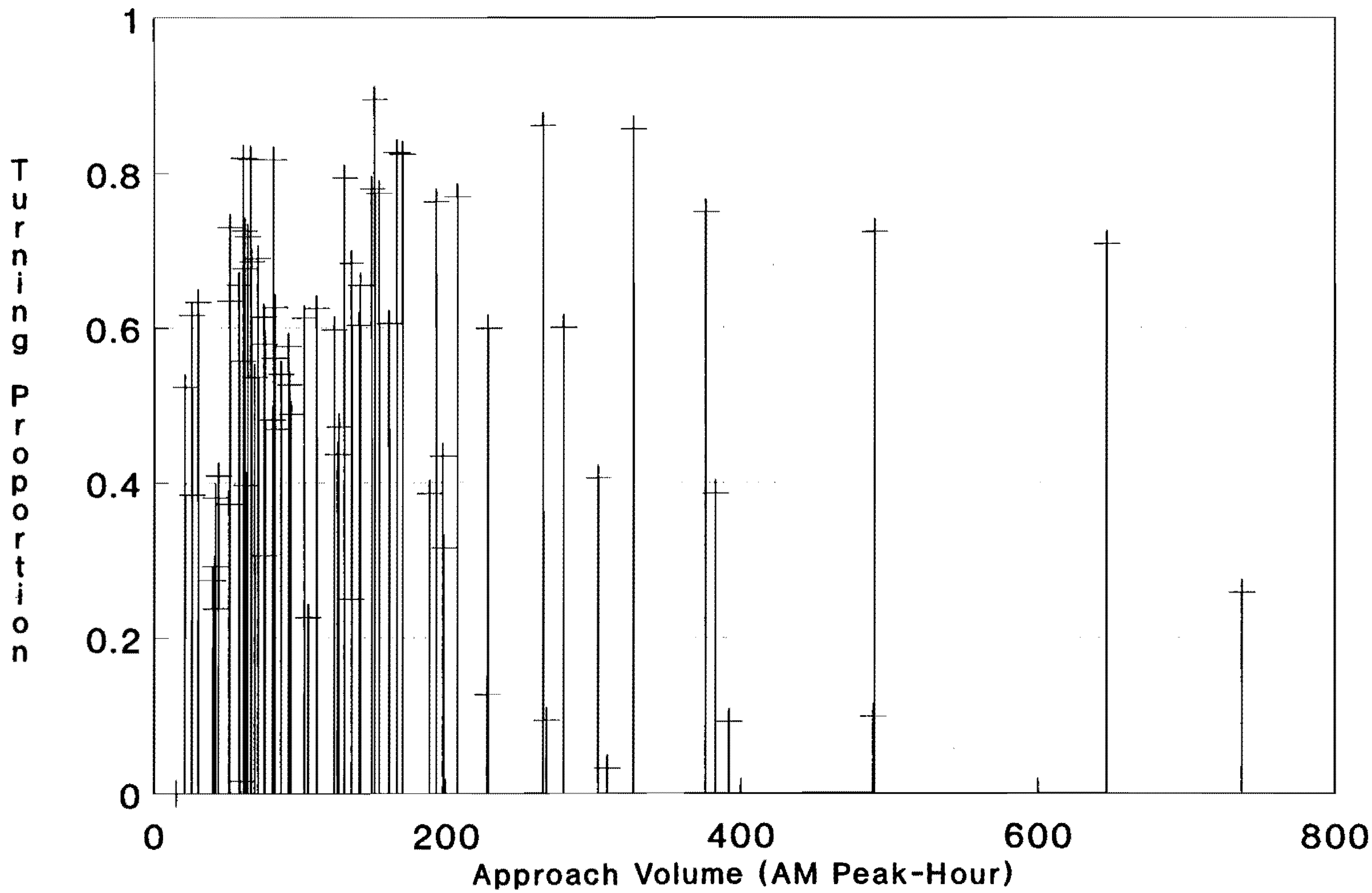
Turning Proportion vs. Approach Volume
Collector to Minor Arterial



Left-Turning Traffic

Turning Proportion vs. Approach Volume

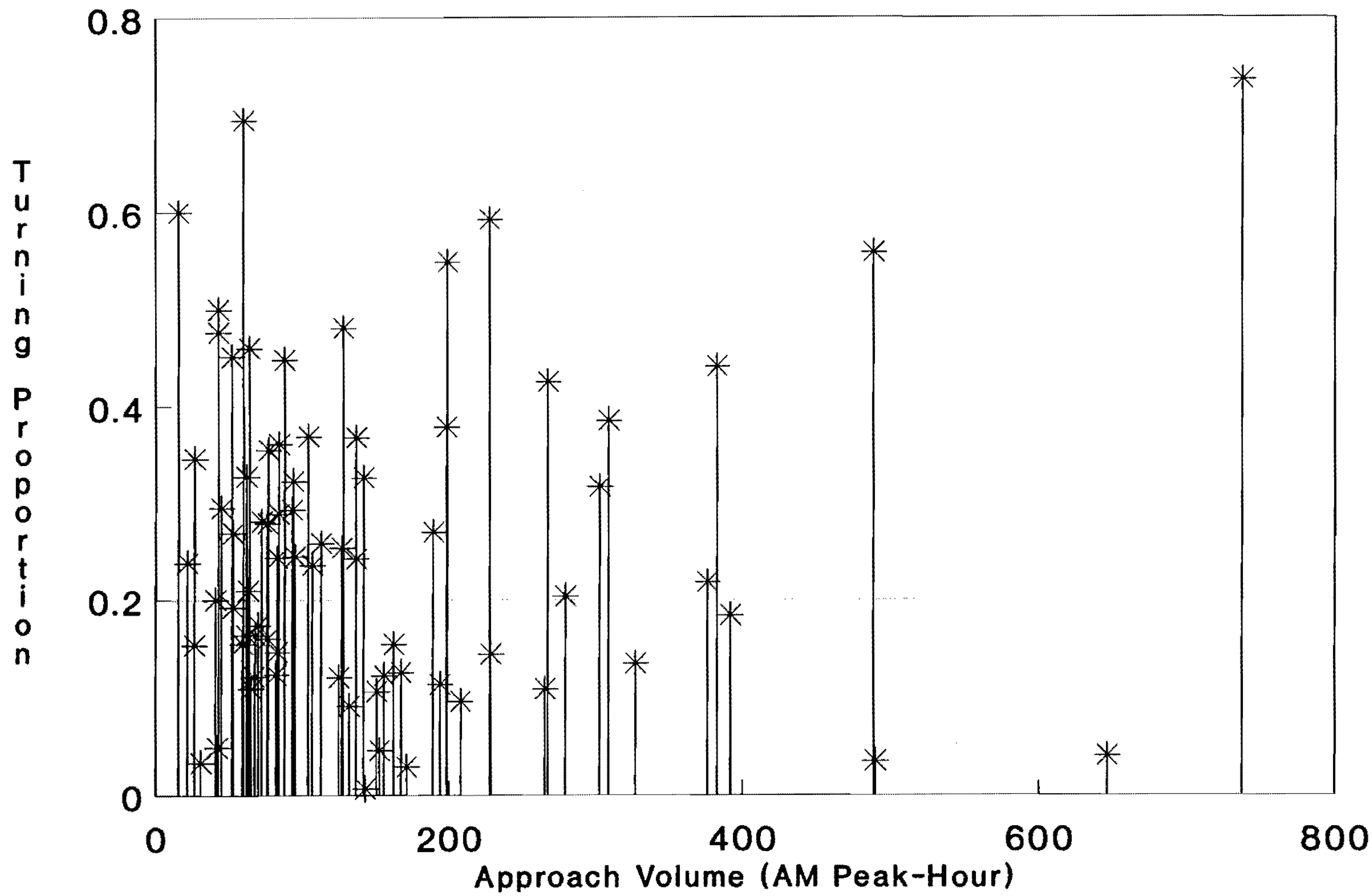
Collector to Minor Arterial



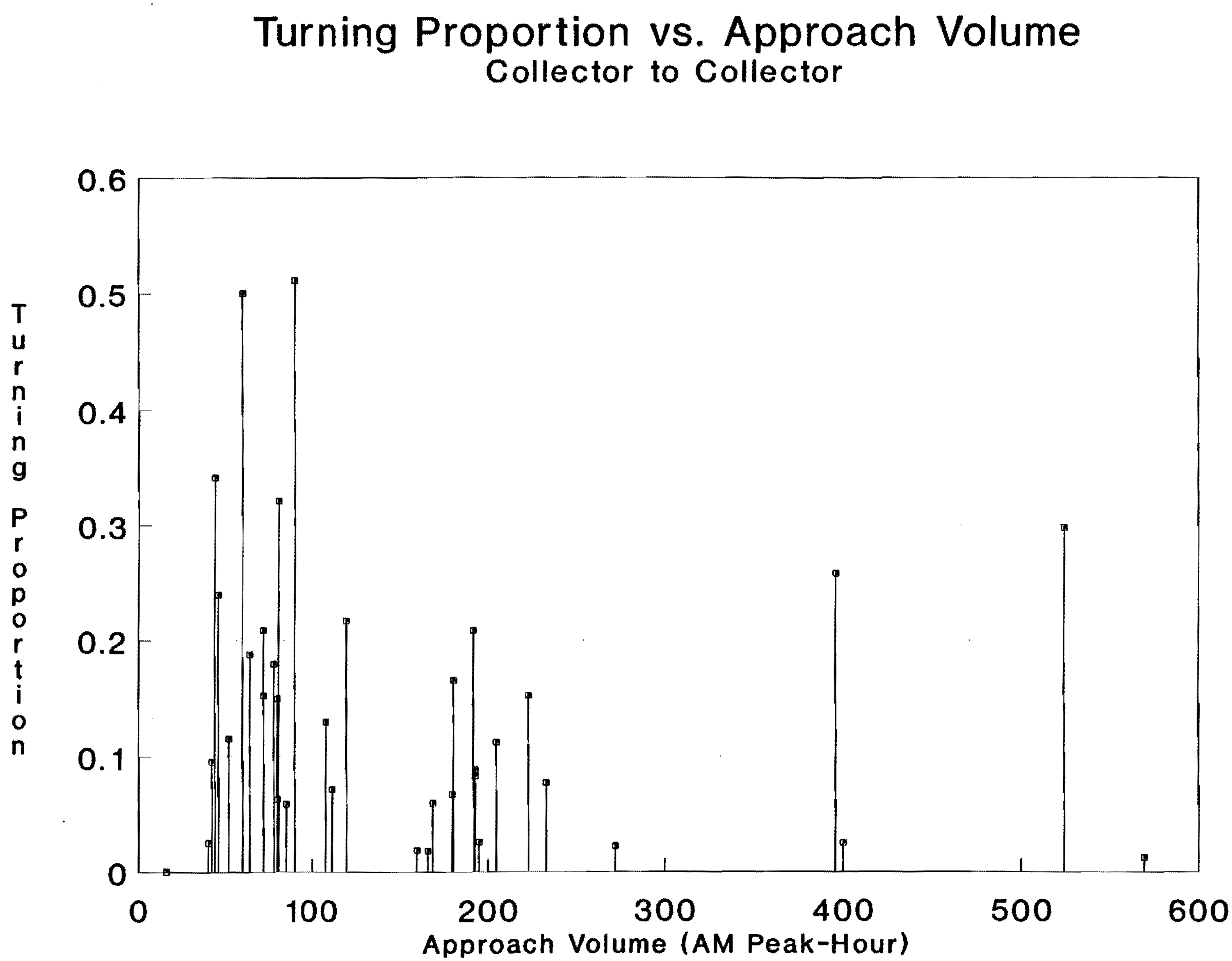
Through Traffic

Turning Proportion vs. Approach Volume

Collector to Minor Arterial



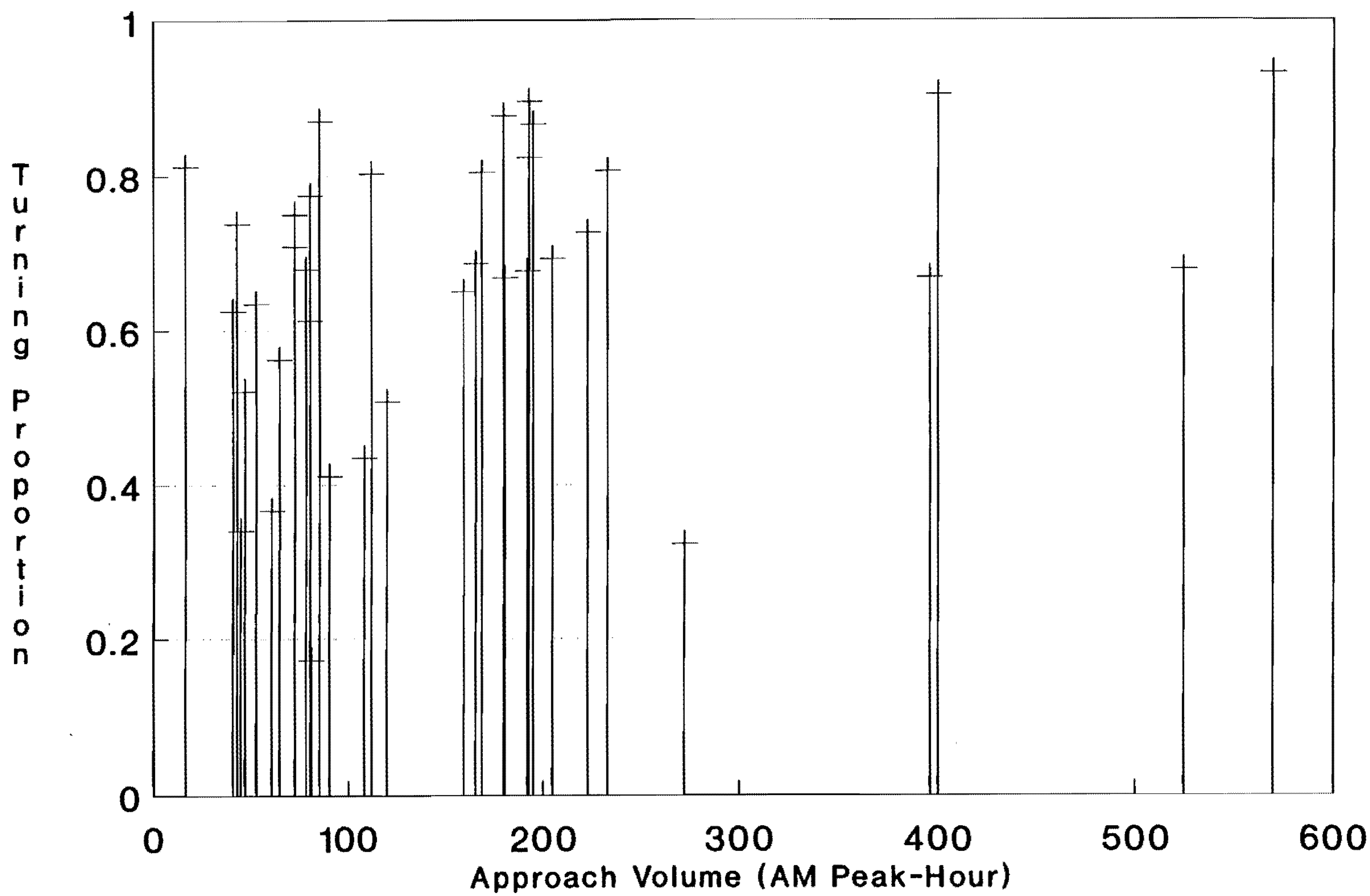
Right-Turning Traffic



Left-Turning Traffic

Turning Proportion vs. Approach Volume

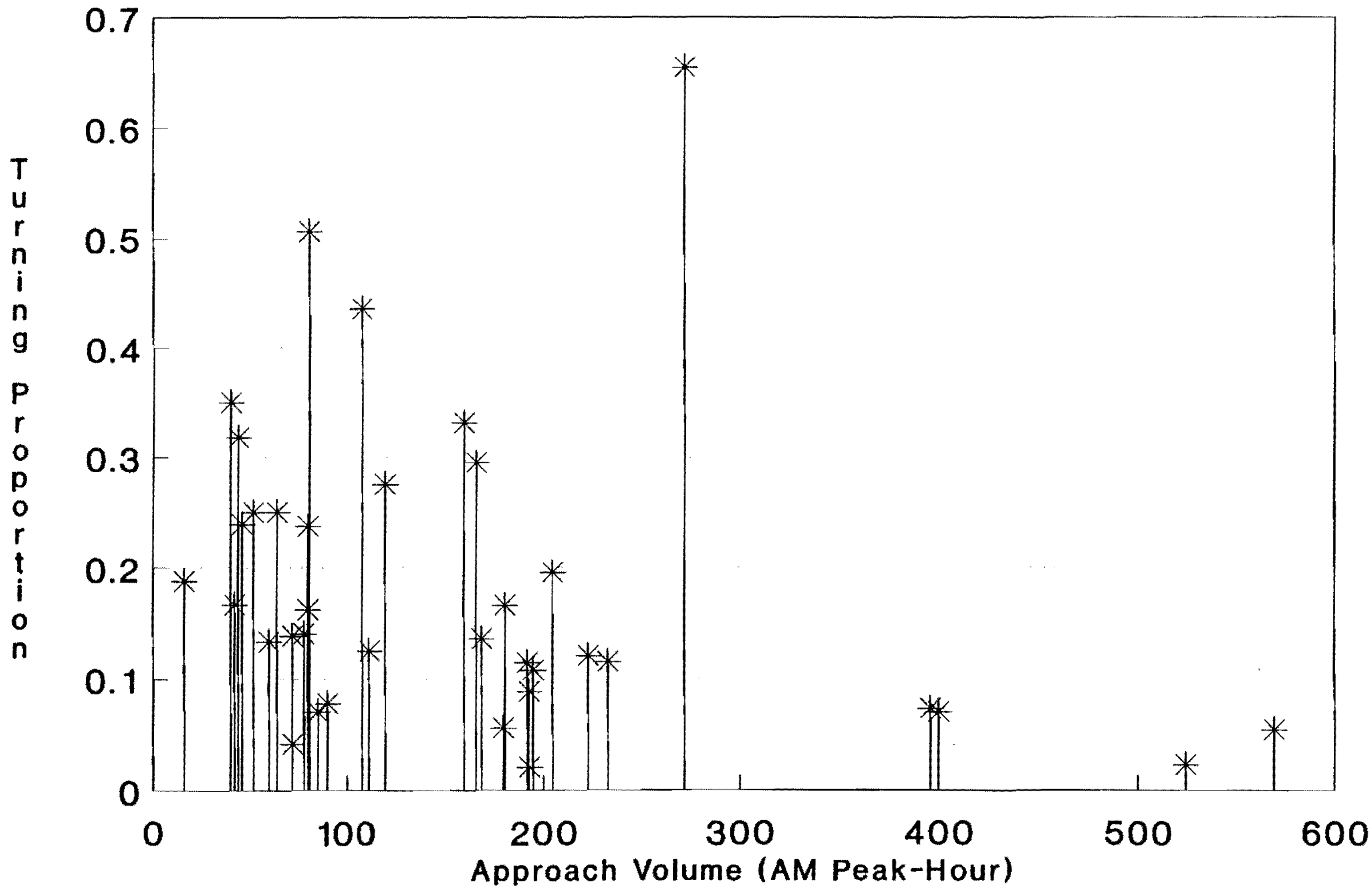
Collector to Collector



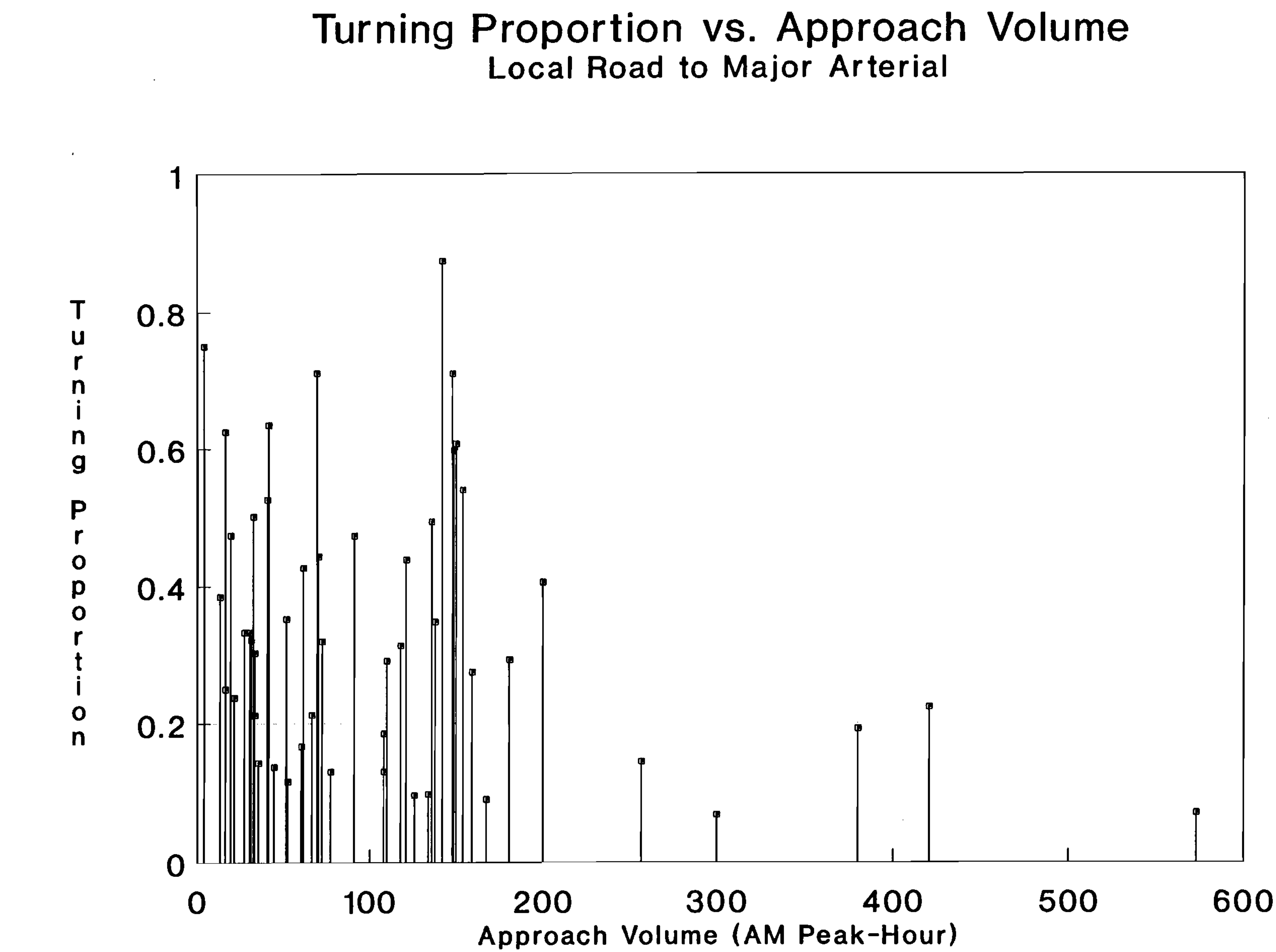
Through Traffic

Turning Proportion vs. Approach Volume

Collector to Collector

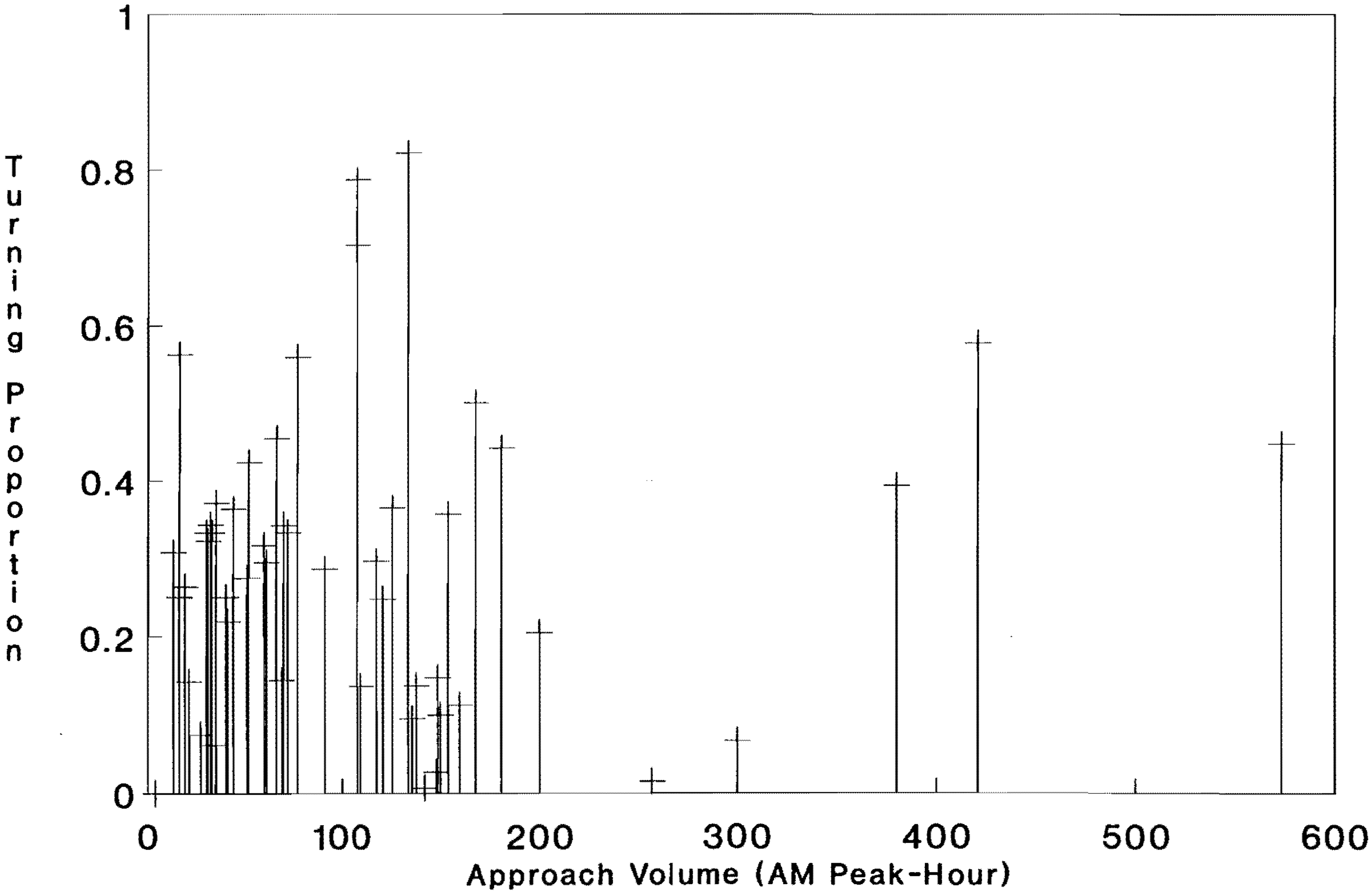


Right-Turning Traffic



Left-Turning Traffic

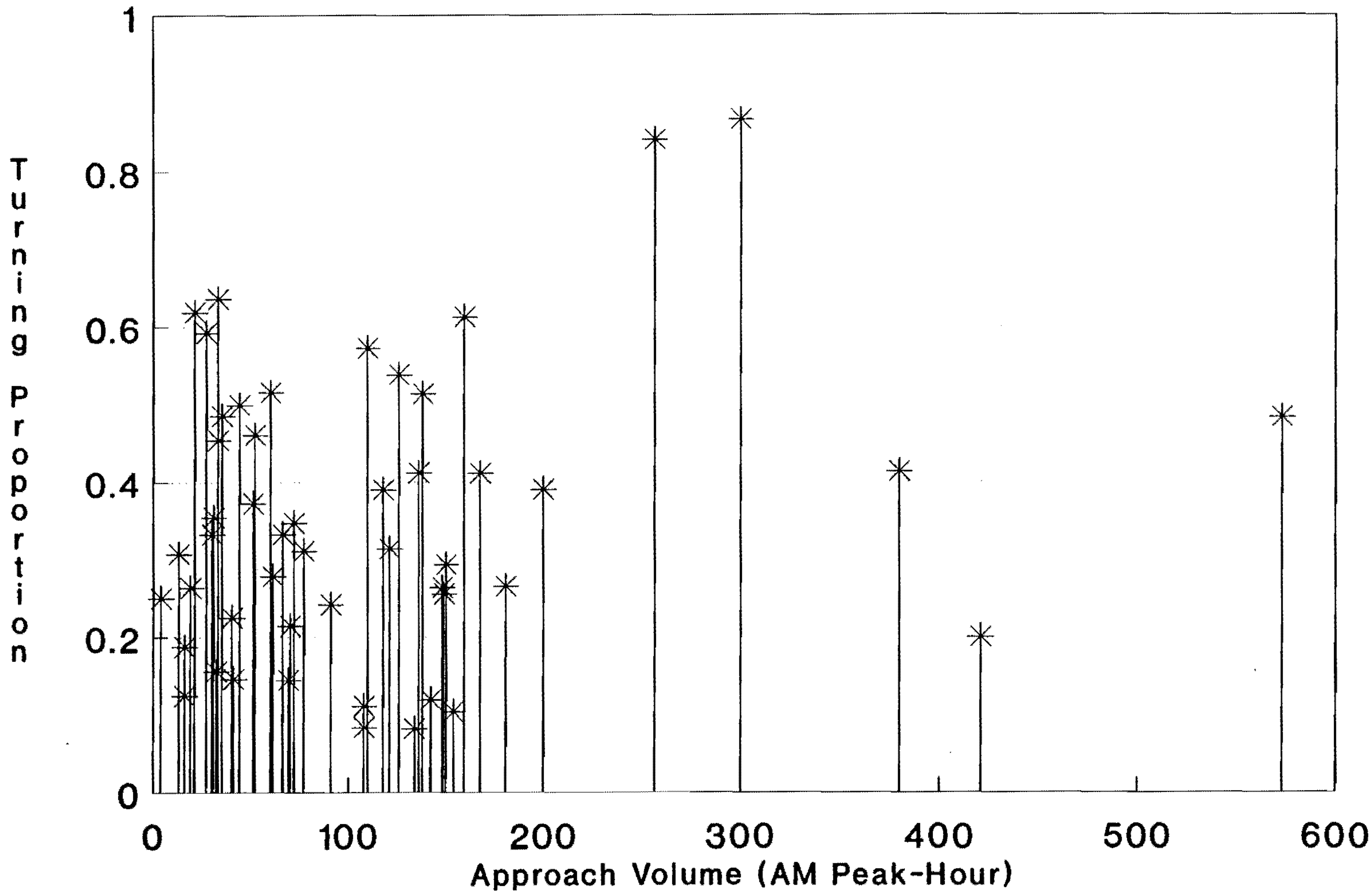
Turning Proportion vs. Approach Volume
Local Road to Major Arterial



Through Traffic

Turning Proportion vs. Approach Volume

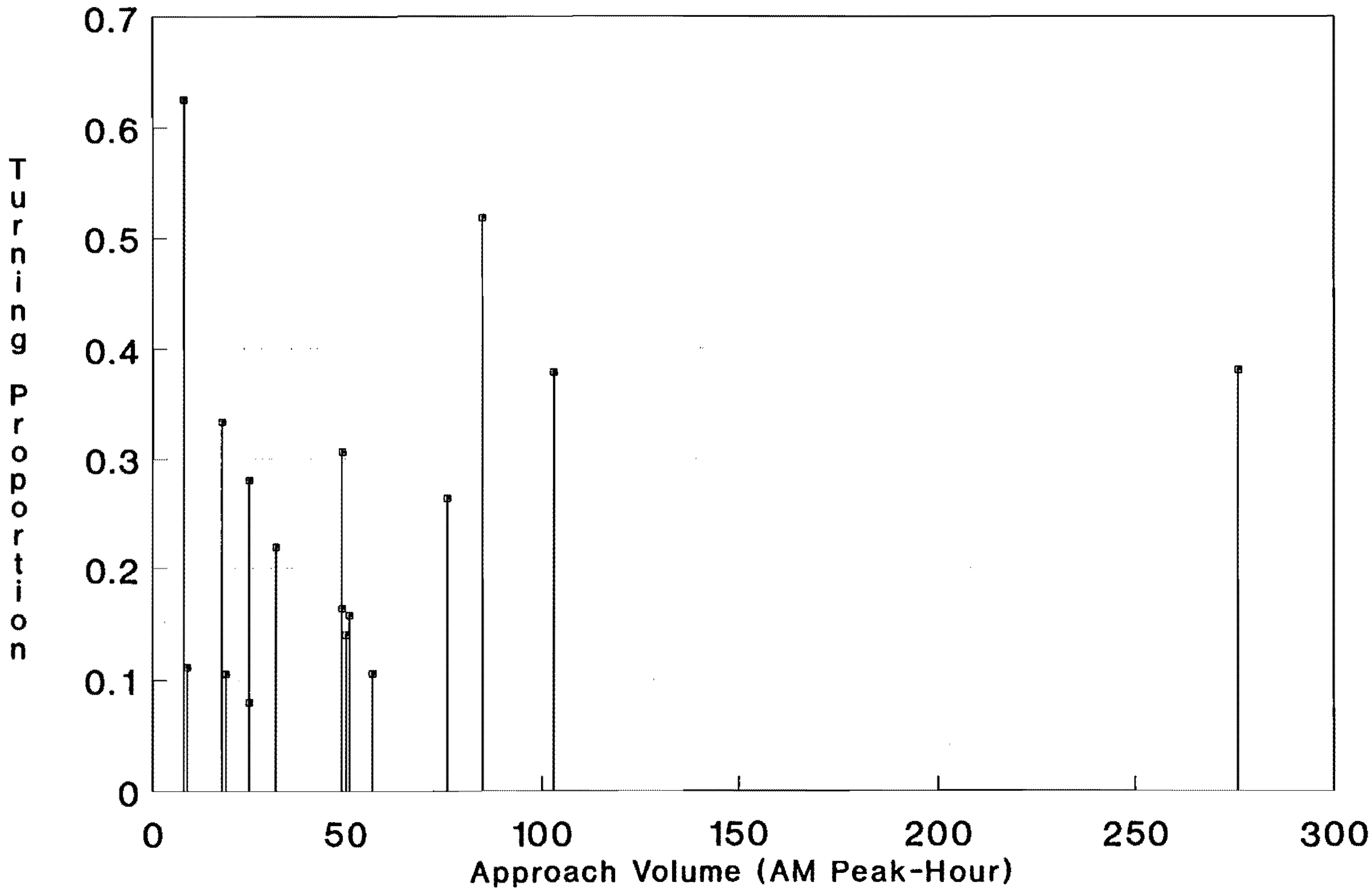
Local Road to Major Arterial



Right-Turning Traffic

Turning Proportion vs. Approach Volume

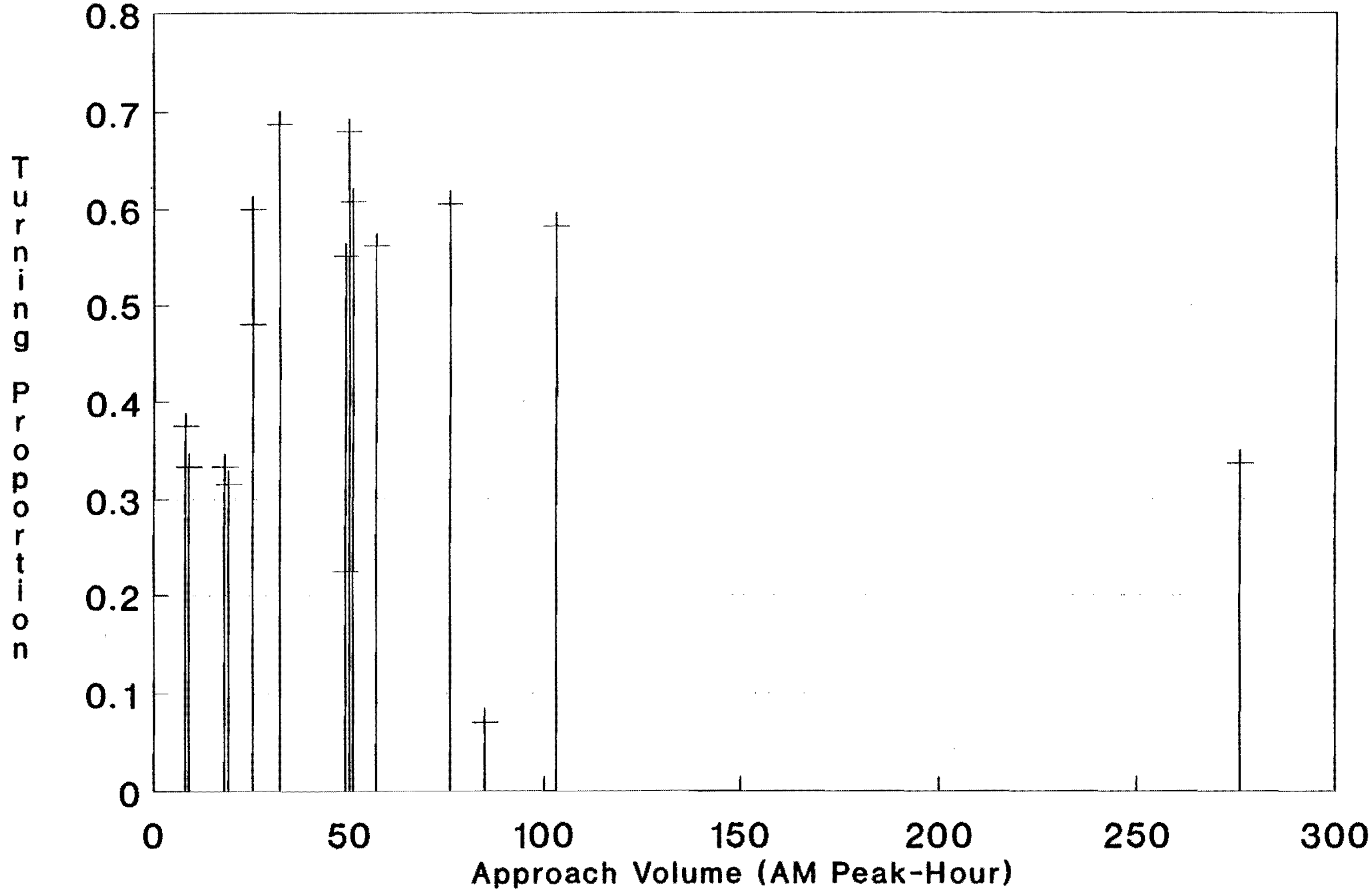
Local Road to Minor Arterial



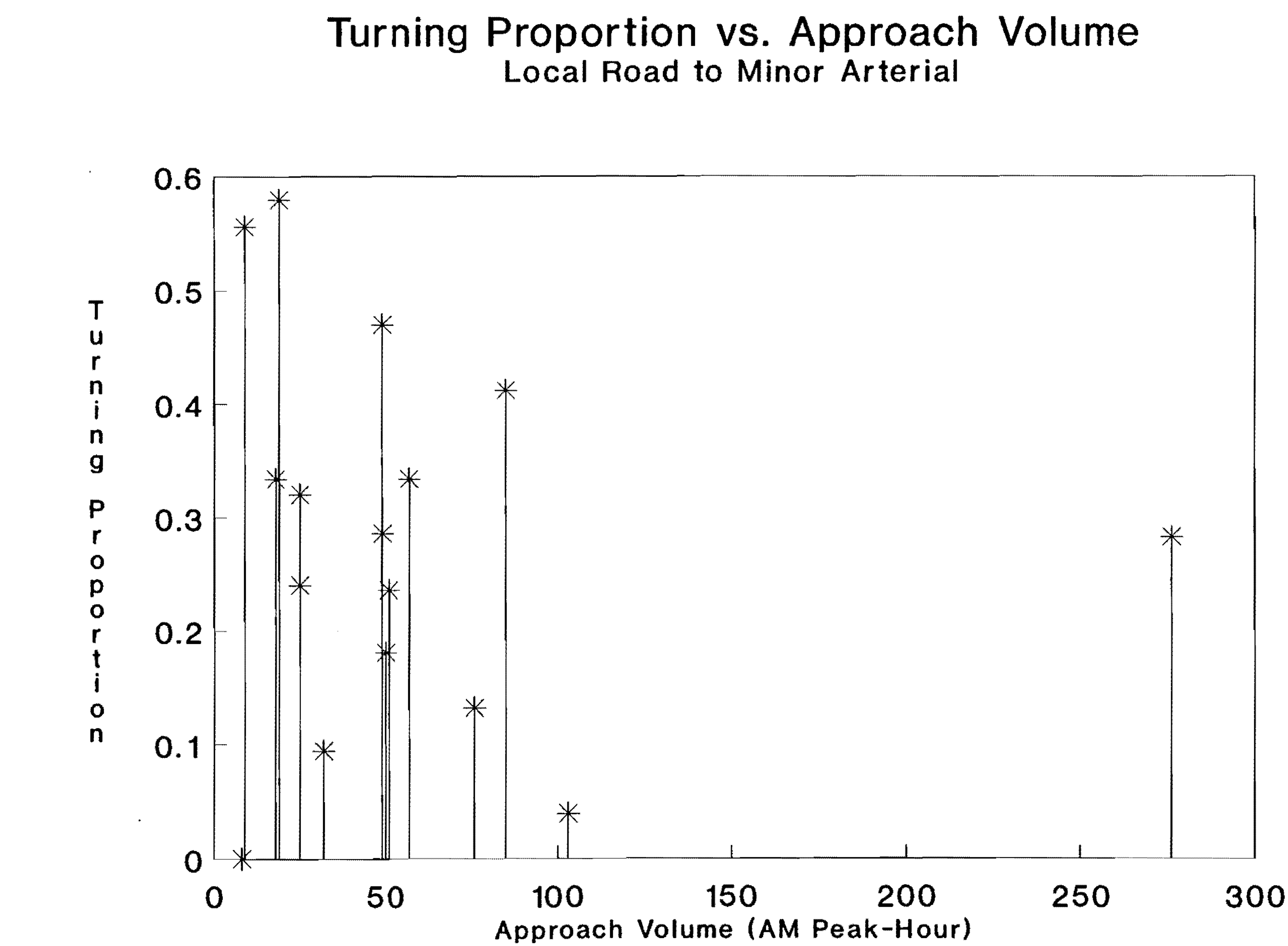
Left-Turning Traffic

Turning Proportion vs. Approach Volume

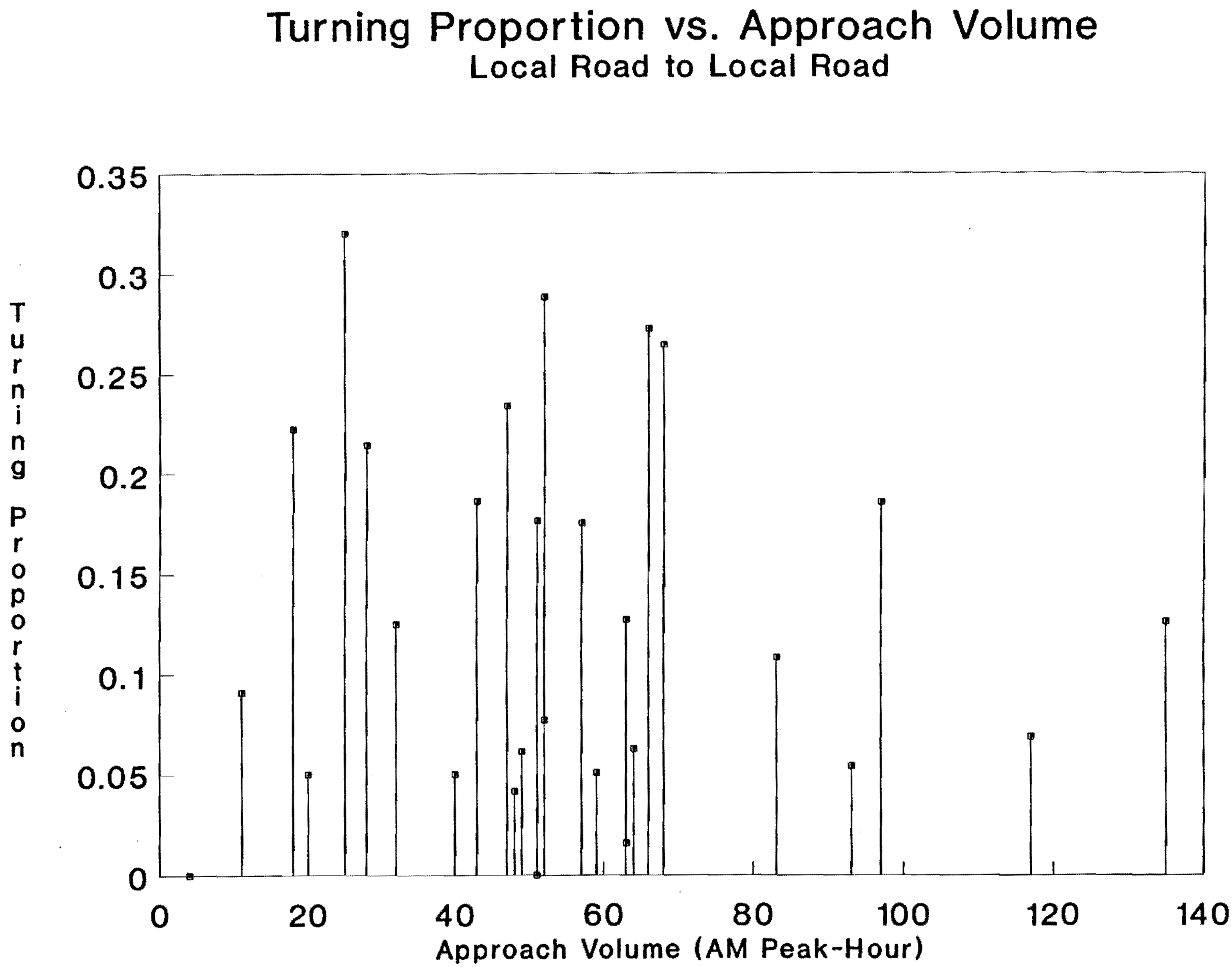
Local Road to Minor Arterial



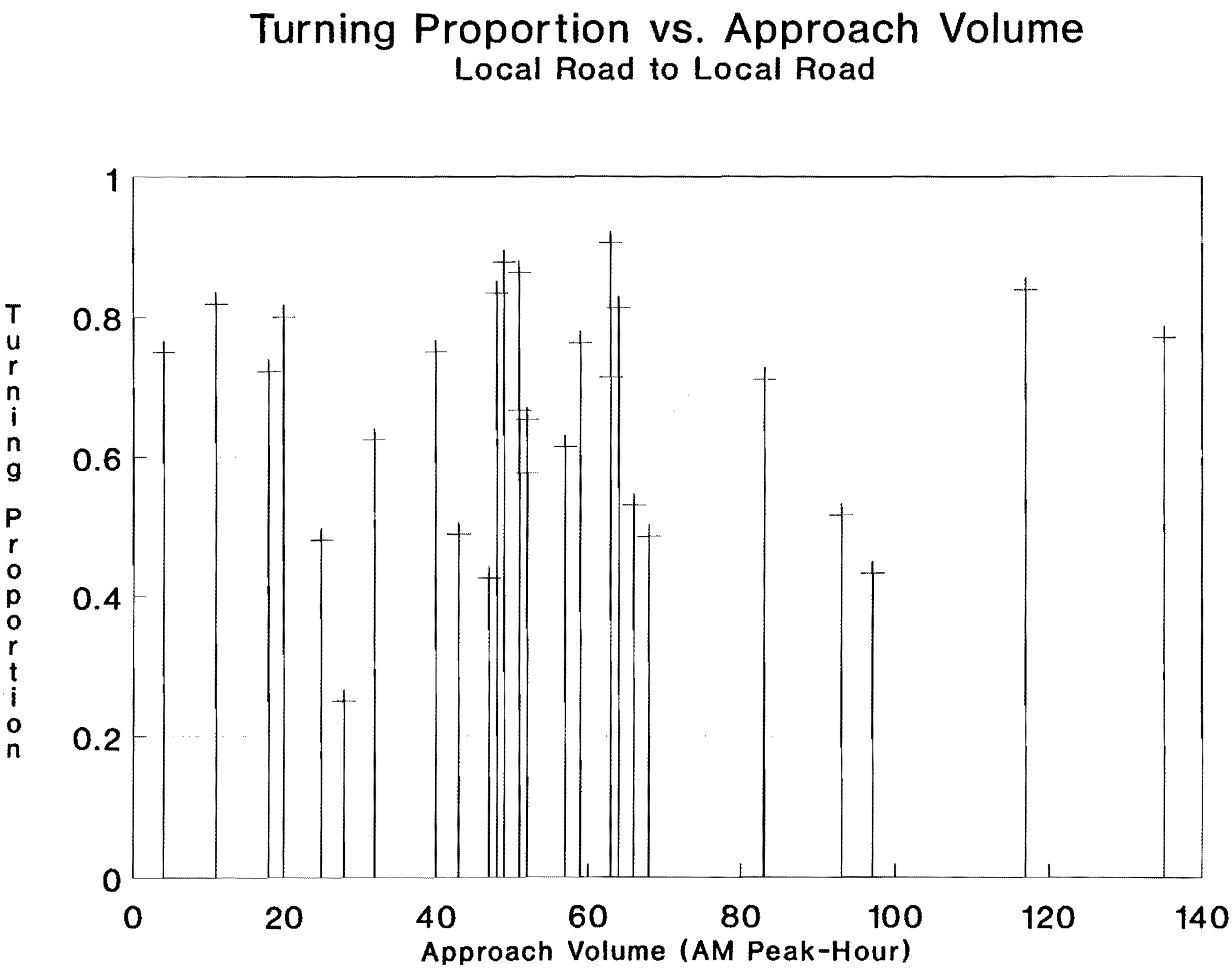
Through Traffic



Right-Turning Traffic



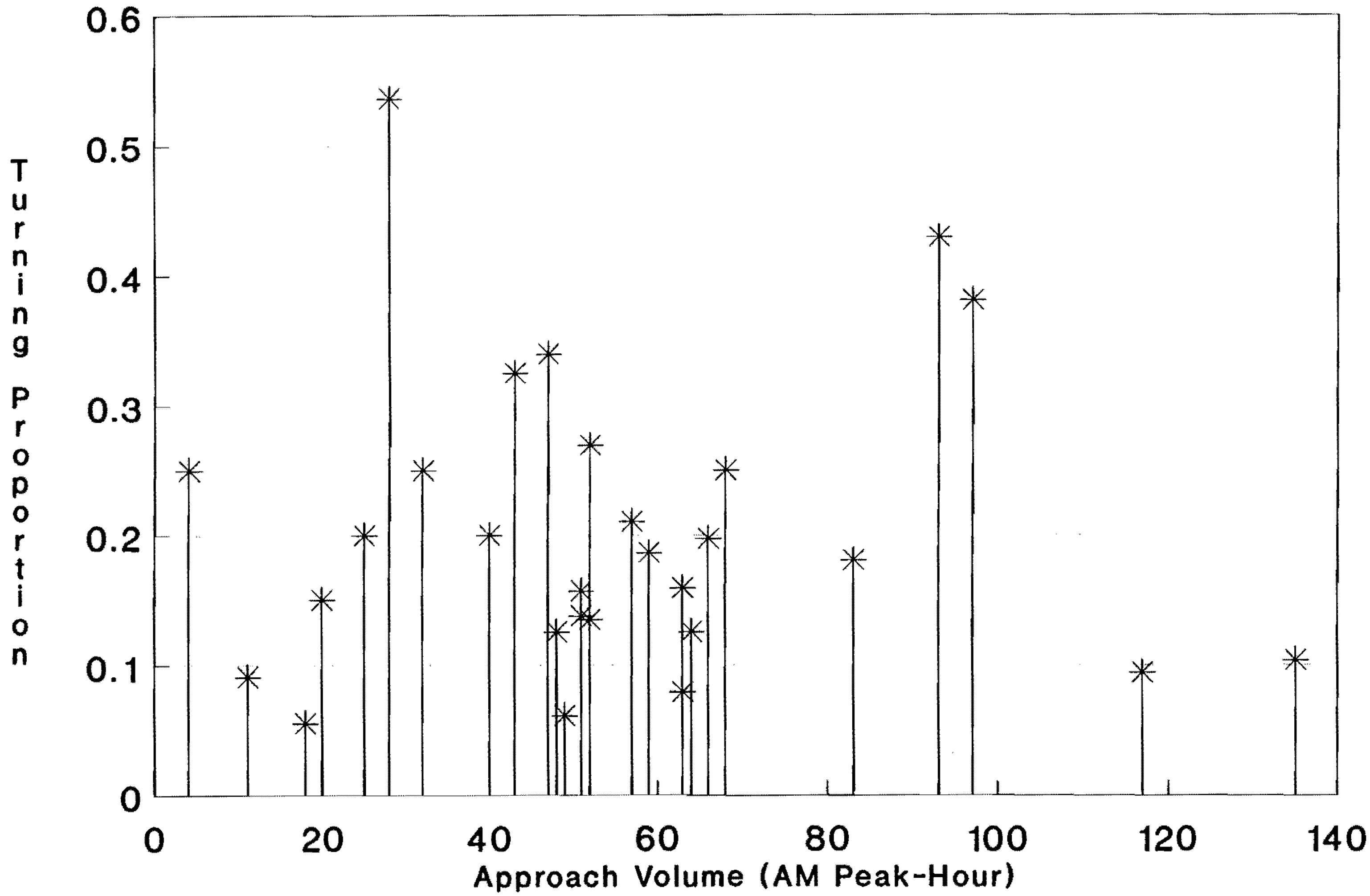
Left-Turning Traffic



Through Traffic

Turning Proportion vs. Approach Volume

Local Road to Local Road



Right-Turning Traffic

Appendix C

Calculation Procedure and Formulas

Correlation Coefficient (63)

Calculation of the coefficent of correlation was performed for each turning flow movement in each category of functional classification. The following formula was used to calculate the correlation coefficient:

$$r = \frac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}}$$

Where:

r = correlation coefficient

S_{xy}, S_{xx}, and S_{yy} are defined by the following equations:

$$S_{xy} = n \sum_{i=1}^{n} x_i y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)$$

$$S_{xx} = n \sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2$$

$$S_{yy} = n \sum_{i=1}^{n} y_i^2 - \left(\sum_{i=1}^{n} y_i\right)^2$$

Where:

n = number of proportions in the population
x = turning flow proportion in question
y = corresponding approach volume

Student's t-test (63):

The t-statistic for the comparison of two means is calculated in the following manner:

Where:
t = t-statistic value
x_1 = mean of the first population

x_2	=	mean of the second population
δ	=	difference between the hypothesized means (assume δ = zero in this case)
n_1	=	number of samples in the first population
n_2	=	number of samples in the second population
s_1^2	=	variance of the first population
s_2^2	=	variance of the second population

Method 3:

The weighted average turning flow proportion was determined by the following:

$$\textit{weighted average} = \frac{\sum_{i=1}^{n} \textit{Turning Flow Volume}}{\sum_{i=1}^{n} \textit{Approach Volume}}$$

Appendix D

Data Sets

San Antonio (38, 39)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Flores n-s	Major Arterial	AM	10	190	210	410	10	86	10	106	10	111	10	131	86	53	10	149
Neal Probandt e-w	Collector	OFF	10	173	86	269	10	181	10	201	10	43	10	63	128	62	10	200
		PM	10	210	130	350	10	282	10	302	10	51	10	71	276	129	10	415
Flores n-s	Major Arterial	AM	20	449	54	523	38	288	21	347	17	52	14	83	44	49	43	136
Sayers e-w	Collector	OFF	26	283	14	323	10	264	15	289	10	20	27	57	12	34	10	56
		PM	49	394	21	464	30	586	56	672	39	64	30	133	23	50	17	90
Flores n-s	Major Arterial	AM	73	430	84	587	26	371	34	431	32	188	88	308	87	166	37	290
Southcross e-w	Major Arterial	OFF	44	209	65	318	38	228	36	302	29	140	63	232	36	148	32	216
		PM	64	408	99	571	33	460	64	557	45	236	128	409	69	278	66	413
S. Flores n-s	Major Arterial	AM	22	378	32	432	20	319	64	403	85	74	49	208	37	92	42	171
Pyron e-w	Collector	OFF	25	303	14	342	7	360	47	414	21	24	17	62	20	30	9	59
		PM	20	468	16	504	20	481	54	555	58	55	40	153	37	65	28	130
Pleasanton n-s	Major Arterial	AM	88	293	15	396	10	171	46	227	99	164	89	352	18	225	10	253
Division e-w	Minor Arterial	OFF	78	160	12	250	13	241	40	294	24	111	133	268	8	91	8	107
		PM	113	211	35	359	45	350	57	452	45	156	157	358	24	195	37	256
Pleasanton n-s	Major Arterial	AM	105	467	80	652	19	307	30	356	29	447	99	575	74	320	24	418
W. Southcross e-w	Major Arterial	OFF	89	307	60	456	13	331	61	405	47	229	104	380	45	203	21	269
		PM	67	378	55	500	34	480	67	581	53	349	110	512	68	328	22	418
Pleasanton n-s	Major Arterial	AM	10	516	47	573	210	380	16	606	10	213	26	249	39	157	66	262
Gerald e-w	Collector	OFF	15	433	30	478	44	460	23	527	12	26	13	51	45	59	60	164
		PM	27	602	33	662	42	740	16	798	21	81	27	129	31	86	64	181
Pleasanton n-s	Major Arterial	AM	11	520	50	581	47	454	33	534	49	127	13	189	63	128	53	244
Pyron e-w	Collector	OFF	28	464	42	534	34	525	28	587	21	64	28	113	41	53	35	129
		PM	100	569	112	781	80	610	85	775	102	203	85	390	79	181	71	331
Flores n-s	Major Arterial	AM	90	83	32	205	48	109	56	213	48	386	92	526	40	450	34	524
SW Military/SE Militar	Major Arterial	OFF	102	274	108	484	60	173	62	295	50	429	88	567	30	361	68	459
		PM	198	272	71	541	139	344	144	627	118	834	185	1137	112	909	98	1119

San Antonio - Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
SW Military e-w	Major Arterial	AM	171	306	123	600	100	233	60	393	57	470	112	639	90	410	77	577
Pleasanton n-s	Major Arterial	OFF	159	279	126	564	169	237	54	460	89	616	103	808	100	609	112	821
		PM	192	373	182	747	219	351	120	690	165	864	169	1198	240	957	98	1295
SW Military e-w	Major Arterial	AM	207	257	70	534	54	149	60	263	34	667	173	874	39	516	36	591
Commercial n-s	Minor Arterial	OFF	149	168	93	410	51	134	64	249	23	804	125	952	51	727	54	832
		PM	165	231	82	478	89	291	100	480	129	1097	228	1454	97	1029	111	1237
SW Military e-w	Major Arterial	AM	199	10	29	238	10	10	15	35	10	891	207	1108	10	720	15	745
Logwood n-s	Collector	OFF	83	15	43	141	10	10	27	47	10	1015	62	1087	25	916	10	951
		PM	123	53	76	252	16	25	32	73	19	1666	197	1882	74	1518	17	1609
N. Alamo n-s	Major Arterial	AM	11	19	10	40	21	21	10	52	10	148	22	180	10	135	32	177
E. Josephine e-w	Collector	OFF	29	30	10	69	17	28	10	55	10	87	32	129	10	56	28	94
		PM	41	46	11	98	31	44	12	87	10	110	36	156	10	161	32	203
N. Alamo n-s	Major Arterial	AM	25	39	10	74	10	41	10	61	10	117	37	164	10	115	10	135
E. Grayson e-w	Collector	OFF	28	36	22	86	23	44	10	77	10	95	28	133	10	121	14	145
		PM	26	56	16	98	36	60	28	124	10	181	29	220	14	185	25	224
N. Alamo n-s	Major Arterial	AM	10	42	10	62	10	42	19	71	18	91	19	128	50	270	25	345
Casa Blanca e-w	Collector	OFF	10	29	11	50	16	36	15	67	13	97	10	120	31	218	29	278
		PM	15	63	10	88	17	53	23	93	15	138	14	167	24	240	22	286
Broadway n-s	Major Arterial	AM	10	412	10	432	29	975	30	1034	53	30	38	121	26	18	17	61
Pershing wb	Local	OFF	17	445	10	472	22	466	28	516	28	16	27	71	23	12	14	49
Tuleta eb	Local	PM	16	989	15	1020	22	608	30	660	110	41	77	228	36	21	45	102
Broadway n-s	Major Arterial	AM	61	284	10	355	10	801	88	899	130	34	121	285	20	13	10	43
Mulberry e-w	Collector	OFF	106	419	21	546	10	486	125	621	157	22	97	276	12	24	15	51
		PM	196	963	33	1192	32	560	254	846	359	55	176	590	30	67	28	125

San Antonio -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
Broadway n-s	Major Arterial	AM	63	295	13	371	14	969	113	1096	107	139	139	385	10	119	14	143
Josephine e-w	Collector	OFF	123	375	12	510	13	466	63	542	87	86	137	310	10	63	23	96
		PM	175	774	23	972	20	542	127	689	141	117	127	385	10	150	37	197
Broadway n-s	Major Arterial	AM	15	319	28	362	41	1153	32	1226	28	100	30	158	25	98	38	161
Grayson e-w	Collector	OFF	17	456	28	501	60	532	15	607	21	69	27	117	24	53	73	150
		PM	24	911	40	975	87	579	23	689	49	86	38	173	23	89	99	211
Broadway n-s	Major Arterial	AM	16	271	10	297	35	790	140	965	65	75	38	178	72	128	63	263
Casa Blanca wb	Collector	OFF	25	331	14	370	43	453	88	584	47	41	28	116	55	80	89	224
Newell eb	Collector	PM	26	768	14	808	68	411	175	654	85	79	20	184	53	126	91	270
Pershing e-w	Collector	AM	10	237	10	257	128	347	16	491	10	49	10	69	10	22	31	63
N. New Braunfels n-s	Major Arterial	OFF	10	186	10	206	78	183	10	271	10	19	10	39	10	24	54	88
		PM	15	383	10	408	45	249	24	318	12	22	12	46	13	57	191	261
Funston e-w	Local	AM	10	202	10	222	10	284	63	357	10	43	24	77	13	110	11	134
N. New Braunfels n-s	Major Arterial	OFF	10	143	13	166	10	159	16	185	10	32	10	52	10	45	10	65
		PM	10	338	15	363	10	289	18	317	25	63	10	98	17	64	16	97
Eleanor e-w	Minor Arterial	AM	15	173	17	205	10	310	13	333	10	16	43	69	17	13	10	40
N. New Braunfels n-s	Major Arterial	OFF	18	134	12	164	10	124	10	144	10	10	24	44	10	10	10	30
		PM	63	312	17	392	10	275	19	304	26	28	39	93	12	24	10	46
NW 24th n-s	Minor Arterial	AM	22	360	66	448	64	487	12	563	27	81	29	137	38	30	47	115
W. Poplar e-w	Minor Arterial	OFF	11	243	25	279	23	200	10	233	10	12	21	43	28	18	36	82
		PM	42	633	53	728	50	474	16	540	18	30	34	82	85	89	104	278
NW 24th n-s	Minor Arterial	AM	10	539	23	572	25	729	20	774	30	33	40	103	15	20	11	46
Ruiz e-w	Minor Arterial	OFF	10	307	12	329	16	347	10	373	11	12	22	45	14	12	10	36
		PM	12	666	47	725	40	569	15	624	19	24	38	81	16	36	11	63
S. Zarzamora n-s	Major Arterial	AM	10	368	10	388	10	372	10	392	12	12	10	34	10	10	12	32
W Durango e-w	Collector	OFF	10	412	10	432	10	421	10	441	10	10	13	33	11	20	10	41
		PM	19	592	10	621	10	507	21	538	11	24	16	51	16	40	22	78

San Antonio -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
W Commerce e-w	Major Arterial	AM	72	343	81	496	124	398	102	624	147	589	97	833	101	346	60	507
NW/SW 24th n-s	Minor Arterial	OFF	57	203	65	325	58	204	126	388	110	389	74	573	89	453	53	595
		PM	123	461	85	669	82	396	141	619	210	498	76	784	153	785	94	1032
N. Colorado n-s	Major Arterial	AM	30	397	31	458	82	476	43	601	76	305	100	481	10	88	15	113
W Poplar e-w	Minor Arterial	OFF	23	242	16	281	37	204	29	270	38	80	23	141	10	54	25	89
		PM	60	637	19	716	45	329	64	438	60	142	41	243	10	157	27	194
N. Colorado n-s	Major Arterial	AM	23	424	14	461	45	445	11	501	10	23	45	78	10	17	23	50
Delgado e-w	Collector	OFF	10	225	10	245	16	202	8	226	10	10	10	30	10	10	18	38
		PM	10	517	10	537	18	308	10	336	10	16	17	43	10	23	59	92
N. Colorado n-s	Major Arterial	AM	10	385	34	429	30	414	10	454	10	20	10	40	20	19	15	54
Arbor e-w	Collector	OFF	10	224	10	244	14	228	10	252	10	10	10	30	10	10	10	30
		PM	10	473	14	497	10	286	10	306	12	10	10	32	13	12	45	70
N. Colorado n-s	Major Arterial	AM	16	383	39	438	42	387	20	449	42	231	30	303	23	99	26	148
Ruiz e-w	Minor Arterial	OFF	10	215	10	235	18	171	17	206	18	96	21	135	13	65	27	105
		PM	20	414	10	444	26	283	20	329	20	94	20	134	16	475	37	528
Callaghan n-s	Major Arterial	AM	144	301	125	570	181	442	39	662	71	659	308	1038	132	378	196	706
Culebra e-w	Major Arterial	OFF	102	153	70	325	80	165	36	281	46	298	93	437	87	290	101	478
		PM	237	472	128	837	148	320	40	508	51	436	157	644	136	501	151	788
Culebra e-w	Major Arterial	AM	25	38	34	97	153	42	46	241	15	882	23	920	10	446	41	497
Benrus n-s	Collector	OFF	16	20	10	46	51	16	26	93	24	407	16	447	10	358	31	399
		PM	46	65	11	122	99	63	44	206	30	659	32	721	16	813	59	888
Culebra e-w	Major Arterial	AM	10	10	11	31	49	10	10	69	10	1141	10	1161	10	515	10	535
Alicia nb	Local	OFF	24	10	10	44	24	10	10	44	10	483	10	503	10	417	10	437
Pettus sb	Local	PM	16	10	10	36	67	10	10	87	13	725	10	748	19	970	10	999
Culebra e-w	Major Arterial	AM	89	370	39	498	182	418	66	666	82	1117	124	1323	53	452	129	634
NW 36th sb	Collector	OFF	63	149	42	254	72	148	56	276	50	461	57	568	18	334	59	411
Esmeralda nb	Collector	PM	166	407	42	615	127	335	103	565	82	627	85	794	73	888	109	1070

San Antonio -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Culebra e-w	Major Arterial	AM	143	488	91	722	41	656	58	755	89	773	248	1110	95	315	40	450
N. Gen. McMullen n-s	Major Arterial	OFF	101	330	90	521	37	302	39	378	67	441	92	600	88	303	33	424
		PM	277	661	114	1052	50	584	87	721	92	478	181	751	130	694	54	878
Culebra e-w	Major Arterial	AM	205	239	54	498	56	348	72	476	34	1044	237	1315	41	390	29	460
24th nb	Minor Arterial	OFF	129	120	60	309	54	141	65	260	48	666	112	826	39	526	37	602
Wilson sb	Minor Arterial	PM	260	284	62	606	33	252	90	375	62	732	183	977	78	1185	45	1308
Culebra e-w	Major Arterial	AM	10	10	10	30	14	37	30	81	40	1094	24	1158	10	467	13	490
Elmendorf n-s	Collector	OFF	25	15	10	50	22	14	28	64	41	744	23	808	22	608	17	647
		PM	48	26	10	84	18	30	58	106	66	722	17	805	10	1236	15	1261
Culebra e-w	Major Arterial	AM	83	260	67	410	69	325	57	451	68	962	119	1149	57	401	33	491
Zarzamora n-s	Major Arterial	OFF	89	213	53	355	40	221	53	314	54	563	77	694	84	449	25	558
		PM	205	392	88	685	59	313	82	454	70	670	114	854	92	1069	58	1219
S. Gen. McMullen n-s	Major Arterial	AM	177	615	73	865	156	680	172	1008	258	590	184	1032	65	322	85	472
W Commerce e-w	Major Arterial	OFF	171	357	111	639	110	316	139	565	157	358	127	642	108	349	89	546
		PM	226	730	109	1065	167	579	196	942	271	427	148	846	166	619	189	974
S. Gen. McMullen n-s	Major Arterial	AM	17	820	49	886	12	915	13	940	60	30	34	124	64	24	18	106
El Paso e-w	Collector	OFF	24	597	29	650	10	544	19	573	35	18	26	79	45	16	14	75
		PM	42	1090	57	1189	13	843	39	895	37	20	38	95	59	38	22	119
S. Gen. McMullen n-s	Major Arterial	AM	84	716	76	876	79	945	14	1038	18	103	152	273	88	88	50	226
Ceralvo e-w	Minor Arterial	OFF	34	466	22	522	55	433	17	505	25	37	44	106	31	35	59	125
		PM	122	1043	64	1229	79	758	36	873	30	72	94	196	82	109	108	299
S. Gen. McMullen n-s	Major Arterial	AM	34	298	15	347	65	1051	14	1130	43	26	22	91	32	15	63	110
Roselawn e-w	Local	OFF	43	237	12	292	72	202	10	284	17	10	18	45	19	19	41	79
		PM	86	1107	24	1217	107	273	12	392	44	28	17	89	13	28	84	125
W Martin e-w	Minor Arterial	AM	123	430	10	563	20	561	125	706	36	312	43	391	65	123	81	269
NW 24th n-s	Minor Arterial	OFF	78	273	15	366	14	297	60	371	12	97	18	127	56	96	78	230
		PM	102	559	48	709	49	553	63	665	35	149	26	210	128	343	128	599

San Antonio -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
W. Martin e-w	Minor Arterial	AM	12	53	27	92	10	46	11	67	10	568	12	590	16	211	10	237
NW 19th n-s	Collector	OFF	10	19	22	51	10	27	10	47	12	244	13	269	10	194	10	214
		PM	13	45	14	72	10	47	10	67	10	314	11	335	27	555	12	594
W. Martin e-w	Minor Arterial	AM	10	93	33	136	39	98	25	162	32	569	18	619	18	153	20	191
N. Hamilton n-s	Collector	OFF	10	35	12	57	12	38	26	76	15	229	10	254	10	171	11	192
		PM	27	92	20	139	23	103	32	158	31	305	18	354	27	528	34	589
W. Martin e-w	Minor Arterial	AM	10	85	46	141	25	46	23	94	35	775	10	820	12	266	16	294
San Jacinto n-s	Collector	OFF	10	23	22	55	11	17	20	48	17	274	10	301	18	246	10	274
		PM	10	51	36	97	11	33	39	83	30	370	16	416	34	708	21	763
W. Martin e-w	Minor Arterial	AM	22	313	98	433	77	238	24	339	72	679	45	796	19	230	57	306
N. Colorado n-s	Major Arterial	OFF	11	114	45	170	37	124	31	192	33	283	19	335	17	223	56	296
		PM	31	235	50	316	34	258	49	341	47	316	27	390	50	678	83	811
N. Zarzamora n-s	Major Arterial	AM	32	341	39	412	44	478	29	551	11	494	85	590	64	238	12	314
Woodlawn e-w	Minor Arterial	OFF	19	201	35	255	12	196	10	218	14	147	33	194	45	158	12	215
		PM	54	380	60	494	10	323	20	353	27	247	42	316	69	423	27	519
N. Zarzamora n-s	Major Arterial	AM	19	299	32	350	109	449	17	575	25	575	41	641	20	177	45	242
Cincinnati e-w	Collector	OFF	17	210	13	240	24	244	11	279	13	116	23	152	28	100	33	161
		PM	57	459	40	556	29	346	33	408	26	171	40	237	39	403	43	485
N. Zarzamora n-s	Major Arterial	AM	15	389	25	429	43	561	20	624	30	322	46	398	25	99	25	149
Poplar e-w	Minor Arterial	OFF	25	326	15	366	10	363	10	383	27	59	23	109	26	54	21	101
		PM	39	613	31	683	15	485	31	531	23	110	41	174	30	229	61	320
N. Zarzamora n-s	Major Arterial	AM	12	423	26	461	59	615	10	684	24	127	26	177	25	102	37	164
Ruiz e-w	Collector	OFF	17	384	31	432	29	367	21	417	12	45	15	72	38	40	29	107
		PM	19	640	44	703	37	476	18	531	17	61	11	89	49	114	71	234
N. Zarzamora n-s	Major Arterial	AM	15	287	59	361	89	360	10	459	23	451	27	501	15	156	40	211
W. Martin e-w	Minor Arterial	OFF	22	321	37	380	43	312	20	375	29	191	24	244	31	185	65	281
		PM	35	611	49	695	50	474	44	568	28	246	39	313	59	515	94	668

San Antonio -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
S. Zarzamora n-s	Major Arterial	AM	23	341	19	383	32	319	26	377	18	119	13	150	14	76	27	117
Guadalupe e-w	Major Arterial	OFF	17	361	38	416	22	314	29	365	14	78	18	110	39	84	56	179
		PM	29	531	36	596	49	450	37	536	22	92	22	136	44	208	67	319
S. Zarzamora n-s	Major Arterial	AM	59	345	20	424	15	377	28	420	11	111	87	209	12	47	17	76
Vera Cruz e-w	Collector	OFF	48	346	10	404	10	361	37	408	10	43	55	108	10	17	11	38
		PM	96	698	10	804	11	481	42	534	20	68	82	170	14	58	10	82
S. Zarzamora n-s	Major Arterial	AM	10	484	12	506	11	468	10	489	10	10	10	30	10	10	10	30
Chihuahua e-w	Local	OFF	10	445	10	465	10	417	10	437	10	10	10	30	10	10	10	30
		PM	10	690	10	710	10	526	10	546	10	10	10	30	10	10	11	31
S. Zarzamora n-s	Major Arterial	AM	10	353	184	547	38	333	17	388	13	140	10	163	136	39	33	208
S. Laredo e-w	Minor Arterial	OFF	20	482	189	691	31	366	16	413	11	65	80	156	148	68	35	251
		PM	19	540	164	723	37	421	22	480	13	82	20	115	165	105	64	334
S. Zarzamora n-s	Major Arterial	AM	34	497	13	544	16	389	45	450	47	29	26	102	10	12	21	43
Merida e-w	Collector	OFF	33	450	10	493	23	439	43	505	57	19	29	105	10	15	22	47
		PM	39	609	14	662	30	604	44	678	35	31	56	122	18	28	22	68
S. Zarzamora n-s	Major Arterial	AM	27	485	23	535	33	343	55	431	91	98	23	212	11	51	57	119
Ceralvo e-w	Minor Arterial	OFF	21	399	24	444	21	349	58	428	60	51	23	134	14	40	44	98
		PM	47	492	23	562	46	512	99	657	51	81	37	169	21	112	37	170
S. Zarzamora n-s	Major Arterial	AM	58	502	27	587	13	329	25	367	12	46	68	126	14	30	22	66
Brady e-w	Local	OFF	38	372	13	423	15	359	16	390	10	31	50	91	10	30	20	60
		PM	111	582	33	726	22	524	36	582	21	39	70	130	22	72	30	124

Duncanville (40)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Camp Wisdon Road e-w	Major Arterial	AM	300	384	125	809	50	173	87	310	133	297	163	593	83	341	54	478
Main Street n-s	Major Arterial	OFF	129	153	154	436	39	118	51	208	64	372	130	566	90	312	56	458
		PM	235	224	202	661	100	325	157	582	114	621	307	1042	162	648	74	884
Davis Street e-w	Collector	AM	32	690	12	734	7	361	14	382	46	10	53	109	18	20	19	57
Main Street n-s	Major Arterial	OFF	19	354	9	382	4	283	11	298	15	9	28	52	9	6	19	34
		PM	35	564	29	628	20	784	37	841	23	16	71	110	27	18	22	67
Center Street e-w	Minor Arterial	AM	42	405	30	477	23	247	1	271	268	95	90	453	33	106	54	193
Main Street n-s	Major Arterial	OFF	52	302	28	382	19	264	2	285	113	72	47	232	28	61	24	113
		PM	82	333	44	459	27	475	1	503	163	137	78	378	60	170	43	273
Santa Fe Trail n-s	Major Arterial	AM	28	118	203	349	1	68	75	144	80	459	9	548	87	467	5	559
Wheatland Road e-w	Major Arterial	OFF	26	47	76	149	1	34	48	83	60	361	10	431	46	337	5	388
		PM	35	84	119	238	1	164	136	301	73	704	48	825	144	773	7	924
Santa Fe Trail n-s	Major Arterial	AM	36	185	4	225	77	66	52	195	172	480	18	670	0	186	129	315
Danieldale Road e-w	Major Arterial	OFF	17	63	4	84	46	42	44	132	69	152	7	228	1	140	44	185
		PM	19	92	0	111	128	208	143	479	72	226	18	316	7	461	99	567

Euless (41)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Main Street n-s	Major Arterial	AM	20	79	4	103	2	136	61	199	70	16	41	127	7	22	14	43
Bear Creek Drive e-w	Collector	OFF	29	146	9	184	5	182	7	194	7	10	19	36	13	9	7	29
		PM	47	244	18	309	26	291	21	338	9	9	33	51	13	11	16	40
Main Street n-s	Major Arterial	AM	42	147	44	233	59	187	46	292	11	235	40	286	22	123	18	163
Mid Cities Blvd e-w	Minor Arterial	OFF	18	121	23	162	23	133	18	174	12	78	27	117	37	86	24	147
		PM	49	440	72	561	42	421	79	542	87	221	91	399	118	412	122	652
Main Street n-s	Major Arterial	AM	56	172	68	296	16	240	48	304	60	132	88	280	140	172	28	340
Ash Lane e-w	Collector	OFF	9	147	46	202	19	172	5	196	7	15	10	32	46	40	8	94
		PM	48	360	112	520	16	296	24	336	8	24	24	56	108	80	64	252
Main Street n-s	Major Arterial	AM	48	228	44	320	32	488	88	608	68	168	140	376	152	104	84	340
Harwood Road e-w	Minor Arterial	OFF	58	127	41	226	50	176	40	266	37	75	66	178	56	69	32	157
		PM	168	428	112	708	104	396	128	628	92	192	108	392	128	204	136	468
Main Street n-s	Major Arterial	AM	68	200	16	284	12	916	168	1096	72	60	108	240	224	128	20	372
Midway Drive e-w	Collector	OFF	40	214	32	286	10	355	26	391	36	14	50	100	85	21	13	119
		PM	72	720	80	872	20	712	132	864	192	76	56	324	164	80	24	268
Main Street n-s	Major Arterial	AM	60	196	64	320	172	120	64	356	32	508	68	608	20	232	92	344
S. H. 10 e-w	Major Arterial	OFF	66	79	25	170	29	71	91	191	51	235	45	331	6	181	48	235
		PM	96	208	16	320	92	196	144	432	96	328	60	484	80	628	84	792

Garland (42, 43)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Country Club Road n-s	Minor Arterial	AM	73	79	12	164	11	78	23	112	11	119	50	180	47	495	30	572
Miller Road e-w	Major Arterial	OFF	48	38	14	100	12	35	11	58	9	91	30	130	11	174	13	198
		PM	66	83	26	175	24	59	14	97	23	436	94	553	16	172	21	209
Dairy n-s	Minor Arterial	AM	27	147	13	187	19	114	62	195	22	88	25	135	14	497	82	593
Miller Road e-w	Major Arterial	OFF	15	66	11	92	17	77	42	136	24	96	21	141	16	187	44	247
		PM	32	129	31	192	80	159	53	292	91	466	58	615	12	157	49	218
Dairy n-s	Minor Arterial	AM	20	238	8	266	2	203	62	267	44	6	35	85	6	6	6	18
Celeste e-w	Local	OFF	6	82	2	90	3	113	5	121	6	2	4	12	1	2	3	6
		PM	4	196	7	207	6	182	8	196	8	5	4	17	2	1	4	7
1st Street n-s	Major Arterial	AM	252	453	8	713	11	339	101	451	50	137	57	244	37	471	18	526
Kingsley Road e-w	Major Arterial	OFF	115	232	21	368	32	302	84	418	51	180	72	303	24	233	15	272
		PM	135	449	37	621	41	598	107	746	178	635	187	1000	65	248	26	339
Kingsley Road e-w	Major Arterial	AM	22	116	34	172	22	57	23	102	22	261	5	288	50	1043	30	1123
Glenbrook Drive n-s	Minor Arterial	OFF	23	48	16	87	21	40	16	77	17	255	4	276	16	426	20	462
		PM	10	52	35	97	48	155	20	223	20	870	40	930	39	439	38	516
Kingsley Road e-w	Major Arterial	AM	7	11	15	33	6	16	22	44	6	281	1	288	22	778	9	809
Old Orchard	Local	OFF	0	4	3	7	5	5	18	28	12	283	4	299	5	494	5	504
		PM	3	6	10	19	3	7	15	25	31	1013	5	1049	4	469	3	476
Kingsley Road e-w	Major Arterial	AM	235	288	38	561	15	166	68	249	43	196	82	321	66	862	48	976
Saturn Road	Minor Arterial	OFF	144	190	40	374	27	150	41	218	33	228	96	357	48	375	29	452
		PM	137	334	145	616	118	424	51	593	75	905	280	1260	101	344	42	487
1st Street n-s	Major Arterial	AM	7	1410	7	1424	7	858	15	880	25	5	19	49	27	10	19	56
Armstrong e-w	Collector	OFF	7	739	6	752	9	653	5	667	5	6	8	19	23	5	18	46
		PM	23	944	31	998	36	1491	25	1552	27	27	25	79	77	29	62	168
1st Street n-s	Major Arterial	AM	231	1311	26	1568	33	714	100	847	61	120	87	268	43	559	65	667
Miller Road e-w	Major Arterial	OFF	118	617	24	759	32	578	76	686	91	93	88	272	23	224	45	292
		PM	180	826	53	1059	131	1285	98	1514	173	518	238	929	29	222	62	313

Garland -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Garland Avenue n-s	Major Arterial	AM	290	564	65	919	127	1104	157	1388	44	317	140	501	160	658	56	874
Walnut St e-w	Major Arterial	OFF	183	372	63	618	88	558	107	753	73	263	129	465	151	400	64	615
		PM	171	966	99	1236	143	762	95	1000	228	713	251	1192	130	443	93	666
Glenbrook Drive n-s	Minor Arterial	AM	65	261	34	360	55	278	97	430	35	361	52	448	62	778	36	876
Walnut St e-w	Major Arterial	OFF	46	97	34	177	35	172	56	263	38	272	55	365	44	390	17	451
		PM	73	275	45	393	45	244	100	389	115	717	100	932	54	520	47	621
Glenbrook Drive n-s	Minor Arterial	AM	21	255	22	298	34	261	95	390	20	39	24	83	2	49	20	71
Austin e-w	Collector	OFF	28	141	16	185	29	270	23	322	15	22	33	70	6	26	15	47
		PM	16	266	16	298	40	350	15	405	57	57	41	155	16	81	73	170
Glenbrook Drive n-s	Minor Arterial	AM	11	174	10	195	9	224	4	237	4	38	10	52	7	42	13	62
State e-w	Collector	OFF	11	174	10	195	9	224	4	237	4	38	10	52	7	42	13	62
		PM	6	258	16	280	21	346	8	375	16	82	25	123	14	66	26	106
Glenbrook Drive n-s	Minor Arterial	AM	47	285	17	349	17	235	40	292	16	120	19	155	8	229	29	266
Main St e-w	Collector	OFF	53	180	25	258	23	204	30	257	24	135	46	205	10	158	21	189
		PM	50	250	41	341	32	360	24	416	43	279	56	378	20	168	23	211
Glenbrook Drive n-s	Minor Arterial	AM	20	295	39	354	24	247	12	283	1	3	5	9	2	6	11	19
Avenue A e-w	Local	OFF	6	181	50	237	42	169	6	217	1	7	8	16	8	5	15	28
		PM	3	289	69	361	71	424	7	502	5	14	11	30	11	9	19	39
6th Street n-s	Local	AM	0	6	1	7	2	3	8	13	7	138	4	149	2	415	16	433
Main St. e-w	Collector	OFF	4	3	3	10	8	6	8	22	13	134	10	157	6	194	13	213
		PM	2	5	5	12	21	11	18	50	10	288	4	302	4	177	20	201
5th Street n-s	Minor Arterial	AM	65	56	26	147	24	55	34	113	40	391	55	486	55	815	37	907
Walnut St e-w	Major Arterial	OFF	40	26	37	103	11	32	27	70	30	298	57	385	51	489	23	563
		PM	63	60	91	214	32	68	58	158	44	807	90	941	60	518	21	599
5th Street n-s	Minor Arterial	AM	17	219	10	246	4	106	22	132	10	19	1	30	1	47	39	87
State e-w	Collector	OFF	6	115	7	128	5	64	14	83	16	20	8	44	16	30	17	63
		PM	16		6	22	4	225	18	247	20	46	35	101	28	49	18	95
5th Street n-s	Minor Arterial	AM	18	154	21	193	4	84	26	114	15	104	12	131	3	280	44	327
Main St. e-w	Collector	OFF	15	75	6	96	13	53	13	79	21	106	20	147	5	214	43	262
		PM	19	115	22	156	43	245	32	320	19	279	48	346	9	193	42	244

Garland -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Miller Road e-w	Major Arterial	AM	62	167	28	257	17	115	69	201	30	307	45	382	41	852	39	932
5th Street n-s	Minor Arterial	OFF	29	68	73	170	21	46	49	116	21	234	37	292	5	427	16	448
		PM	42	102	10	154	55	168	65	288	71	886	60	1017	16	399	35	450
Miller Road e-w	Major Arterial	AM	55	203	12	270	55	105	66	226	75	267	24	366	19	1050	73	1142
Glenbrook Drive	Minor Arterial	OFF	18	82	15	115	29	58	51	138	85	320	13	418	12	525	37	574
		PM	26	121	31	178	109	207	109	425	146	1048	55	1249	18	506	81	605
Miller Road e-w	Major Arterial	AM	73	613	74	760	156	1259	172	1587	88	235	8	331	254	900	163	1317
Garland Avenue n-s	Major Arterial	OFF	21	399	75	495	119	651	73	843	81	201	27	309	144	378	127	649
		PM	59	913	241	1213	253	868	79	1200	129	875	27	1031	174	328	158	660
Garland Avenue n-s	Major Arterial	AM	1	817	18	836	7	1362	9	1378	5	4	4	13	89	22	38	149
Park eb	Local	OFF	0	626	25	651	7	838	8	853	2	1	1	4	18	4	15	37
Avenue F wb	Local	PM	0	1216	41	1257	27	1226	13	1266	10	4	11	25	23	6	30	59
Walnut Street e-w	Major Arterial	AM	110	738	29	877	45	321	157	523	79	263	62	404	62	676	52	790
1st Street n-s	Major Arterial	OFF	73	353	8	434	23	238	90	351	83	164	60	307	37	330	36	403
		PM	88	439	21	548	44	594	103	741	278	518	146	942	63	352	50	465

Corpus Christi (44, 45)

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
Staples n-s	Minor Arterial	AM	40	197	18	255	96	279	93	468	26	125	32	183	24	380	36	440
Lipan e-w	Minor Arterial	OFF	48	320	45	413	50	321	79	450	84	261	109	454	19	161	48	228
		PM	40	350	45	435	52	271	58	381	103	287	74	464	14	126	77	217
Staples n-s	Minor Arterial	AM	19	96	24	139	147	116	126	389	17	231	192	440	94	257	18	369
Leopard e-w	Major Arterial	OFF	11	100	36	147	180	123	157	460	89	364	127	580	110	424	51	585
		PM	11	95	34	140	159	129	105	393	15	346	102	463	89	409	23	521
Staples n-s	Minor Arterial	AM	5	256	10	271	20	349	37	406	7	30	11	48	22	159	32	213
Comanche e-w	Minor Arterial	OFF	9	357	30	396	68	382	22	472	25	106	13	144	18	89	23	130
		PM	14	452	53	519	28	328	18	374	23	73	16	112	23	232	17	272
Staples n-s	Minor Arterial	AM	9	404	8	421	8	448	15	471	11	10	21	42	7	10	9	26
Park e-w	Collector	OFF	22	567	14	603	12	494	19	525	19	13	28	60	13	10	9	32
		PM	19	742	10	771	7	395	16	418	18	9	19	46	2	12	9	23
Staples n-s	Minor Arterial	AM	5	267	6	278	8	591	15	614	13	22	20	55	7	28	7	42
Buford e-w	Minor Arterial	OFF	24	532	13	569	4	619	21	644	32	15	14	61	11	19	15	45
		PM	19	678	13	710	16	416	22	454	29	37	18	84	9	21	28	58
Staples n-s	Minor Arterial	AM	18	251	43	312	78	464	19	561	15	236	28	279	37	323	65	425
Morgan e-w	Minor Arterial	OFF	23	447	95	565	108	490	29	627	37	264	31	332	84	311	87	482
		PM	11	617	119	747	106	365	29	500	36	281	20	337	59	242	96	397
Staples n-s	Minor Arterial	AM	12	468	16	496	6	420	25	451	35	27	26	88	11	27	12	50
Elizabeth e-w	Minor Arterial	OFF	26	563	14	603	8	544	36	588	59	24	30	113	21	29	10	60
		PM	16	698	20	734	12	461	36	509	41	35	31	107	15	30	10	55
Staples n-s	Minor Arterial	AM	6	143	13	162	118	437	0	555	3	67	12	82	6	60	61	127
Brownlee e-w	Collector	OFF	7	452	15	474	39	342	1	382	0	25	9	34	11	46	83	140
		PM	5	475	12	492	44	230	0	274	1	28	6	35	11	68	115	194
Staples n-s	Minor Arterial	AM	2	561	33	596	126	1008	37	1171	48	93	1	142	39	55	32	126
Louisiana e-w	Collector	OFF	4	763	33	800	76	507	26	609	83	37	2	122	29	77	146	252
		PM	3	988	32	1023	87	572	30	689	121	84	2	207	26	40	93	159

Corpus Christi -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Staples n-s	Minor Arterial	AM	3	514	30	547	70	1016	58	1144	39	60	4	103	105	93	78	276
Annapolis e-w	Local	OFF	8	702	77	787	30	579	40	649	65	43	32	140	54	33	72	159
		PM	9	1004	130	1143	61	602	45	708	78	63	13	154	44	50	80	174
Staples n-s	Minor Arterial	AM	269	414	6	689	3	769	341	1113	168	48	273	489	25	141	5	171
Texan Trail e-w	Collector	OFF	171	668	6	845	7	507	170	684	224	32	229	485	2	20	6	28
		PM	317	613	10	940	11	627	307	945	175	48	256	479	12	65	18	95
Staples n-s	Minor Arterial	AM	4	571	89	664	50	875	20	945	20	37	12	69	284	36	72	392
Carroll e-w	Collector	OFF	14	809	163	986	37	576	8	621	10	33	9	52	129	22	46	197
		PM	11	877	246	1134	45	630	13	688	16	49	13	78	158	30	55	243
Staples n-s	Minor Arterial	AM	73	411	132	616	100	470	90	660	101	313	69	483	317	712	87	1116
Weber e-w	Minor Arterial	OFF	79	617	166	862	94	448	115	657	166	410	51	627	162	323	65	550
		PM	73	581	179	833	107	511	85	703	203	845	74	1122	186	364	89	639
Staples n-s	Minor Arterial	AM	21	331	50	402	392	633	20	1045	0	323	47	370	8	256	218	482
Baldwin eb	Minor Arterial	OFF	35	515	62	612	255	404	20	679	0	171	40	211	26	232	281	539
Swatner wb	Minor Arterial	PM	27	681	62	770	279	379	4	662	1	187	33	221	13	266	365	644
Staples n-s	Minor Arterial	AM	2	436	132	570	1	225	69	295	104	134	20	258	103	151	33	287
Ayers e-w	Minor Arterial	OFF	0	542	159	701	0	260	99	359	159	199	35	393	79	158	39	276
		PM	1	791	172	964	0	172	50	222	172	173	16	361	83	151	36	270

Fort Worth (46, 47)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Main St. n-s	Major Arterial	AM	22	306	68	396	184	1134	214	1532	225	985	66	1276	177	608	106	891
28th St. e-w	Major Arterial	OFF	72	364	156	592	126	302	222	650	186	436	20	642	180	436	82	698
		PM	91	785	144	1020	135	448	253	836	319	501	29	849	165	653	118	936
Main St. n-s	Major Arterial	AM	7	314	2	323	24	866	2	892	5	3	13	21	3	0	1	4
26th St. e-w	Local	OFF	6	480	8	494	2	438	12	452	14	4	6	24	10	2	16	28
		PM	16	973	19	1008	18	538	16	572	9	2	5	16	17	8	11	36
Main St. n-s	Major Arterial	AM	5	363	16	384	36	808	4	848	6	32	10	48	6	11	11	28
Exchange e-w	Collector	OFF	20	480	12	512	10	472	16	498	6	10	16	32	28	14	18	60
		PM	61	1286	49	1396	29	559	29	617	21	29	18	68	23	33	64	120
Main St. n-s	Major Arterial	AM	10	333	25	368	62	782	16	860	3	85	36	124	19	39	33	91
23rd St. e-w	Collector	OFF	30	420	32	482	14	220	20	254	20	22	6	48	22	30	22	74
		PM	72	1008	40	1120	29	482	41	552	25	65	34	124	15	109	72	196
Main St. n-s	Major Arterial	AM	58	376	6	440	18	732	34	784	27	19	57	103	11	20	5	36
21st St. e-w	Collector	OFF	30	546	8	584	8	534	20	562	16	10	38	64	14	16	12	42
		PM	85	1038	9	1132	17	510	25	552	21	21	49	91	15	28	29	72
Main St. n-s	Major Arterial	AM	54	333	9	396	1	702	12	715	30	3	60	93	14	3	3	20
20th St. e-w	Major Arterial	OFF	46	484	6	536	2	454	48	504	40	6	40	86	0	12	2	14
		PM	123	1125	8	1256	4	611	62	677	53	8	55	116	18	7	3	28
Main St. n-s	Major Arterial	AM	30	174	36	240	256	825	259	1340	162	543	39	744	95	706	163	964
Northside e-w	Major Arterial	OFF	42	316	92	450	108	352	76	536	136	292	24	452	92	288	86	466
		PM	176	831	125	1132	244	357	159	760	351	860	29	1240	56	639	229	924
Main St. n-s	Major Arterial	AM	17	423	20	460	4	942	58	1004	31	2	11	44	9	3	9	21
7th St. e-w	Minor Arterial	OFF	6	436	2	444	2	458	8	468	2	8	34	44	16	4	4	24
		PM	3	863	7	873	4	453	7	464	72	0	16	88	121	3	28	152
28th st. e-w	Major Arterial	AM	10	32	74	116	9	41	19	69	11	675	18	704	59	544	21	624
Clinton St. n-s	Collector	OFF	42	48	62	152	6	42	20	68	14	490	32	536	52	566	10	628
		PM	21	59	0	80	11	56	30	97	15	593	23	631	101	833	6	940

Fort Worth -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
28th st. e-w	Major Arterial	AM	34	82	36	152	52	145	22	219	14	706	48	768	62	704	58	824
Decatur St. n-s	Minor Arterial	OFF	22	74	52	148	76	68	36	180	46	654	24	724	28	622	76	726
		PM	64	203	77	344	115	115	41	271	28	799	28	855	35	870	104	1009
28th st. e-w	Major Arterial	AM	16	11	5	32	21	10	9	40	8	1053	11	1072	7	796	9	812
Glendale/Oscar n-s	Local	OFF	22	4	22	48	4	0	12	16	4	700	20	724	10	708	6	724
		PM	45	6	21	72	15	8	9	32	7	924	21	952	13	1054	9	1076
28th st. e-w	Major Arterial	AM	19	31	15	65	167	35	50	252	26	775	11	812	1	725	126	852
Deen St. n-s	Minor Arterial	OFF	26	52	24	102	94	30	36	160	40	654	12	706	12	694	92	798
		PM	25	37	30	92	123	40	33	196	29	840	27	896	19	1076	189	1284
Camp Bowie Blvd. e-w	Major Arterial	AM	87	65	244	396	13	74	5	92	7	779	10	796	86	342	7	435
Hulen St. n-s	Minor Arterial	OFF	90	68	118	276	14	46	14	74	34	502	44	580	130	532	4	666
		PM	136	49	144	329	8	63	26	97	35	543	58	636	196	945	35	1176
Camp Bowie Blvd. e-w	Major Arterial	AM	8	57	44	109	30	218	81	329	31	524	13	568	14	417	21	452
Merrick St. n-s	Collector	OFF	26	72	20	118	10	92	72	174	68	478	10	556	36	584	4	624
		PM	19	68	53	140	38	143	132	313	40	495	17	552	59	1274	43	1376
Lancaster e-w	Major Arterial	AM	167	12	44	223	12	25	7	44	7	654	71	732	57	1510	9	1576
Collard n-s	Collector	OFF	102	36	64	202	14	10	6	30	8	588	48	644	36	698	6	740
		PM	116	16	88	220	15	22	26	63	27	1461	181	1669	52	871	9	932
Lancaster e-w	Major Arterial	AM	40	11	105	156	11	29	8	48	7	542	28	577	55	1356	17	1428
Ayers n-s	Collector	OFF	38	24	104	166	10	22	8	40	12	684	34	730	72	692	6	770
		PM	62	28	186	276	9	32	23	64	45	1552	79	1676	154	1210	32	1396
Lancaster e-w	Major Arterial	AM	143	261	64	468	115	254	111	480	77	503	67	647	72	1175	101	1348
Oakland n-s	Minor Arterial	OFF	96	176	96	368	140	188	76	404	108	702	142	952	144	640	118	902
		PM	216	519	285	1020	222	479	145	846	195	1191	193	1579	252	809	135	1196
Lancaster e-w	Major Arterial	AM	23	24	25	72	10	19	31	60	20	761	15	796	24	1400	13	1437
Rand n-s	Local	OFF	24	12	28	64	8	6	24	38	28	832	30	890	36	824	10	870
		PM	31	23	62	116	20	35	49	104	66	1599	40	1705	46	1175	11	1232

Fort Worth -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Lancaster e-w	Major Arterial	AM	26	10	36	72	24	9	40	73	19	566	7	592	30	1133	34	1197
Edgewood n-s	Collector	OFF	16	22	26	64	36	4	62	102	42	692	22	756	20	804	30	854
		PM	46	38	28	112	68	33	63	164	91	1583	26	1700	65	1351	56	1472
Lancaster e-w	Major Arterial	AM	58	73	73	204	96	81	79	256	60	612	31	703	59	1063	25	1147
Tierney n-s	Collector	OFF	62	26	66	154	42	76	44	162	58	738	68	864	64	704	38	806
		PM	66	94	108	268	54	89	62	205	127	1228	105	1460	131	1181	84	1396
Lancaster e-w	Major Arterial	AM	51	53	53	157	24	40	20	84	3	695	14	712	71	1253	9	1333
Canton n-s	Collector	OFF	56	26	40	122	22	20	6	48	12	618	10	640	20	628	20	668
		PM	102	53	72	227	22	41	9	72	16	962	22	1000	61	864	8	933

Hurst (48, 49)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
SH 10 e-w	Major Arterial	AM	23	114	527	664	367	99	218	684	64	1292	123	1479	102	909	129	1140
Precinct Line n-s	Minor Arterial	OFF	20	80	24	124	72	94	96	262	66	440	22	528	16	460	84	560
		PM	71	314	63	448	97	219	188	504	322	935	44	1301	82	1065	189	1336
Pipeline e-w	Minor Arterial	AM	59	137	33	229	55	168	57	280	62	400	58	520	24	392	32	448
Hurstview n-s	Collector	OFF	2	10	12	24	48	28	52	128	40	276	22	338	6	372	42	420
		PM	71	165	24	260	127	157	113	397	104	674	30	808	45	737	102	884
Pipeline e-w	Minor Arterial	AM	64	29	135	228	7	34	20	61	18	392	50	460	136	305	8	449
Brown Trail nb	Collector	OFF	56	18	58	132	22	12	14	48	22	256	44	322	60	318	4	382
Uptown sb	Collector	PM	127	53	168	348	29	51	68	148	36	656	133	825	177	804	23	1004
Pipeline e-w	Minor Arterial	AM	129	25	114	268	32	39	10	81	8	376	276	660	152	307	5	464
Bellaire n-s	Collector	OFF	116	26	40	182	18	26	16	60	6	268	78	352	24	276	4	304
		PM	261	42	181	484	28	36	20	84	26	600	154	780	129	717	14	860

College Station (50, 51)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Texas Ave n-s	Major Arterial	AM	341	1087	79	1507	21	563	195	779	48	19	71	138	94	243	84	421
Walton wb	Local	OFF	191	1323	48	1562	32	1271	119	1422	115	33	199	347	55	57	61	173
New Main eb	Local	PM	156	1416	96	1668	43	1559	135	1737	252	145	372	769	99	65	51	215
Texas Ave n-s	Major Arterial	AM	286	1150	2	1438	36	525	141	702	254	63	135	452	27	235	85	347
Kyle wb	Major Arterial	OFF	307	1151	11	1469	70	1229	187	1486	210	124	342	676	27	115	105	247
George Bush eb	Major Arterial	PM	361	1145	14	1520	85	1542	196	1823	271	204	392	867	64	177	86	327
Texas Ave n-s	Major Arterial	AM	44	1051	10	1105	11	437	119	567	119	77	33	229	8	72	19	99
Holleman e-w	Minor Arterial	OFF	38	1023	46	1107	29	1095	144	1268	123	79	40	242	28	64	24	116
		PM	61	1166	59	1286	40	1451	229	1720	184	127	70	381	44	116	45	205
George Bush e-w	Major Arterial	AM	73	150	157	380	67	13	56	136	179	794	20	993	34	1487	143	1664
Dexter n-s	Local	OFF	12	14	29	55	61	11	86	158	73	558	12	643	33	565	45	643
		PM	14	20	36	70	102	70	114	286	83	853	25	961	62	617	49	728
Wellborn n-s	Major Arterial	AM	12	1007	36	1055	25	199	15	239	53	34	8	95	25	24	143	192
Holleman e-w	Minor Arterial	OFF	17	410	18	445	98	434	53	585	39	35	18	92	20	56	105	181
		PM	49	559	39	647	182	779	34	995	45	87	26	158	49	61	100	210

Arlington (52, 53)

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
Bowen n-s	Minor Arterial	AM	196	247	539	982	143	282	60	485	77	1345	222	1644	206	719	34	959
Division e-w	Major Arterial	OFF	116	174	152	442	56	176	42	274	25	439	114	578	38	396	132	566
		PM	346	566	278	1190	181	676	99	956	51	640	65	756	501	850	123	1474
Bowen n-s	Minor Arterial	AM	3	369	70	442	36	314	44	394	118	355	17	490	65	73	51	189
Norwood e-w	Collector	OFF	13	383	120	516	25	353	49	427	64	124	8	196	98	78	35	211
		PM	31	693	100	824	64	839	47	950	94	136	44	274	76	162	35	273
Bowen n-s	Minor Arterial	AM	35	240	60	335	93	175	44	312	133	318	41	492	46	159	39	244
Park Row e-w	Minor Arterial	OFF	48	296	62	406	96	245	48	389	76	231	48	355	88	186	50	324
		PM	111	430	120	661	190	599	136	925	109	320	83	512	174	574	164	912
Bowen n-s	Minor Arterial	AM	7	387	29	423	29	277	6	312	27	12	2	41	17	1	41	59
Winewood e-w	Collector	OFF	2	434	17	453	21	347	3	371	13	3	0	16	15	3	37	55
		PM	4	592	16	612	58	698	20	776	29	2	2	33	13	2	39	54
Bowen n-s	Minor Arterial	AM	5	303	12	320	17	248	9	274	57	24	25	106	40	23	12	75
Tucker e-w	Collector	OFF	19	375	18	412	18	377	28	423	15	31	60	106	25	26	13	64
		PM	37	483	60	580	21	633	63	717	81	74	28	183	37	73	21	131
Bowen n-s	Minor Arterial	AM	65	210	53	328	144	97	114	355	193	736	52	981	19	422	124	565
Pioneer e-w	Major Arterial	OFF	51	118	23	192	151	125	81	357	156	423	28	607	85	453	110	648
		PM	104	256	24	384	252	256	247	755	214	870	91	1175	117	939	263	1319
Pioneer e-w	Major Arterial	AM	54	80	77	211	25	50	10	85	11	843	28	882	58	533	23	614
Roosevelt n-s	Collector	OFF	33	48	76	157	9	31	10	50	9	458	26	493	70	395	29	494
		PM	61	58	96	215	42	37	6	85	15	747	52	814	109	741	24	874
Pioneer e-w	Major Arterial	AM	25	77	57	159	41	29	95	165	34	655	11	700	40	439	13	492
Smith Barry n-s	Collector	OFF	21	41	45	107	29	37	45	111	42	533	18	593	74	473	16	563
		PM	29	64	90	183	68	135	91	294	137	1143	49	1329	184	1256	81	1521
Pioneer e-w	Major Arterial	AM	95	408	171	674	18	104	156	278	348	453	19	820	68	434	19	521
Park Springs n-s	Major Arterial	OFF	62	193	118	373	18	145	172	335	179	364	19	562	100	357	18	475
		PM	69	363	20	452	30	876	134	1040	306	523	38	867	293	615	41	949

Arlington -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Park Row e-w	Minor Arterial	AM	187	710	43	940	94	396	146	636	231	394	70	695	46	314	92	452
Fielder n-s	Major Arterial	OFF	167	479	36	682	101	486	184	771	173	346	94	613	89	278	79	446
		PM	216	669	74	959	148	1079	314	1541	240	486	219	945	189	685	104	978
Park Row e-w	Minor Arterial	AM	58	560	78	696	42	288	41	371	73	400	58	531	27	250	91	368
Davis n-s	Minor Arterial	OFF	43	257	59	359	76	244	1	321	31	252	72	355	2	295	37	334
		PM	58	560	78	696	42	288	41	371	73	400	58	531	27	250	91	368
Little Road n-s	Major Arterial	AM	169	608	147	924	22	863	31	916	82	84	538	704	284	44	20	348
Pleasant Ridge e-w	Minor Arterial	OFF	222	455	151	828	18	446	47	511	46	57	197	300	228	42	9	279
		PM	897	1244	398	2539	64	1165	83	1312	103	146	239	488	611	172	61	844
Green Oak Blvd n-s	Major Arterial	AM	82	771	15	868	24	179	65	268	105	4	39	148	20	20	260	300
Forest Bend e-w	Local	OFF	49	412	23	484	53	336	64	453	115	12	77	204	38	20	50	108
		PM	73	649	30	752	132	1076	124	1332	156	26	198	380	24	25	96	145
Green Oak Blvd n-s	Major Arterial	AM	31	1135	2	1168	15	226	44	285	226	1	40	267	7	2	56	65
Overridge	Collector	OFF	23	337	10	370	10	265	41	316	68	1	19	88	1	0	11	12
		PM	62	513	5	580	40	949	232	1221	91	8	68	167	24	8	68	100
South St e-w	Collector	AM	18	188	27	81	10	362	28	64	26	14	41	233	12	36	16	400
Pecan n-s	Collector	OFF	13	332	35	48	18	299	23	84	4	26	18	380	28	38	18	340
		PM				0				0				0				0
South St e-w	Collector	AM	27	753	17	121	47	544	60	49	24	63	34	797	6	26	17	651
Center n-s	Major Arterial	OFF	29	558	33	92	50	527	63	128	16	45	31	620	33	52	43	640
		PM	32	588	16	104	43	974	54	228	10	71	23	636	100	68	60	1071
South St e-w	Collector	AM	0	13	3	85	30	22	8	166	5	74	6	16	3	114	49	60
Mesquite	Collector	OFF	1	39	3	85	24	49	11	164	5	74	6	43	3	114	47	84
		PM	4	37	7	112	37	94	49	220	2	98	12	48	19	162	39	180
East St n-s	Collector	AM	5	44	27	517	52	34	50	755	19	474	24	76	14	707	34	136
Abrams e-w	Minor Arterial	OFF	6	45	25	596	55	50	55	608	9	567	20	76	18	563	27	160
		PM	19	48	34	884	87	81	124	928	30	829	25	101	37	829	62	292

Arlington -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Border e-w	Collector	AM	156	356	12	396	7	531	31	272	102	265	29	524	6	88	178	569
Pecan n-s	Collector	OFF	152	308	40	303	158	329	49	248	18	149	136	500	58	177	13	536
		PM	158	350	28	392	53	550	24	208	30	350	12	536	20	170	18	627
Border e-w	Collector	AM	33	417	82	308	124	809	59	154	45	214	49	532	22	106	26	992
Center n-s	Major Arterial	OFF	40	557	70	180	79	472	21	296	21	135	24	667	72	144	80	572
		PM	39	456	53	220	74	560	17	192	27	137	56	548	31	143	18	651

Arlington -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Abrams e-w	Minor Arterial	AM	5	11	5	21	9	19	23	51	38	513	8	559	10	591	10	611
Mesquite n-s	Collector	OFF	14	35	19	68	30	43	23	96	33	644	35	712	17	535	44	596
		PM	41	54	28	123	57	94	85	236	37	759	28	824	48	876	39	963
Abrams e-w	Minor Arterial	AM	48	478	54	580	48	414	47	509	31	379	25	435	57	384	43	484
Center n-s	Major Arterial	OFF	43	471	66	580	86	509	57	652	92	502	26	620	70	468	49	587
		PM	73	665	74	812	83	1014	91	1188	107	714	83	904	82	566	68	716
Abrams e-w	Minor Arterial	AM	84	123	96	303	9	136	7	152	10	474	109	593	249	407	16	672
Pecan n-s	Collector	OFF	109	107	184	400	22	80	10	112	11	413	76	500	125	439	16	580
		PM	132	102	186	420	42	132	14	188	13	794	142	949	230	895	24	1149
Abrams e-w	Minor Arterial	AM	13	18	13	44	35	74	15	124	37	735	50	822	35	426	23	484
West n-s	Collector	OFF	13	33	23	69	46	50	20	116	20	488	34	542	27	582	35	644
		PM	34	42	52	128	52	90	66	208	15	589	40	644	34	822	32	888
Main e-w	Collector	AM	15	54	3	72	26	61	33	120	40	130	22	192	3	104	53	160
West n-s	Collector	OFF	10	50	72	132	13	69	30	112	30	101	22	153	8	122	34	164
		PM	16	83	16	115	35	92	37	164	46	118	44	208	16	107	37	160
Division e-w	Major Arterial	AM	21	382	20	423	44	469	99	612	24	770	37	831	50	409	40	499
Center St n-s	Major Arterial	OFF	36	530	57	623	67	537	128	732	29	724	87	840	103	714	39	856
		PM	97	501	134	732	59	650	31	740	54	1000	62	1116	127	800	117	1044

San Angelo (54, 55)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Beauregard Ave e-w	Major Arterial	AM	9	5	5	19	5	13	17	35	42	505	20	567	2	219	6	227
David St. n-s	Local	OFF				0				0				0				0
		PM	50	19	9	78	10	15	75	100	41	494	21	556	7	654	16	677
Beauregard Ave e-w	Major Arterial	AM	12	21	4	37	8	42	9	59	33	467	53	553	14	183	13	210
Randolph n-s	Collector	OFF				0				0				0				0
		PM	63	47	33	143	12	68	38	118	33	344	45	422	15	509	29	553
Beauregard Ave e-w	Major Arterial	AM	16	36	5	57	8	43	21	72	41	365	29	435	12	160	16	188
Irving n-s	Collector	OFF				0				0				0				0
		PM	51	69	34	154	24	67	48	139	25	316	40	381	21	430	14	465
Beauregard Ave e-w	Major Arterial	AM	24	82	28	134	27	194	24	245	36	328	32	396	22	148	12	182
Chadbourne n-s	Minor Arterial	OFF				0				0				0				0
		PM	64	226	38	328	22	225	75	322	58	271	80	409	24	371	25	420
Beauregard Ave e-w	Major Arterial	AM	24	141	17	182	5	140	39	184	36	216	38	290	36	132	3	171
Oakes n-s	Collector	OFF				0				0				0				0
		PM	50	178	37	265	2	135	54	191	59	250	33	342	57	253	15	325
Beauregard Ave e-w	Major Arterial	AM	9	57	45	111	4	50	30	84	28	150	21	199	29	140	9	178
Magdalen n-s	Collector	OFF				0				0				0				0
		PM	9	62	111	182	3	44	32	79	17	245	24	286	13	194	51	258
Harris Ave. e-w	Minor Arterial	AM	6	16	20	42	9	25	29	63	35	419	15	469	19	263	11	293
Randolph n-s	Collector	OFF				0				0				0				0
		PM	24	39	32	95	11	44	113	168	9	325	21	355	24	619	14	657
Harris Ave. e-w	Minor Arterial	AM	16	46	20	82	14	49	30	93	30	348	42	420	23	297	22	342
Irving n-s	Collector	OFF				0				0				0				0
		PM	42	43	21	106	19	63	67	149	18	309	50	377	23	523	10	556
Harris Ave. e-w	Minor Arterial	AM	11	83	12	106	23	195	31	249	19	292	36	347	11	298	22	331
Chadbourne n-s	Minor Arterial	OFF				0				0				0				0
		PM	30	212	24	266	42	250	26	318	23	338	16	377	45	297	29	371

San Angelo -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
Harris Ave. e-w	Minor Arterial	AM	17	117	16	150	8	138	21	167	34	198	61	293	22	295	19	336
Oakes n-s	Collector	OFF				0				0				0				0
		PM	48	168	38	254	17	118	25	160	29	249	39	317	32	353	31	416
Harris Ave. e-w	Minor Arterial	AM	8	46	21	75	2	63	38	103	59	157	30	246	18	271	15	304
Magdalen n-s	Collector	OFF				0				0				0				0
		PM	16	54	29	99	15	49	74	138	38	277	15	330	12	313	10	335
Harris Ave. e-w	Minor Arterial	AM	5	105	10	120	33	182	127	342	42	84	15	141	17	184	27	228
Main St. n-s	Major Arterial	OFF				0				0				0				0
		PM	10	267	17	294	38	171	134	343	114	154	30	298	14	142	52	208
Twohig Ave. e-w	Collector	AM	1	25	14	40	46	37	7	90	8	90	14	112	6	33	13	52
Randolph n-s	Collector	OFF				0				0				0				0
		PM	9	42	47	98	46	88	23	157	8	53	13	74	26	169	57	252
Twohig Ave. e-w	Collector	AM	14	53	11	78	12	49	19	80	5	62	13	80	11	51	10	72
Irving n-s	Collector	OFF				0				0				0				0
		PM	11	97	23	131	12	106	40	158	23	96	43	162	30	135	25	190
Twohig Ave. e-w	Collector	AM	10	124	30	164	15	179	18	212	11	38	9	58	11	46	7	64
Chadbourne n-s	Minor Arterial	OFF				0				0				0				0
		PM	32	239	10	281	17	250	42	309	29	67	48	144	23	80	26	129
Beaton St. n-s	Minor Arterial	AM	12	50	14	76	12	34	11	57	8	27	14	49	8	31	12	51
W. Collin Ave. e-w	Local	OFF	5	37	14	56	35	78	10	123	16	36	9	61	15	38	14	67
		PM	8	66	29	103	7	55	14	76	27	28	15	70	26	49	15	90
Beaton St. n-s	Minor Arterial	AM	3	64	14	81	8	30	8	46	20	46	10	76	7	22	3	32
W. 6th Ave. e-w	Local	OFF	5	53	6	64	2	37	24	63	29	38	4	71	5	17	13	35
		PM	8	82	12	102	2	81	28	111	33	60	23	116	19	56	10	85
Commerce St. n-s	Local	AM	1	9	1	11	8	21	14	43	1	57	5	63	5	48	40	93
W. 3rd St. e-w	Local	OFF	3	16	2	21	4	30	6	40	3	20	10	33	2	40	12	54
		PM	5	25	9	39	16	37	7	60	5	42	11	58	3	59	28	90

San Angelo -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Commerce St. n-s	Local	AM	4	13	1	18	3	43	3	49	6	7	15	28	0	3	1	4
W. 4th Ave. e-w	Local	OFF	16	26	5	47	1	33	5	39	6	10	16	32	1	0	2	3
		PM	10	39	7	56	3	36	6	45	2	19	23	44	4	3	1	8
Commerce St. n-s	Local	AM	5	13	3	21	9	34	13	56	6	52	18	76	7	44	3	54
W. 5th Ave. e-w	Collector	OFF	11	29	8	48	11	22	19	52	9	47	17	73	5	52	8	65
		PM	12	32	19	63	12	35	22	69	12	62	22	96	6	88	10	104
Commerce St. n-s	Local	AM	8	12	5	25	1	16	3	20	18	35	13	66	0	44	7	51
W. Collin Ave. e-w	Local	OFF	7	31	15	53	0	6	5	11	25	32	22	79	3	44	8	55
		PM	9	34	20	63	3	19	6	28	41	41	24	106	4	50	6	60

San Angelo -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Twohig Ave. e-w	Collector	AM	16	173	4	193	5	169	21	195	15	15	14	44	4	31	7	42
Oakes n-s	Collector	OFF				0				0				0				0
		PM	12	181	7	200	6	171	25	202	43	46	34	123	7	28	3	38
Concho Ave. e-w	Collector	AM	14	47	47	108	11	24	11	46	12	158	10	180	30	121	30	181
Irving n-s	Collector	OFF				0				0				0				0
		PM	35	70	48	153	33	118	38	189	10	213	33	256	38	270	37	345
Concho Ave. e-w	Collector	AM	9	113	21	143	41	127	30	198	28	160	20	208	24	148	22	194
Chadbourne n-s	Minor Arterial	OFF				0				0				0				0
		PM	41	205	50	296	49	216	73	338	27	189	38	254	40	230	29	299
Concho Ave. e-w	Collector	AM	10	136	23	169	17	159	17	193	23	142	40	205	34	162	27	223
Oakes n-s	Collector	OFF				0				0				0				0
		PM	26	170	74	270	39	188	36	263	44	233	31	308	50	233	22	305
Chadbourne n-s	Minor Arterial	AM	1	86	1	88	2	71	4	77	2	15	8	25	15	11	23	49
2nd St. e-w	Local	OFF				0				0				0				0
		PM	4	310	12	326	3	182	1	186	14	6	7	27	4	3	6	13
Chadbourne n-s	Minor Arterial	AM	18	88	16	122	23	242	42	307	5	33	14	52	4	45	13	62
College Ave. e-w	Collector	OFF				0				0				0				0
		PM	19	290	14	323	17	228	27	272	24	32	31	87	13	157	23	193
Main St. n-s	Major Arterial	AM	3	186	32	221	27	276	11	314	4	9	3	16	31	24	15	70
Koberlin e-w	Local	OFF				0				0				0				0
		PM	8	329	106	443	31	292	19	342	11	15	6	32	71	25	31	127
Bryant Ave. n-s	Major Arterial	AM	23	430	25	478	9	1022	36	1067	15	33	44	92	62	43	9	114
14th St. e-w	Collector	OFF				0				0				0				0
		PM	57	1196	62	1315	8	755	30	793	48	61	49	158	50	61	13	124
Bryant Ave. n-s	Major Arterial	AM	45	245	56	346	30	557	15	602	8	111	136	255	131	106	4	241
19th St. e-w	Minor Arterial	OFF				0				0				0				0
		PM	189	791	121	1101	44	420	18	482	23	165	85	273	190	247	22	459

San Angelo -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Bryant Ave. n-s	Major Arterial	AM	22	314	8	344	4	698	9	711	6	22	24	52	18	14	19	51
23rd St. e-w	Local	OFF				0				0				0				0
		PM	41	798	56	895	17	425	13	455	17	39	14	70	4	31	18	53
Bryant Ave. n-s	Major Arterial	AM	70	185	59	314	16	520	85	621	89	166	63	318	135	147	6	288
29th St. e-w	Minor Arterial	OFF				0				0				0				0
		PM	170	470	153	793	20	317	63	400	58	222	103	383	13	179	110	302
Bryant Ave. n-s	Major Arterial	AM	31	451	27	509	27	298	541	866	556	124	20	700	6	136	24	166
Knickerbocker Rd eb	Minor Arterial	OFF				0				0				0				0
Ave. Q wb		PM	24	410	25	459	50	532	603	1185	628	186	35	849	21	146	33	200
Bryant Ave. n-s	Major Arterial	AM	33	840	10	883	61	735	220	1016	135	141	39	315	83	168	23	274
Ave. N e-w	Minor Arterial	OFF				0				0				0				0
		PM	38	858	38	934	50	1024	179	1253	171	245	51	467	98	210	45	353
Bryant Ave. n-s	Major Arterial	AM	7	1042	69	1118	97	1017	111	1225	9	71	60	140	102	131	96	329
Ave. L e-w	Collector	OFF				0				0				0				0
		PM	13	914	66	993	132	1162	116	1410	69	81	14	164	128	139	92	359

Austin (56, 57)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Lamar n-s	Major Arterial	AM	4	1223	119	1346	111	666	1	778	3	6	9	18	36	6	37	79
10th st e-w	Collector	OFF				0				0				0				0
		PM	39	994	35	1068	94	1257	39	1390	38	28	58	124	101	31	167	299
Lamar n-s	Major Arterial	AM	0	1438	221	1659	111	628	10	749	23	57	24	104	7	3	20	30
9th st e-w	Collector	OFF				0				0				0				0
		PM	27	1042	49	1118	28	1353	38	1419	36	33	15	84	23	99	86	208
Lamar n-s	Major Arterial	AM	9	2108	27	2144	172	579	21	772	3	5	13	21	47	18	397	462
Riverside Dr. e-w	Minor Arterial	OFF				0				0				0				0
		PM	9	1071	38	1118	191	1964	33	2188	26	38	30	94	176	42	717	935
Lamar n-s	Major Arterial	AM	51	1375	515	1941	93	341	128	562	411	519	53	983	108	236	130	474
Barton Springs Rd. e-	Major Arterial	OFF				0				0				0				0
		PM	86	674	201	961	141	1367	379	1887	205	348	84	637	390	529	95	1014
Lamar n-s	Major Arterial	AM	18	2001	5	2024	9	415	22	446	124	1	17	142	10	2	21	33
Treadwell St. e-w	Local	OFF				0				0				0				0
		PM	27	867	7	901	25	1813	79	1917	78	2	30	110	17	2	17	36
Lamar n-s	Major Arterial	AM	29	1838	241	2108	11	373	12	396	46	84	41	171	70	48	28	146
Heather eb	Local	OFF				0				0				0				0
Mary wb	Collector	PM	21	794	139	954	35	1736	48	1819	38	61	46	145	203	96	28	327
Lamar n-s	Major Arterial	AM	85	2054	13	2152	0	479	14	493	70	34	80	184	23	72	23	118
Bluebonnet Lane e-w	Collector	OFF				0				0				0				0
		PM	91	972	45	1108	9	2027	48	2084	58	33	121	212	41	36	8	85

Austin -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Lamar n-s	Major Arterial	AM	86	1450	8	1544	6	363	29	398	91	84	104	279	28	54	4	86
Barton Skyway e-w	Collector	OFF				0				0				0				0
		PM	107	735	14	856	31	1446	63	1540	61	74	100	235	42	84	5	131
Lamar n-s	Major Arterial	AM	4	1275	41	1320	47	447	6	500	91	15	44	150	37	4	216	257
Panther Trail e-w	Local	OFF				0				0				0				0
		PM	36	740	35	811	165	1439	67	1671	29	8	19	56	36	18	119	173
Guadalupe n-s	Major Arterial	AM	19	347	26	392	165	668	12	845	15	84	69	168	37	35	46	118
W. 21st e-w	Local	OFF				0				0				0				0
		PM	59	733	41	833	229	816	59	1104	29	89	55	173	53	177	190	420
Guadalupe n-s	Major Arterial	AM	59	285	5	349	32	817	53	902	40	256	277	573	20	76	12	108
W. 29th e-w	Local	OFF				0				0				0				0
		PM	191	1120	11	1322	31	975	195	1201	192	186	190	568	54	234	36	324
Guadalupe n-s	Major Arterial	AM	2	324	11	337	73	831	18	922	15	6	37	58	48	8	48	104
30th St. e-w	Major Arterial	OFF				0				0				0				0
		PM	7	1215	37	1259	62	982	31	1075	43	17	36	96	120	35	133	288
Guadalupe n-s	Major Arterial	AM	43	351	5	399	14	847	38	899	53	80	48	181	14	85	9	108
W.34th St. e-w	Local	OFF				0				0				0				0
		PM	102	1328	24	1454	28	847	29	904	105	120	98	323	23	108	14	145
Guadalupe n-s	Major Arterial	AM	49	358	5	412	13	783	87	883	9	2	16	27	26	9	6	41
E.41st St. e-w	Local	OFF				0				0				0				0
		PM	22	1100	24	1146	1	731	7	739	79	5	41	125	22	4	20	46
Burnet Road n-s	Major Arterial	AM	30	120	11	161	529	380	49	958	82	628	60	770	22	338	163	523
W 45th St e-w	Major Arterial	OFF				0				0				0				0
		PM	156	410	20	586	338	221	112	671	114	418	41	573	18	710	518	1246
Burnet Road n-s	Major Arterial	AM	4	432	12	448	19	1044	8	1071	10	36	15	61	91	26	14	131
Justin wb	Minor Arterial	OFF				0				0				0				0
Pegram eb	Collector	PM	24	1196	42	1262	49	862	22	933	23	36	7	66	94	77	49	220

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Burnet Road n-s	Major Arterial	AM	21	488	13	522	7	1063	26	1096	44	18	98	160	10	4	2	16
Greenlawn Parkway e-w	Local	OFF				0				0				0				0
		PM	68	1196	101	1365	51	933	32	1016	50	36	102	188	85	36	50	171
Burnet Road n-s	Major Arterial	AM	23	544	15	582	17	1047	46	1110	31	17	34	82	26	17	33	76
Richcreek Rd e-w	Collector	OFF				0				0				0				0
		PM	34	1384	18	1436	35	1039	33	1107	25	16	23	64	22	34	42	98
Burnet Road n-s	Major Arterial	AM	60	466	40	566	79	993	10	1082	43	131	107	281	65	131	90	286
Northcross eb	Collector	OFF				0				0				0				0
St. Joseph Blvd wb	Minor Arterial	PM	162	1263	55	1480	72	976	44	1092	47	176	128	351	50	199	130	379
Burnet Road n-s	Major Arterial	AM	9	702	206	917	18	1371	26	1415	18	14	13	45	472	25	31	528
Buell Ave eb	Minor Arterial	OFF				0				0				0				0
Ohlen Rd wb	Minor Arterial	PM	21	1311	592	1924	39	1380	17	1436	33	50	27	110	440	25	58	523
Jefferson n-s	Local	AM	81	41	78	200	83	55	16	154	71	1659	49	1779	39	607	19	665
35th e-w	Major Arterial	OFF				0				0				0				0
		PM	68	78	84	230	145	107	107	359	77	913	52	1042	79	1326	37	1442
Medical Parkway n-s	Collector	AM	50	65	72	187	84	133	99	316	129	1048	121	1298	101	830	49	980
W 38th St. e-w	Major Arterial	OFF				0				0				0				0
		PM	164	181	193	538	61	71	163	295	170	837	42	1049	63	1274	93	1430
Duval n-s	Collector	AM	32	86	19	137	98	247	52	397	17	660	48	725	9	926	28	963
W 38th St. e-w	Major Arterial	OFF				0				0				0				0
		PM	95	285	54	434	51	170	59	280	42	951	27	1020	28	786	28	842
Red River n-s	Collector	AM	19	168	12	199	13	365	58	436	32	422	1	455	22	815	25	862
W 38th St. e-w	Major Arterial	OFF				0				0				0				0
		PM	69	608	60	737	9	285	62	356	127	823	1	951	30	595	59	684

Addison (58, 59)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Addison Rd n-s	Minor Arterial	AM	53	104	1	158	31	250	18	299	27	63	109	199	13	70	29	112
Sojourn Dr. e-w	Collector	OFF	64	148	5	217	13	95	28	136	23	36	31	90	5	14	4	23
		PM	300	427	4	731	3	67	31	101	44	53	62	159	3	35	3	41
Addison Rd n-s	Minor Arterial	AM	140	201	29	370	88	415	19	522	3	191	543	737	66	148	169	383
Westgrove Dr e-w	Collector	OFF	176	219	41	436	74	193	13	280	13	75	132	220	24	75	95	194
		PM	487	557	72	1116	118	207	16	341	23	186	163	372	47	194	155	396
Addison Rd n-s	Minor Arterial	AM	20	229	72	321	156	739	17	912	7	5	8	20	327	27	158	512
Keller Springs Rd e-w	Minor Arterial	OFF	23	315	123	461	64	301	11	376	12	11	16	39	94	13	120	227
		PM	19	742	411	1172	129	415	7	551	22	19	19	60	144	7	274	425
Addison Rd n-s	Minor Arterial	AM	21	326	29	376	51	1000	43	1094	6	0	9	15	21	11	8	40
Airport Parkway e-w	Collector	OFF	23	332	15	370	7	313	22	342	18	10	8	36	20	6	33	59
		PM	18	927	13	958	16	335	8	359	34	2	20	56	36	7	19	62
Keller Springs Rd e-w	Minor Arterial	AM	27	46	19	92	6	304	18	328	9	164	87	260	124	418	5	547
Quorum Drive n-s	Minor Arterial	OFF	30	86	62	178	2	64	10	76	11	179	31	221	29	182	9	220
		PM	144	262	195	601	5	58	8	71	29	452	38	519	32	266	12	310
Airport Parkway e-w	Collector	AM	15	572	7	594	14	119	29	162	6	16	4	26	1	52	30	83
Quorum Drive n-s	Minor Arterial	OFF	2	117	3	122	3	154	14	171	6	25	14	45	3	18	6	27
		PM	14	135	5	154	12	484	9	505	21	74	46	141	10	25	3	38
Quorum Drive n-s	Minor Arterial	AM	84	132	175	391	113	330	37	480	12	282	82	376	162	458	26	646
Arapaho e-w	Collector	OFF	62	126	113	301	12	95	11	118	17	223	67	307	79	196	25	300
		PM	80	326	195	601	27	149	19	195	69	555	92	716	175	430	134	739
Quorum Drive n-s	Minor Arterial	AM	153	149	33	335	52	291	249	592	170	840	195	1205	81	1397	81	1559
Belt Line Rd. e-w	Major Arterial	OFF	124	84	63	271	55	63	96	214	141	1292	106	1539	65	1074	48	1187
		PM	279	295	84	658	92	138	158	388	235	1692	99	2026	73	1206	73	1352
Midway Rd. n-s	Major Arterial	AM	71	799	69	939	47	1212	17	1276	18	33	25	76	108	117	305	530
Lindberg Dr. e-w	Collector	OFF	98	1048	62	1208	38	1071	114	1223	97	21	48	166	50	40	165	255
		PM	61	1968	71	2100	69	1195	104	1368	76	68	74	218	133	82	474	689

Addison -- Continued

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Midway Rd. n-s	Major Arterial	AM	141	654	182	977	252	1596	77	1925	105	1054	242	1401	178	1028	266	1472
Belt Line Rd e-w	Major Arterial	OFF	198	756	235	1189	280	799	101	1180	146	815	183	1144	260	807	230	1297
		PM	245	1319	344	1908	240	959	126	1325	166	1066	141	1373	355	1337	344	2036
Midway Rd. n-s	Major Arterial	AM	58	1028	115	1201	34	2064	21	2119	53	93	249	395	232	9	17	258
Beltway Dr. e-w	Collector	OFF	115	1216	96	1427	39	1178	23	1240	24	23	75	122	83	17	26	126
		PM	220	1687	260	2167	91	1058	29	1178	35	78	65	178	108	75	26	209
Midway Rd. n-s	Major Arterial	AM	21	1188	33	1242	89	1218	26	1333	53	54	68	175	10	27	53	90
Proton Dr. e-w	Collector	OFF	30	1368	14	1412	18	1120	40	1178	24	7	45	76	8	20	43	71
		PM	146	1849	20	2015	60	1461	32	1553	112	24	54	190	61	112	159	332
Midway Rd. n-s	Major Arterial	AM	147	1382	305	1834	336	1403	62	1801	166	584	368	1118	271	312	236	819
Spring Valley Rd. e-w	Minor Arterial	OFF	204	1017	255	1476	177	1083	74	1334	71	300	101	472	307	372	190	869
		PM	242	1193	240	1675	180	1270	141	1591	141	397	36	574	405	754	205	1364
Belt Line e-w	Major Arterial	AM	19	17	30	66	12	11	99	122	350	1892	96	2338	40	1074	57	1171
Surveyor Blvd n-s	Collector	OFF	44	13	20	77	42	30	103	175	130	1321	1	1452	35	1038	33	1106
		PM	102	31	59	192	48	88	232	368	105	1551	14	1670	66	1649	14	1729
Belt Line e-w	Major Arterial	AM	227	480	273	980	138	1640	391	2169	248	1243	328	1819	133	1004	51	1188
Marsh Lane n-s	Major Arterial	OFF	193	673	138	1004	196	518	185	899	283	844	180	1307	235	895	153	1283
		PM	344	1380	152	1876	184	676	204	1064	352	1144	225	1721	267	1378	213	1858
Addison sb	Minor Arterial	AM	119	645	304	1068	101	249	51	401	174	1493	89	1756	207	1233	9	1449
Inwood nb	Minor Arterial	OFF	112	216	227	555	143	236	161	540	181	1184	102	1467	220	1271	14	1505
Belt Line e-w	Major Arterial	PM	130	446	323	899	256	774	221	1251	216	1545	85	1846	360	1814	9	2183

Corsicana (60, 61)

Intersecting Streets	Functional Classification	Peak	Northbound Left	Northbound Thru	Northbound Right	Northbound Total	Southbound Left	Southbound Thru	Southbound Right	Southbound Total	Eastbound Left	Eastbound Thru	Eastbound Right	Eastbound Total	Westbound Left	Westbound Thru	Westbound Right	Westbound Total
Main St. n-s	Local	AM	2	40	6	48	17	104	14	135	9	59	15	83	9	34	8	51
W. 3rd Ave e-w	Local	OFF	5	52	5	62	9	88	8	105	6	56	6	68	10	52	14	76
		PM	11	121	11	143	6	120	17	143	13	53	11	77	13	49	8	70
Main St. n-s	Local	AM	4	34	14	52	8	98	11	117	11	20	16	47	4	20	8	32
W. 4th Ave. e-w	Local	OFF	4	60	10	74	9	103	14	126	1	34	20	55	5	21	7	33
		PM	19	130	20	169	11	138	19	168	9	37	24	70	14	46	10	70
Main St. n-s	Local	AM	7	25	8	40	22	75	13	110	10	72	17	99	5	53	7	65
W. 5th Ave e-w	Collector	OFF	9	58	11	78	14	96	9	119	15	66	22	103	16	42	5	63
		PM	21	118	29	168	18	113	30	161	23	82	23	128	24	115	15	154
Main St. n-s	Local	AM	15	30	7	52	4	52	8	64	3	45	11	59	18	33	17	68
W. Collin Ave. e-w	Local	OFF	13	50	18	81	8	115	14	137	4	34	8	46	22	33	38	93
		PM	18	94	12	124	12	146	17	175	17	67	40	124	37	89	25	151
Main St. n-s	Local	AM	10	35	12	57	18	42	37	97	8	45	10	63	2	30	8	40
W. 6th Ave e-w	Local	OFF	13	48	4	65	25	44	99	168	18	47	21	86	4	28	23	55
		PM	36	71	12	119	33	73	104	210	42	80	31	153	8	65	21	94
Beaton St. n-s	Minor Arterial	AM	7	46	8	61	3	66	6	75	6	32	19	57	7	34	9	50
W. 3rd Ave e-w	Local	OFF	9	49	10	68	4	49	5	58	8	20	32	60	11	25	9	45
		PM	11	112	14	137	6	57	8	71	9	40	17	66	12	49	5	66
Beaton St. n-s	Minor Arterial	AM	4	50	4	58	5	61	14	80	7	12	6	25	5	3	0	8
W. 4th Ave. e-w	Local	OFF	11	68	14	93	6	55	26	87	6	21	18	45	3	10	6	19
		PM	23	120	13	156	6	59	15	80	11	24	27	62	6	8	0	14
Beaton St. n-s	Minor Arterial	AM	6	54	7	67	16	52	5	73	4	54	8	66	1	50	10	61
W. 5th Ave e-w	Collector	OFF	12	64	15	91	7	52	11	70	10	30	16	56	11	35	19	65
		PM	22	119	21	162	15	61	20	96	16	51	22	89	11	81	20	112

Dauphin County, PA (62)

Intersecting Streets	Functional Classification	Peak	Northbound				Southbound				Eastbound				Westbound			
			Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total
Linglestown Rd. e-w	Minor Arterial	AM	180	10	119	309	37	86	75	198	16	260	126	402	109	450	13	572
Colonial Rd n-s	Collector	OFF				0				0				0				0
		PM	221	98	177	496	39	37	25	101	63	573	238	874	141	348	44	533

Appendix E

t-Test Results Comparing AM and PM Mean Turning Proportions

Table E-1
t-Test Results
Comparing AM and PM Mean Turning Proportions
Left Turning Flow

Functional Classification	AM Mean	PM Mean	Calculated Statistic	Table Statistic
Major Art. to Major Art.	0.1662	0.1786	-0.79	1.645
Major Art. to Minor Art.	0.0869	0.0957	-0.94	1.645
Major Art. to Collector	0.0722	0.0749	-0.04	1.645
Major Art. to Local Road	0.0502	0.0532	0.12	1.663
Minor Art. to Major Art.	0.2546	0.2438	-0.84	1.645
Minor Art. to Minor Art.	0.1494	0.1486	0.037	1.658
Minor Art. to Collector	0.0971	0.1028	0.22	1.645
Minor Art. to Local Road	0.0746	0.0609	-0.28	1.697
Collector to Major Art.	0.2618	0.2646	-0.14	1.645
Collector to Minor Art.	0.2066	0.2327	-0.97	1.645
Collector to Collector	0.1460	0.1376	0.33	1.669
Local Road to Major Art.	0.3464	0.3475	-0.03	1.663
Local Road to Minor Art.	0.2603	0.3062	0.63	1.697
Local Road to Local Road	0.1303	0.1573	0.48	1.706

Table E-2
t-Test Results
Comparing AM and PM Mean Turning Proportions
Through Traffic Flow

Functional Classification	AM Mean	PM Mean	Calculated Statistic	Table Statistic
Major Art. to Major Art.	0.6719	0.6692	0.67	1.645
Major Art. to Minor Art.	0.8109	0.7998	-0.17	1.645
Major Art. to Collector	0.8553	0.8559	0.36	1.645
Major Art. to Local Road	0.9083	0.9066	0.15	1.663
Minor Art. to Major Art.	0.5202	0.5446	0.65	1.645
Minor Art. to Minor Art.	0.6973	0.6883	-0.45	1.658
Minor Art. to Collector	0.8108	0.8055	0.03	1.645
Minor Art. to Local Road	0.8152	0.8254	-0.14	1.697
Collector to Major Art.	0.4528	0.4342	-0.61	1.645
Collector to Minor Art.	0.5311	0.4964	-0.32	1.645
Collector to Collector	0.6672	0.6931	0.59	1.669
Local Road to Major Art.	0.2991	0.2857	-0.35	1.663
Local Road to Minor Art.	0.4591	0.4194	0.10	1.697
Local Road to Local Road	0.6669	0.6468	0.48	1.706

Table E-3
t-Test Results
Comparing AM and PM Mean Turning Proportions
Right Turning Flow

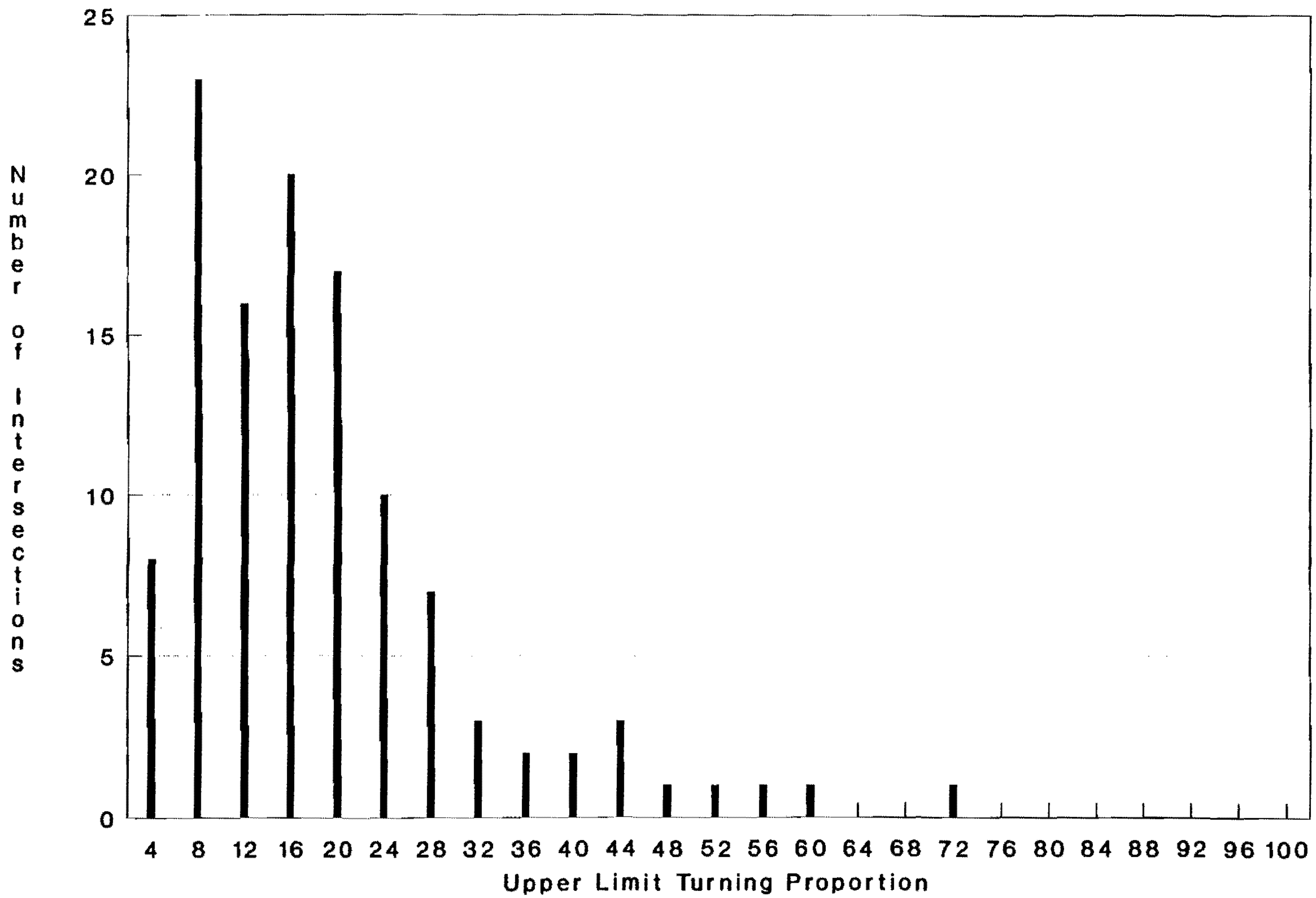
Functional Classification	AM Mean	PM Mean	Calculated Statistic	Table Statistic
Major Art. to Major Art.	0.1615	0.1510	0.67	1.645
Major Art. to Minor Art.	0.1022	0.1045	0.17	1.645
Major Art. to Collector	0.0725	0.0692	0.36	1.645
Major Art. to Local Road	0.0416	0.0402	0.15	1.663
Minor Art. to Major Art.	0.2252	0.2116	0.65	1.645
Minor Art. to Minor Art.	0.1532	0.1632	-0.45	1.658
Minor Art. to Collector	0.0921	0.0916	0.03	1.645
Minor Art. to Local Road	0.1101	0.1139	-0.14	1.697
Collector to Major Art.	0.2883	0.3013	-0.61	1.645
Collector to Minor Art.	0.2623	0.2709	-0.32	1.645
Collector to Collector	0.1869	0.1694	0.60	1.669
Local Road to Major Art.	0.3546	0.3669	-0.35	1.663
Local Road to Minor Art.	0.2807	0.2744	0.10	1.697
Local Road to Local Road	0.2029	0.1960	0.22	1.706

Appendix F

Turning Proportion Distributions

TURNING PROPORTION DISTRIBUTION

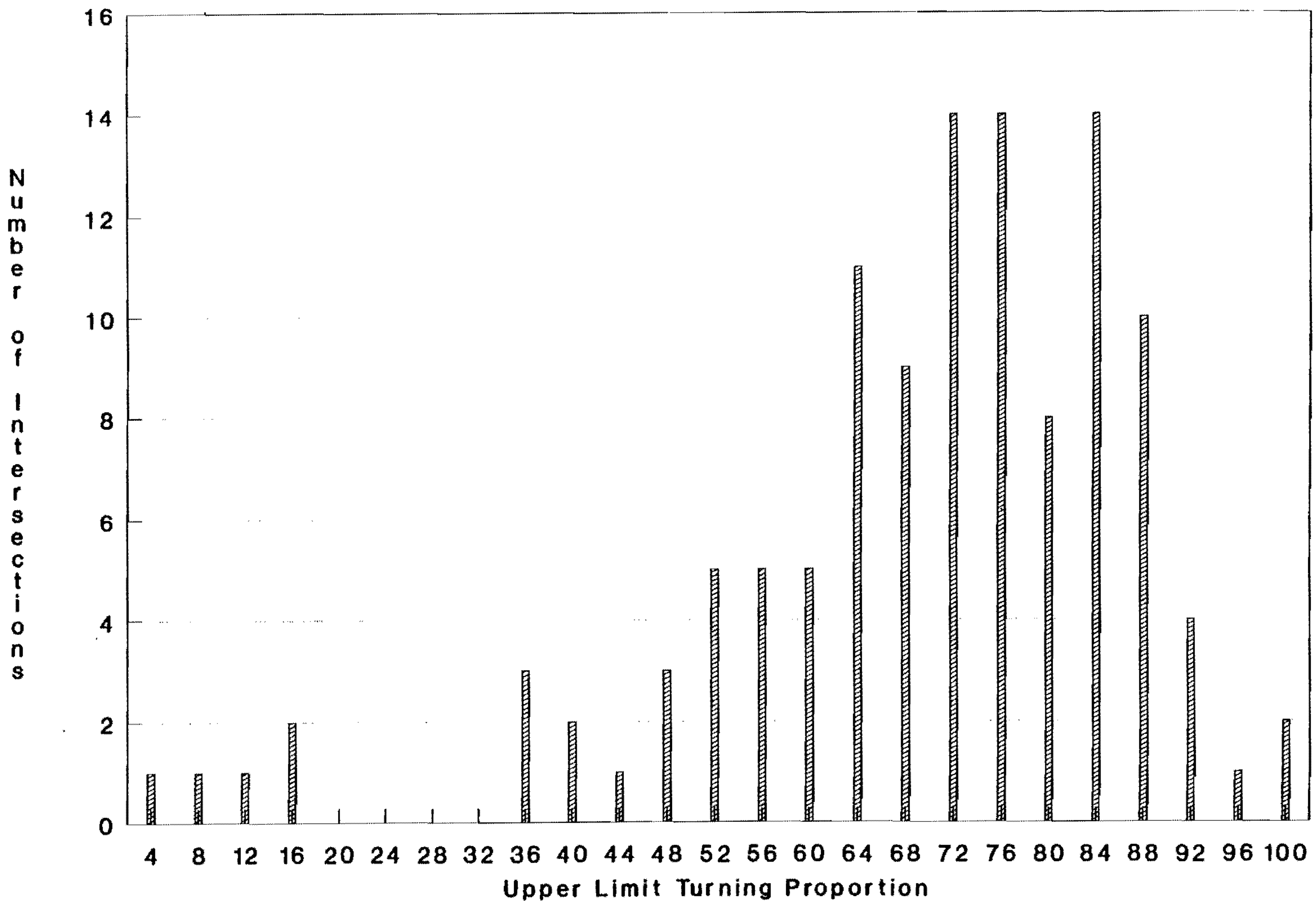
Major Arterial to Major Arterial



Left-Turning Traffic

TURNING PROPORTION DISTRIBUTION

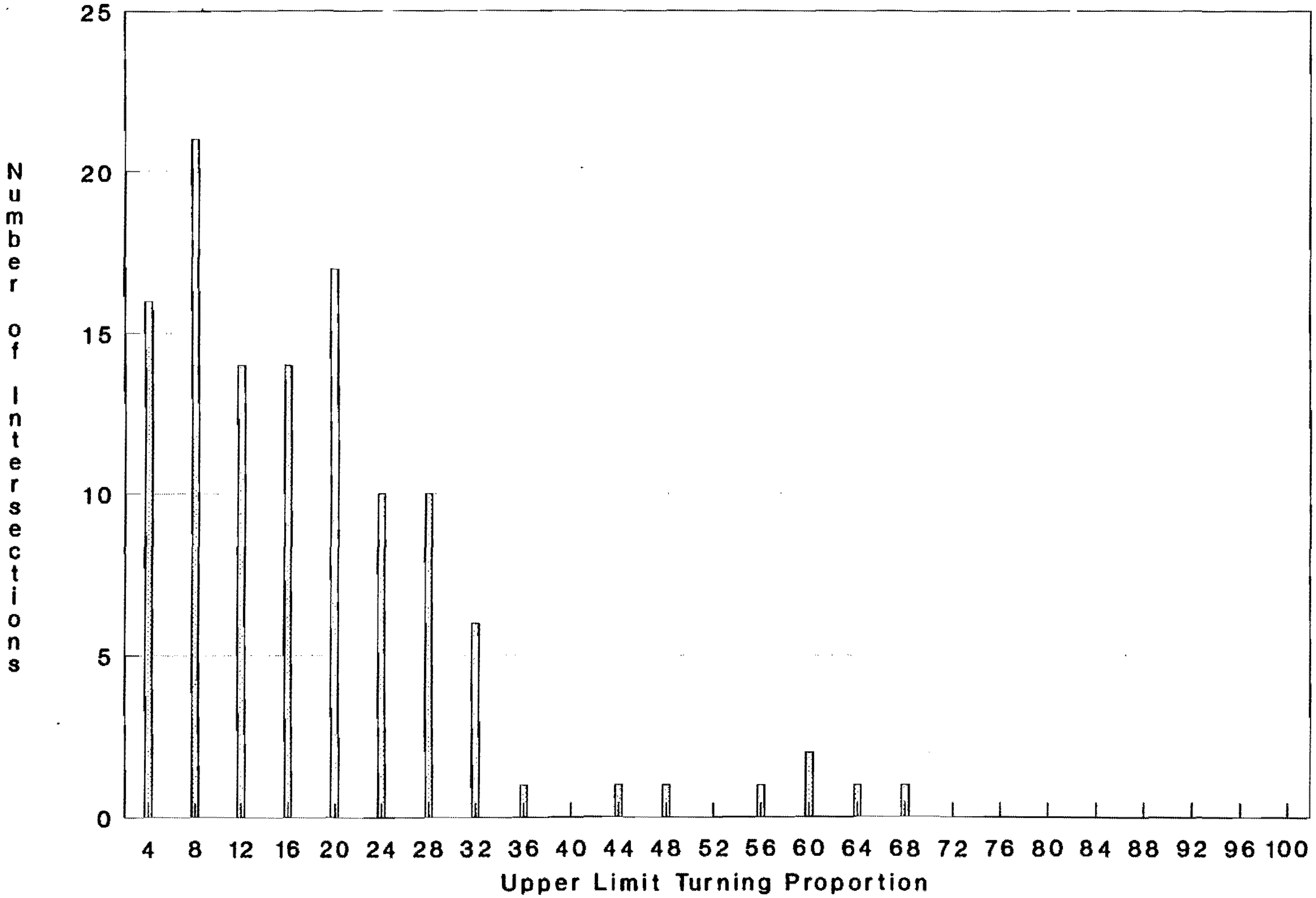
Major Arterial to Major Arterial



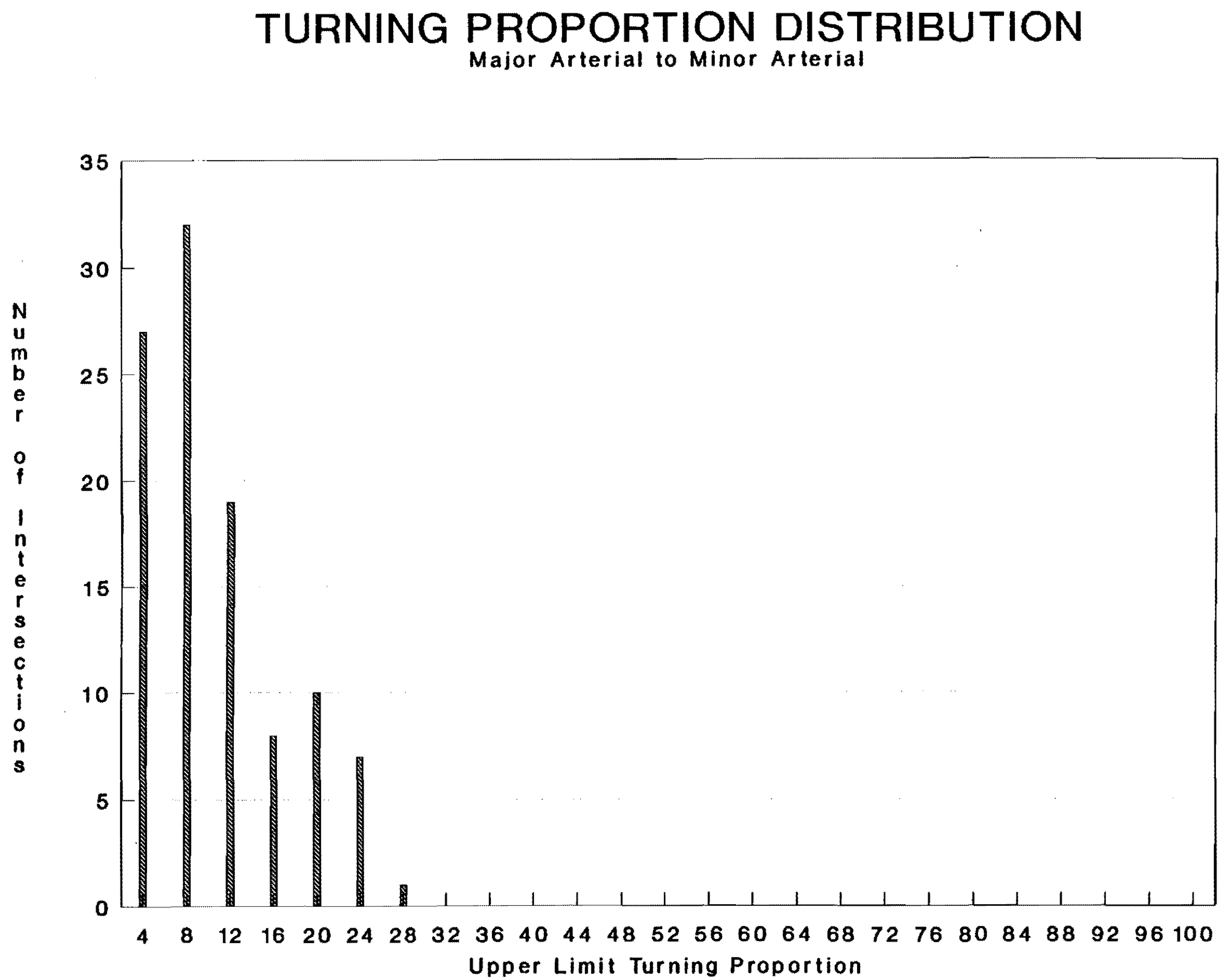
Through Traffic

TURNING PROPORTION DISTRIBUTION

Major Arterial to Major Arterial



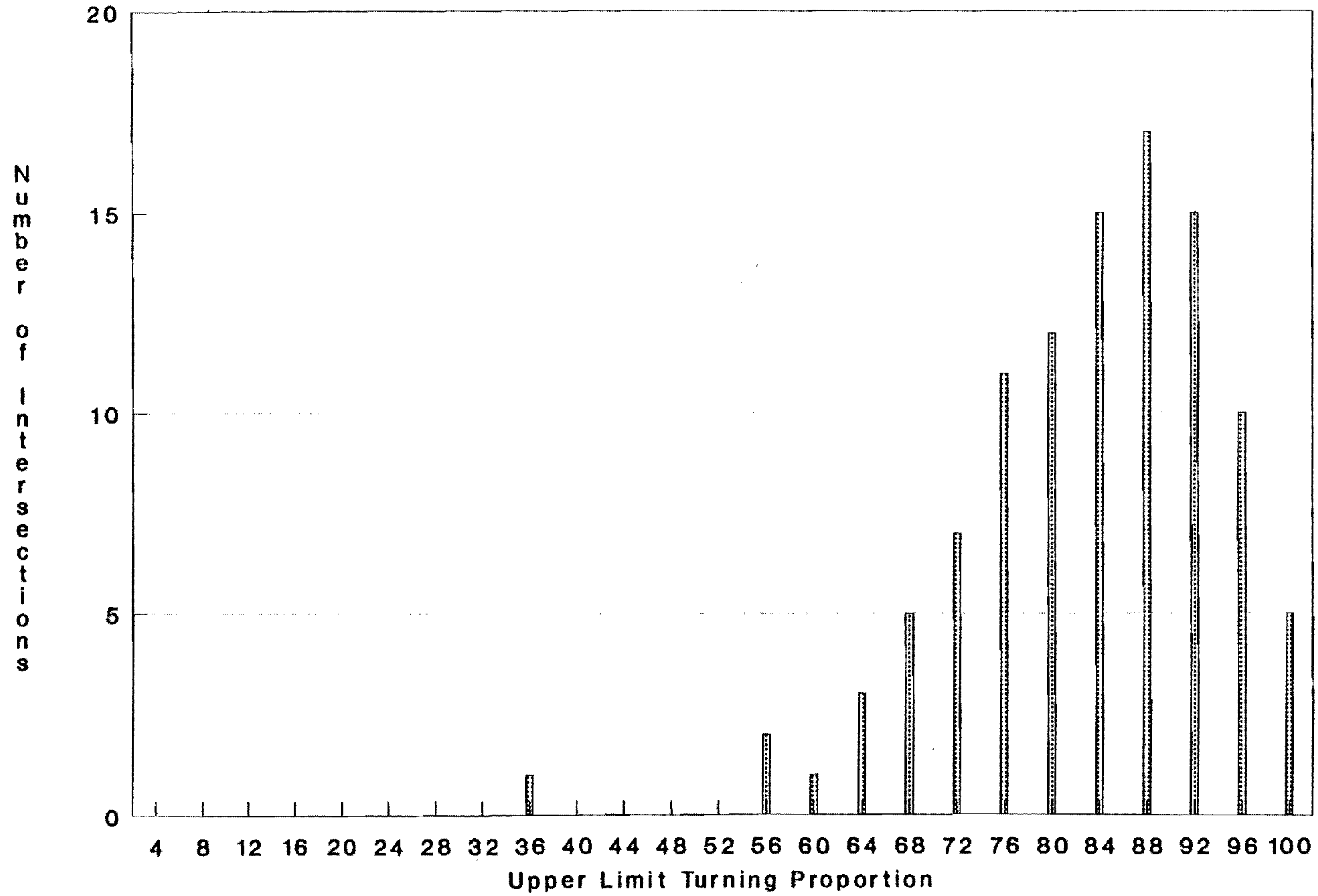
Right-Turning Traffic



Left-Turning Traffic

TURNING PROPORTION DISTRIBUTION

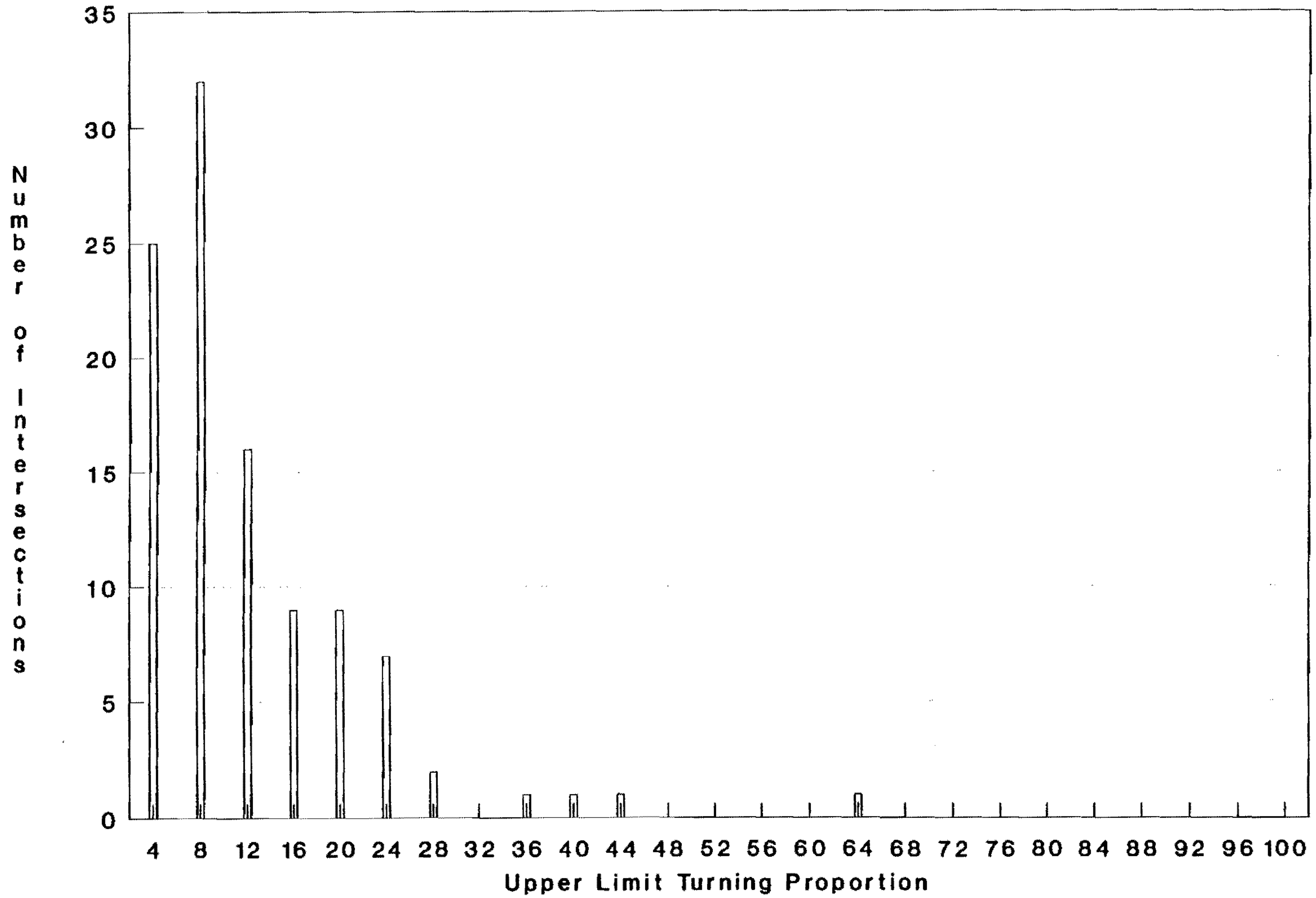
Major Arterial to Minor Arterial



Through Traffic

TURNING PROPORTION DISTRIBUTION

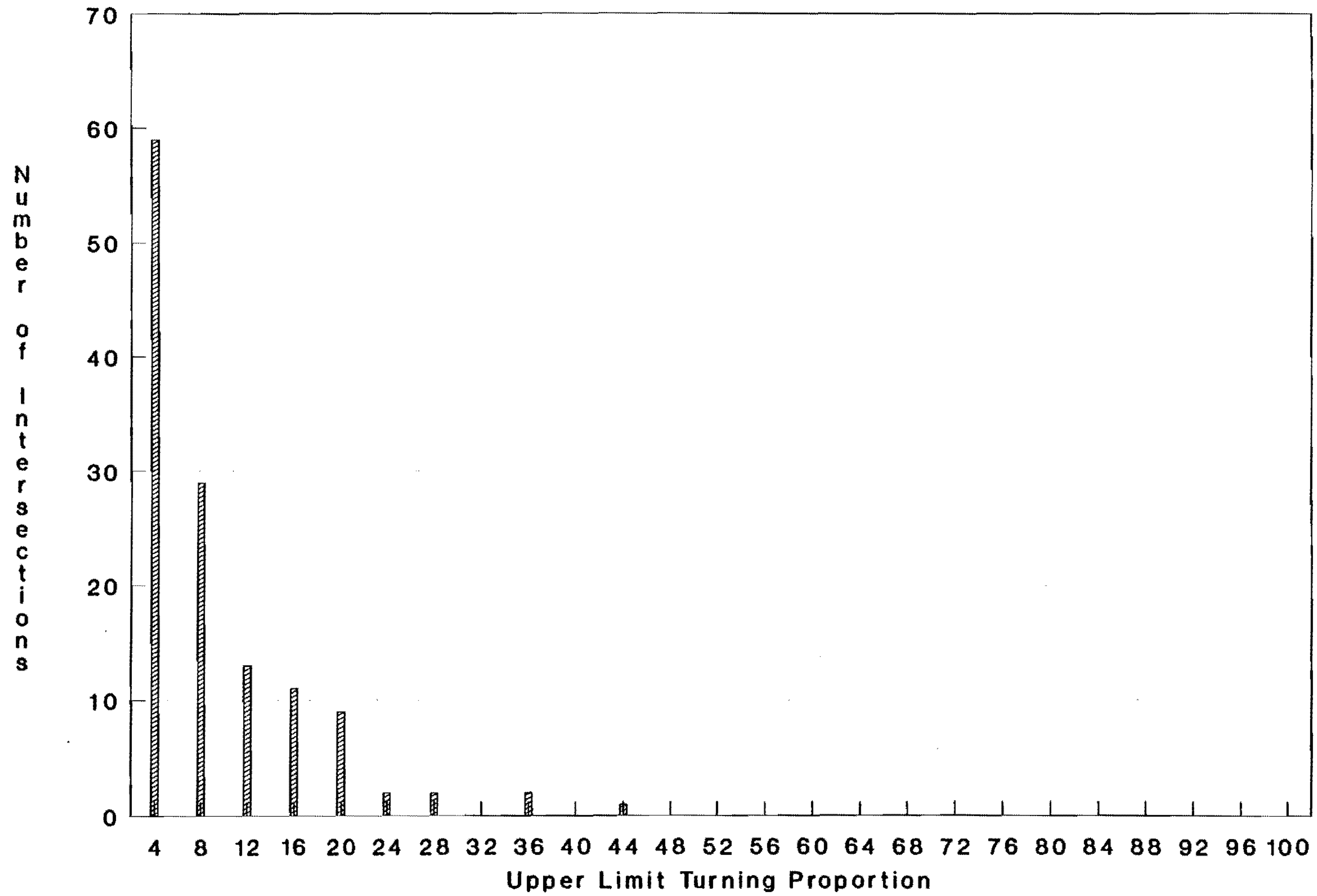
Major Arterial to Minor Arterial



Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

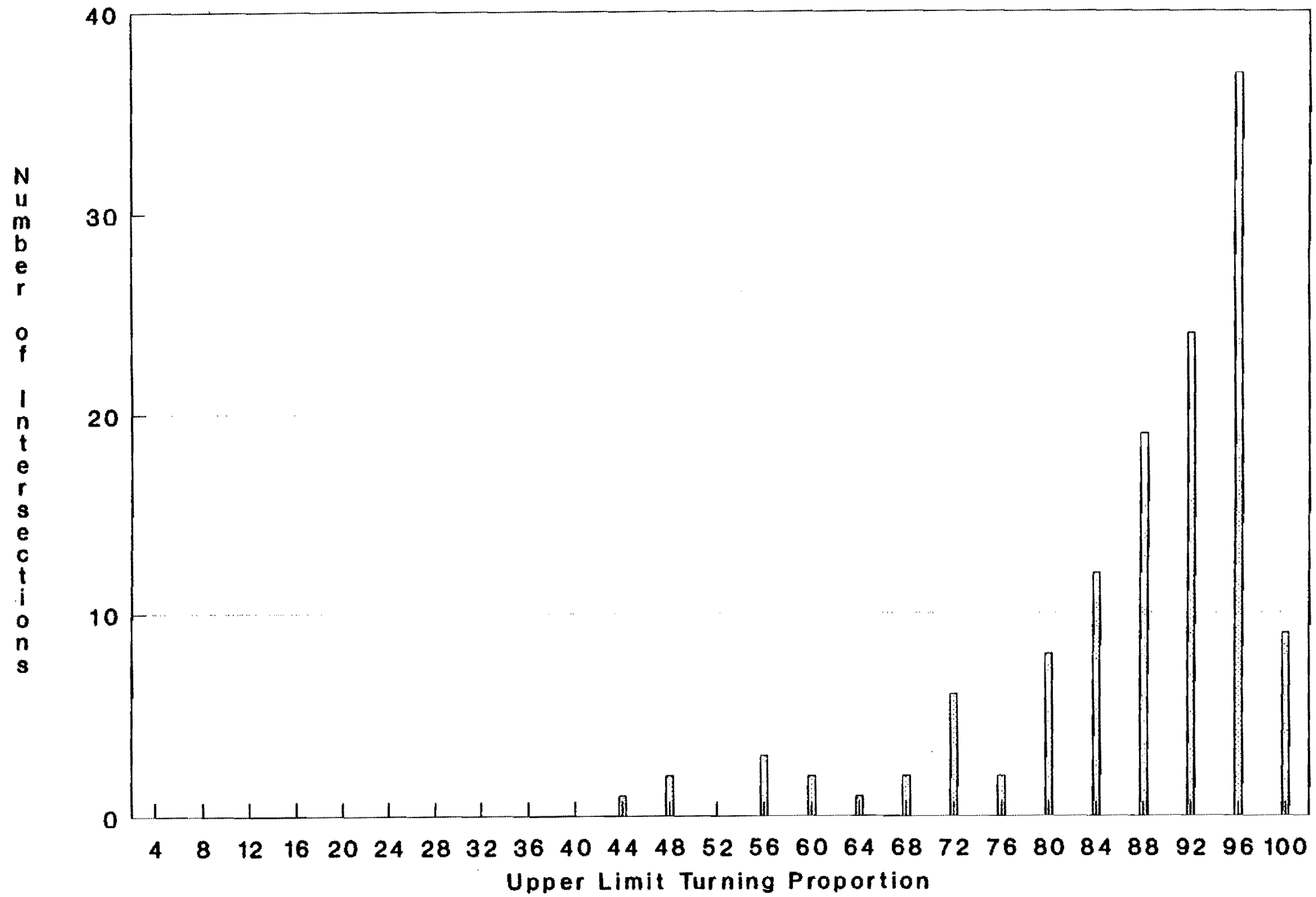
Major Arterial to Collector



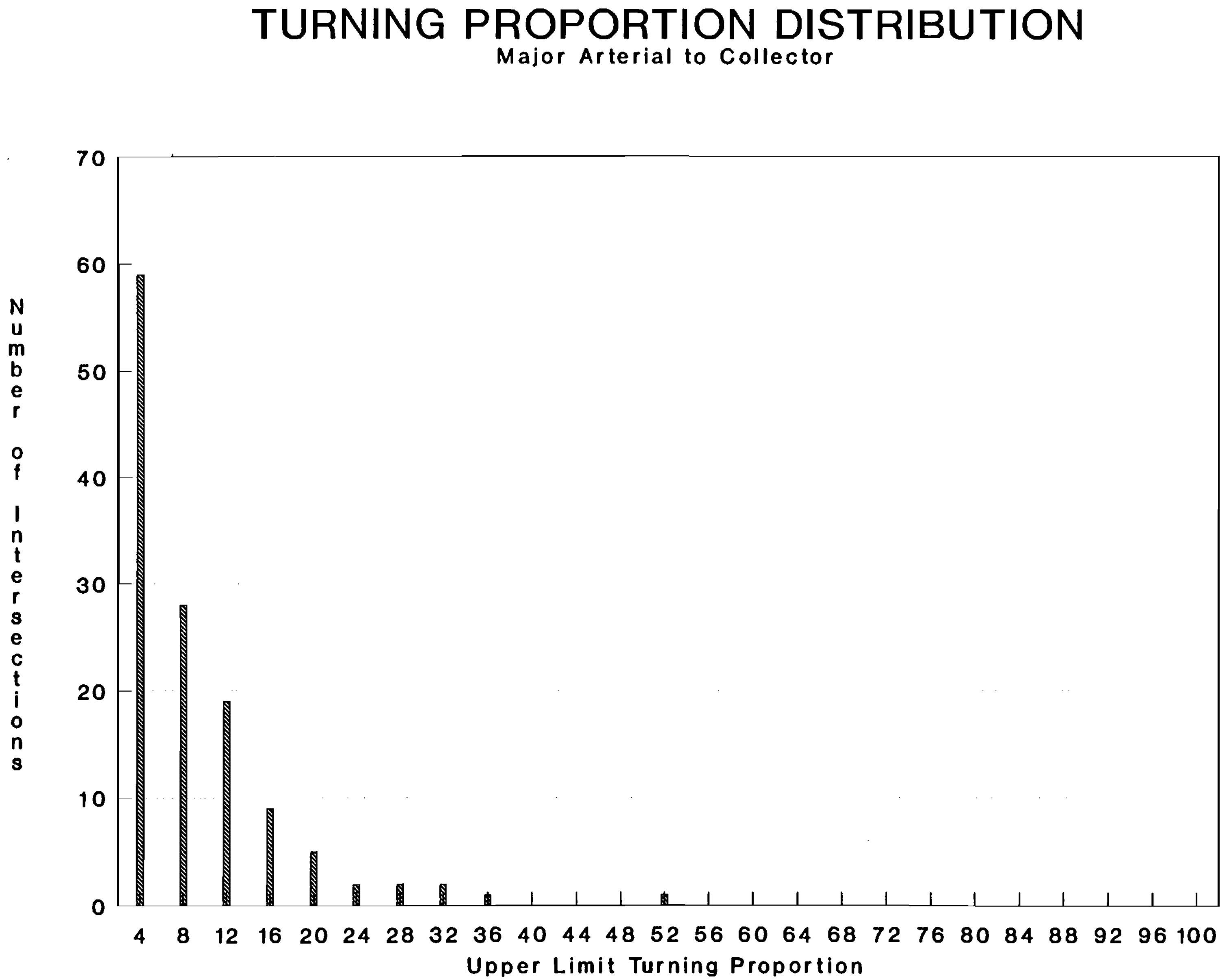
Left-Turning Traffic

TURNING PROPORTION DISTRIBUTION

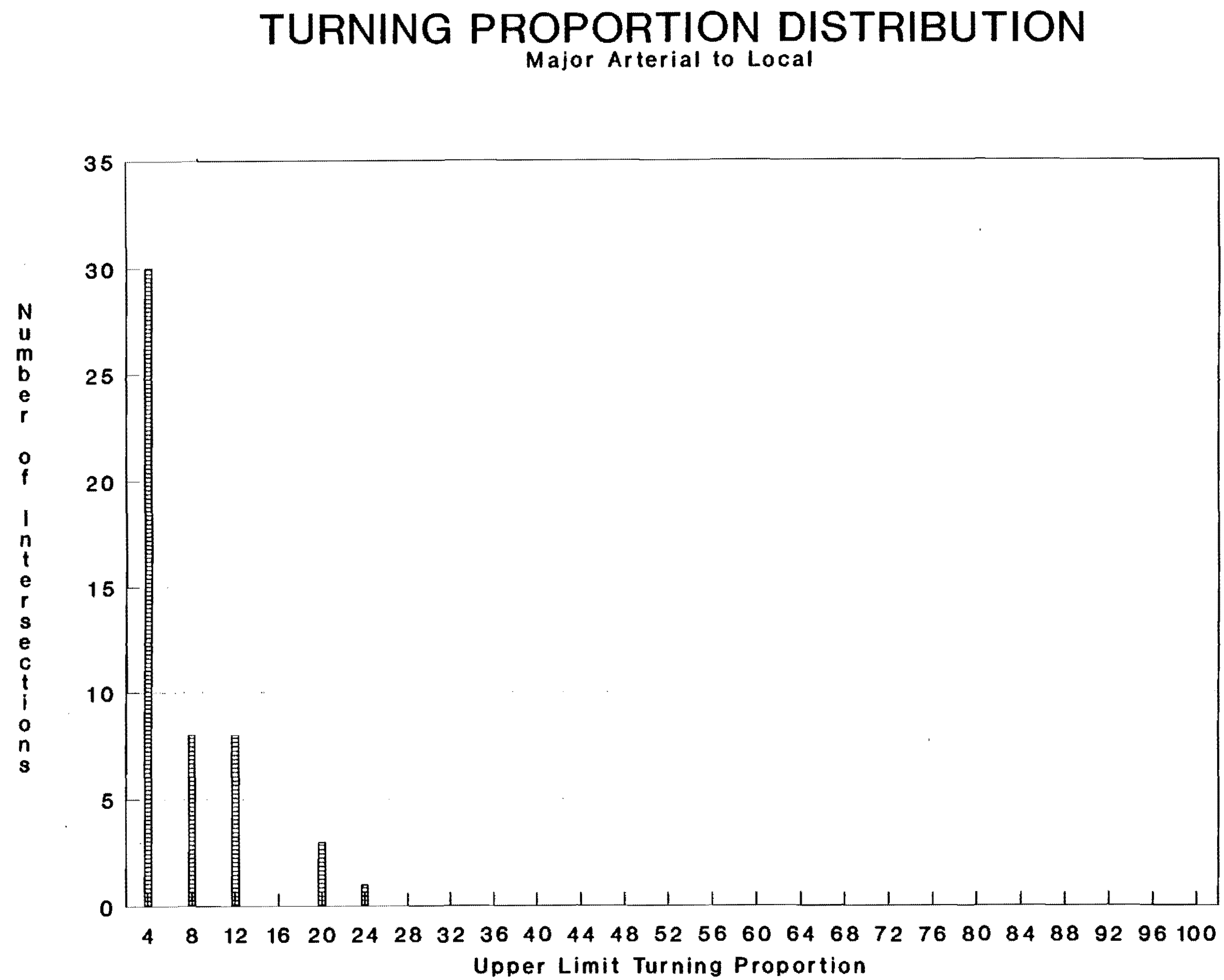
Major Arterial to Collector



Through Traffic

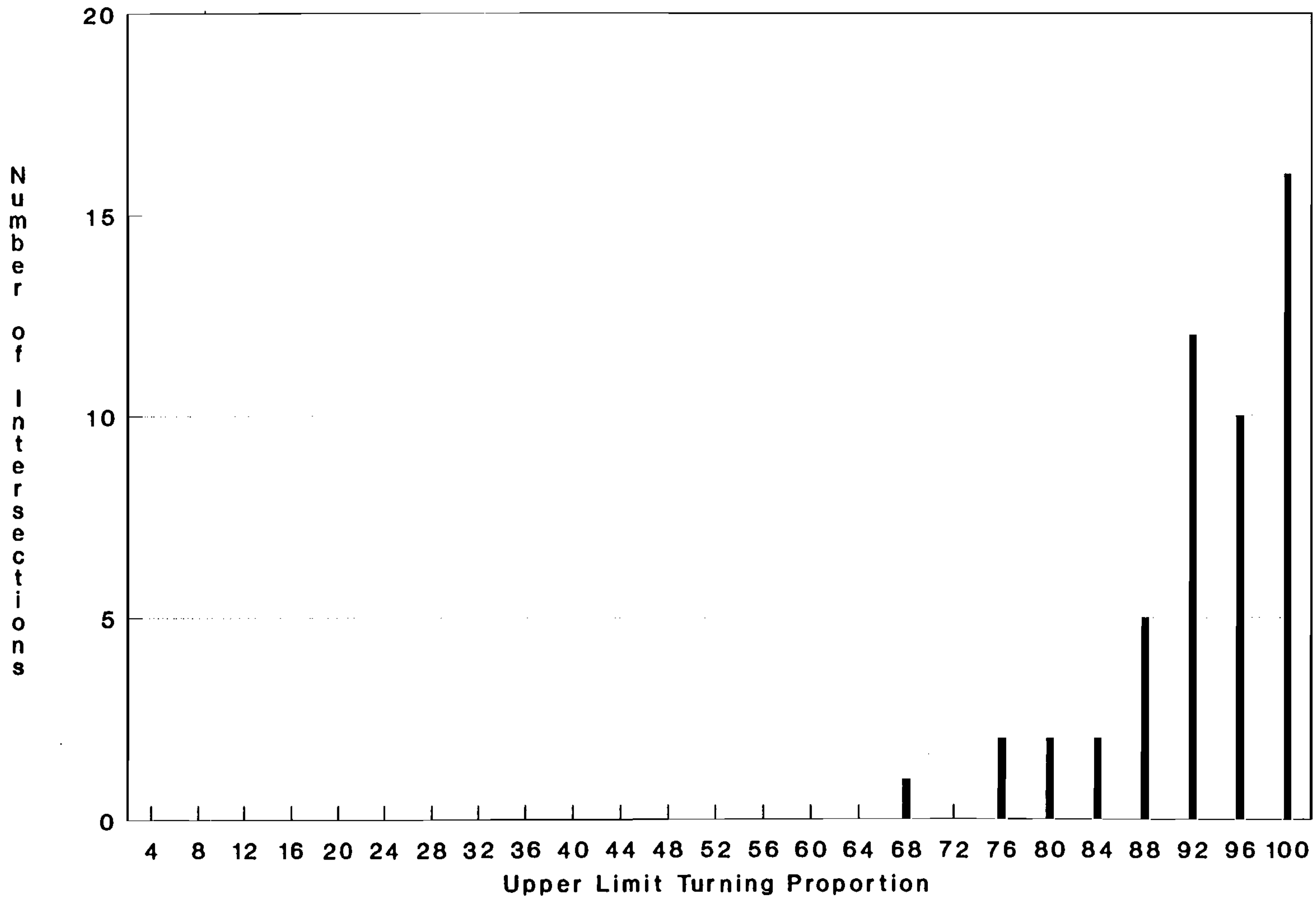


Right-Turning Traffic



Left-Turning Traffic

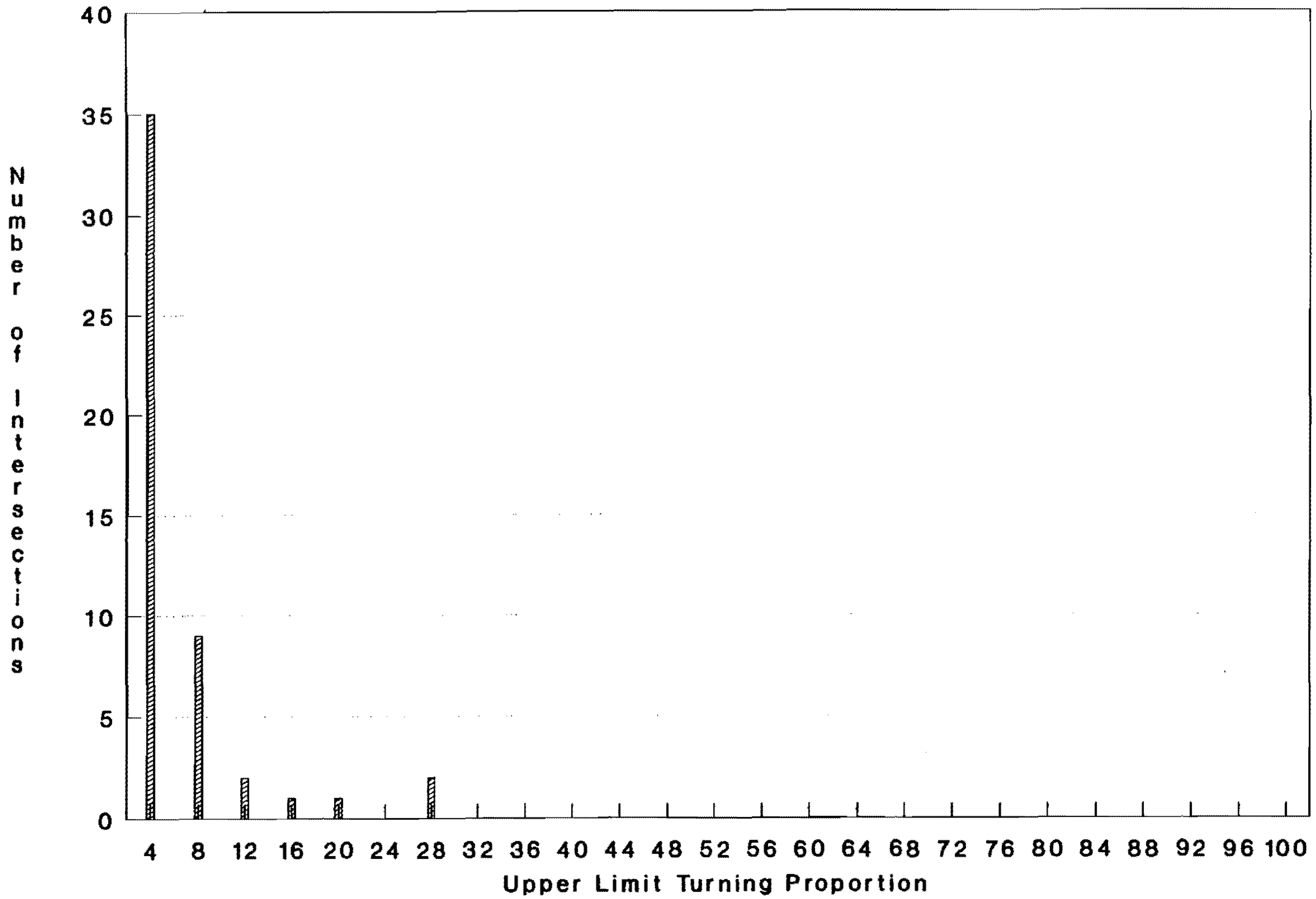
TURNING PROPORTION DISTRIBUTION
Major Arterial to Local



Through Traffic

TURNING PROPORTION DISTRIBUTION

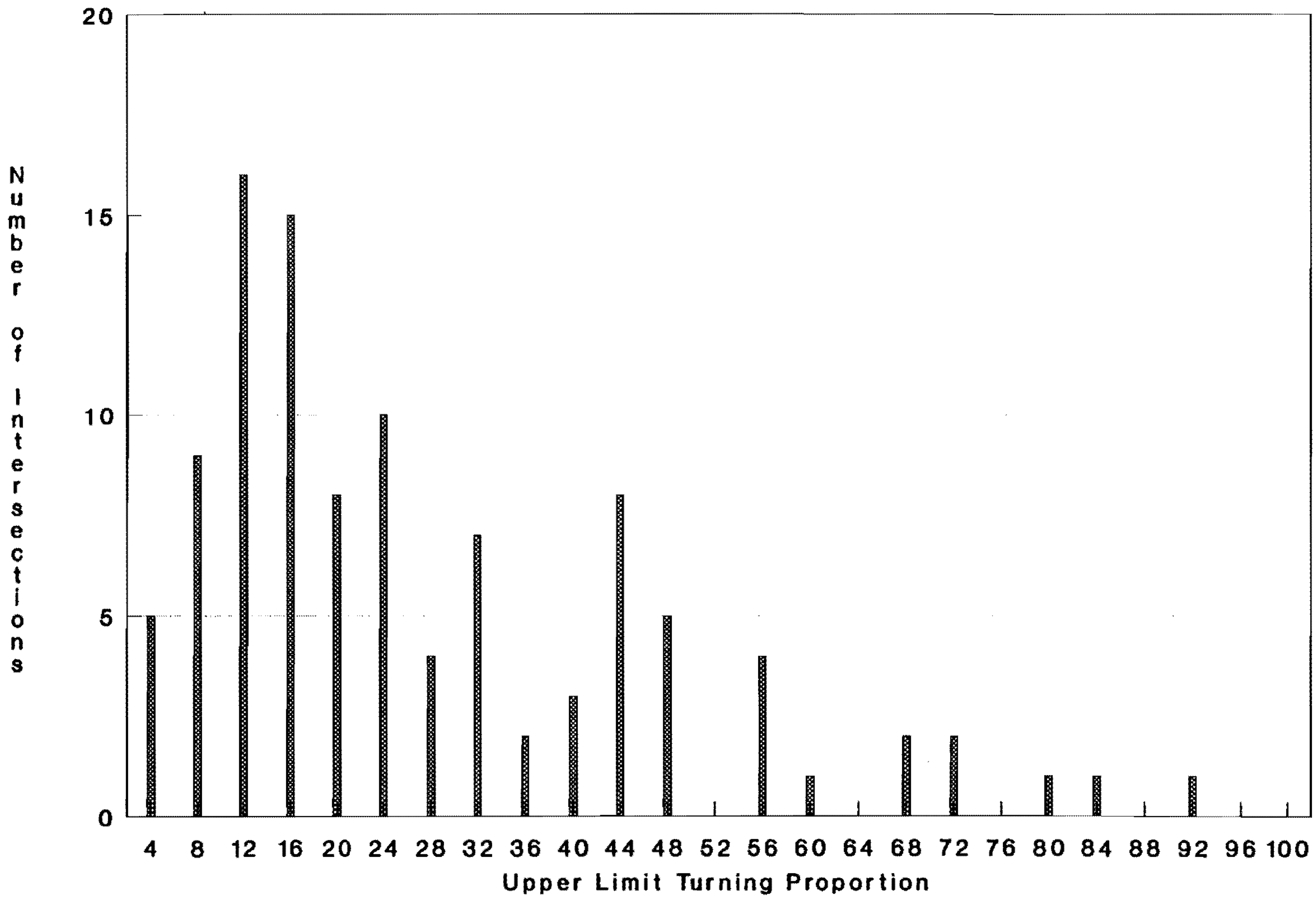
Major Arterial to Local



Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

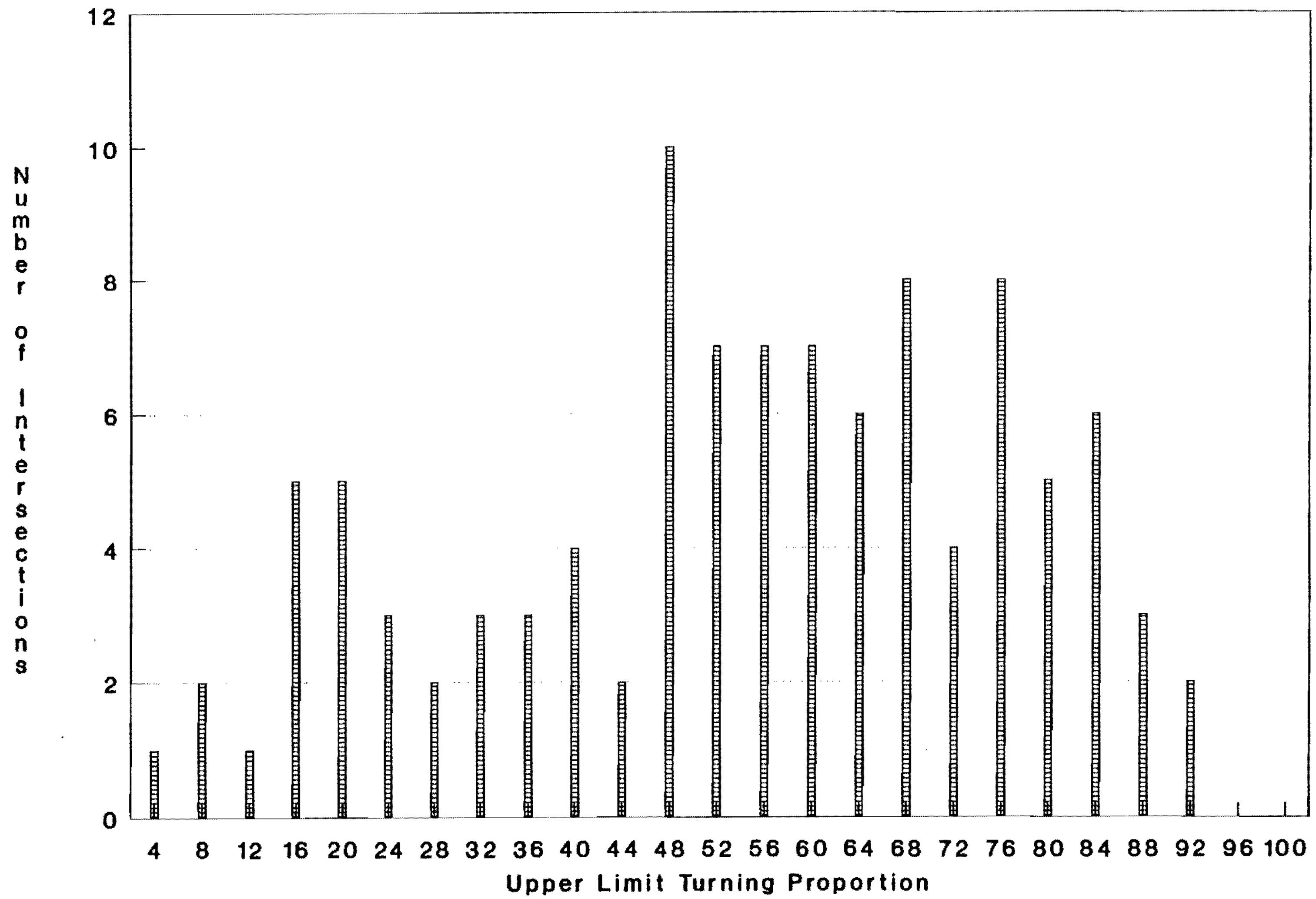
Minor Arterial to Major Arterial



Left-Turning Traffic

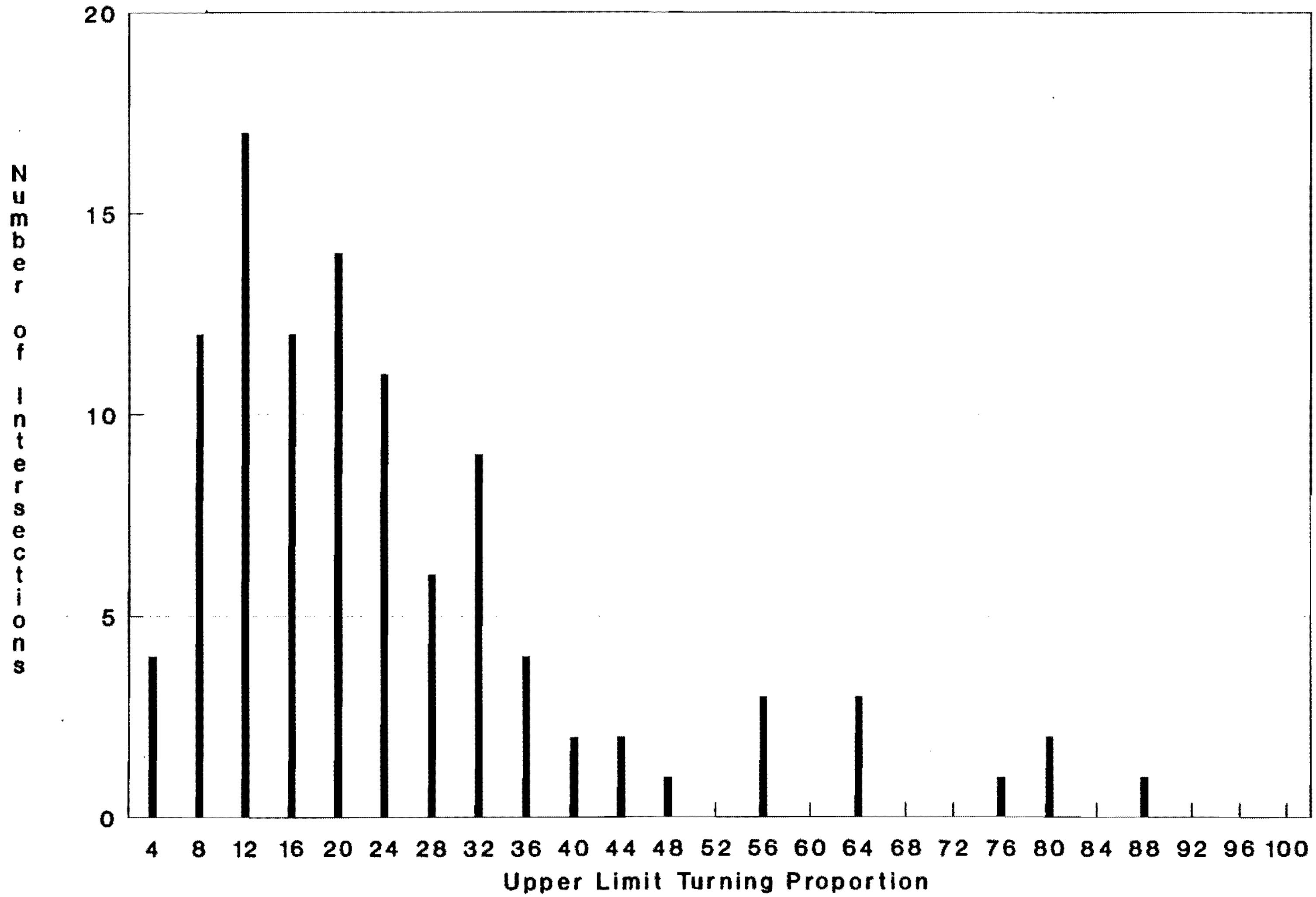
TURNING PROPORTION DISTRIBUTION

Minor Arterial to Major Arterial



Through Traffic

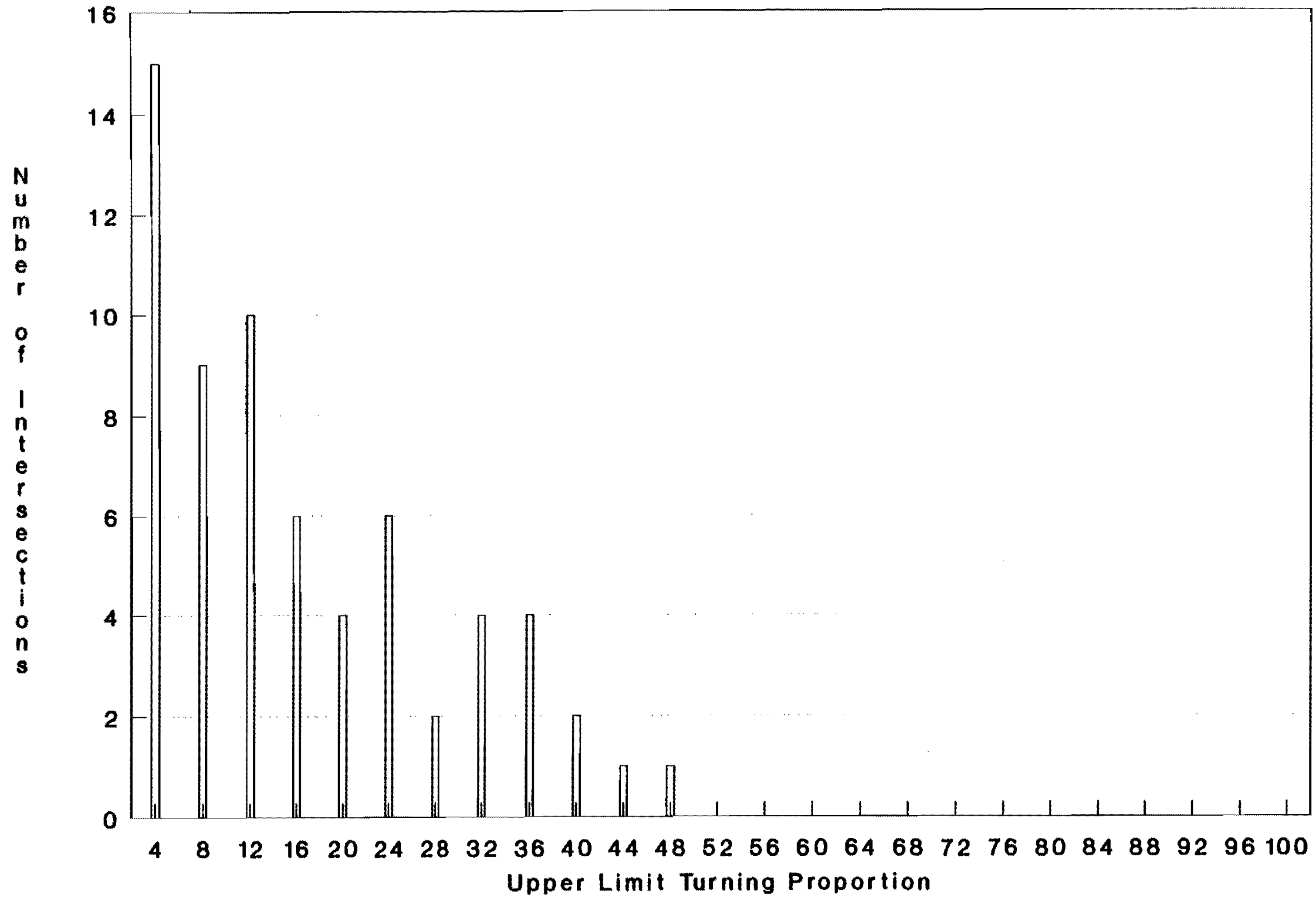
TURNING PROPORTION DISTRIBUTION
Minor Arterial to Major Arterial



Right-Turning Traffic

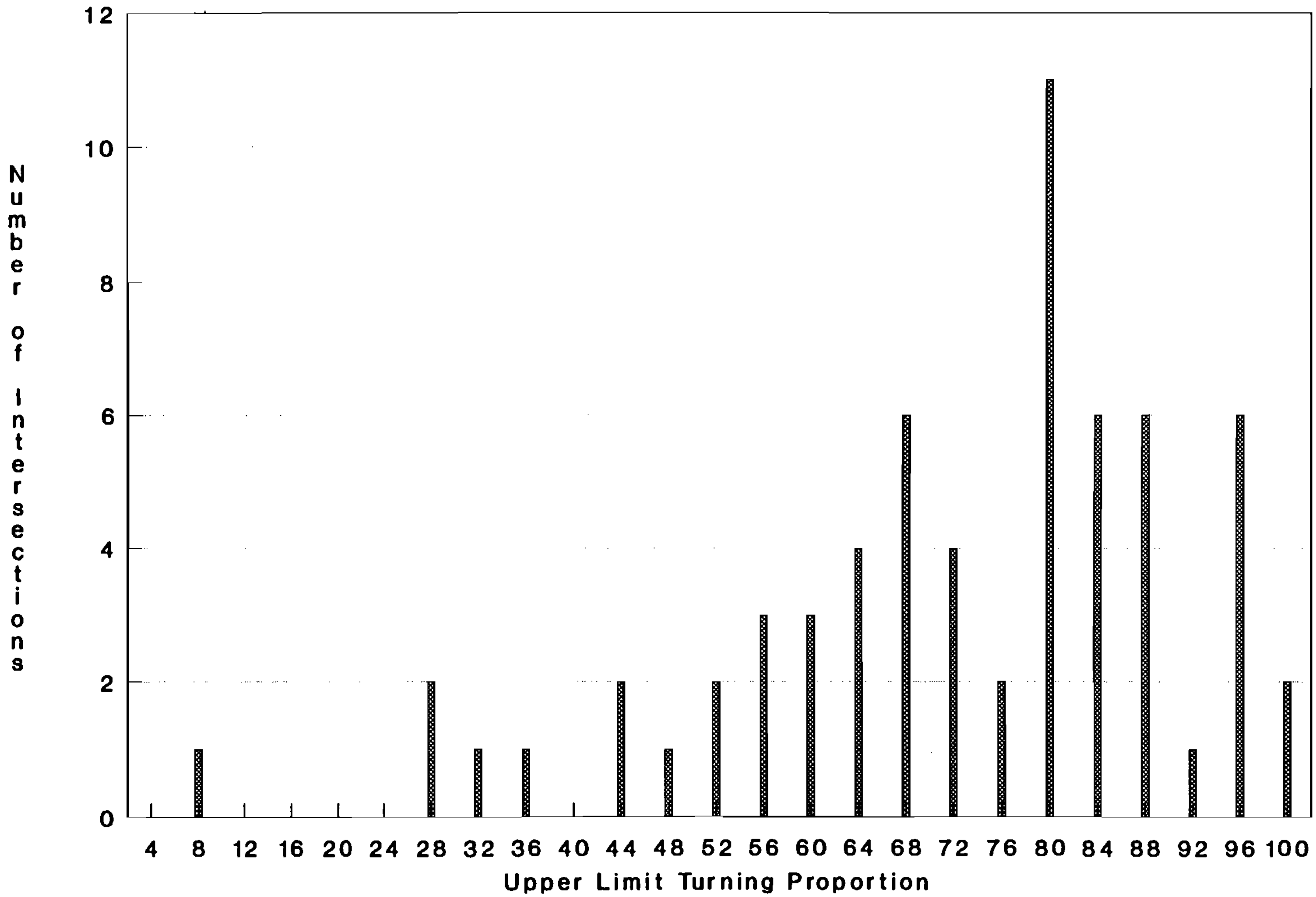
TURNING PROPORTION DISTRIBUTION

Minor Arterial to Minor Arterial



Left-Turning Traffic

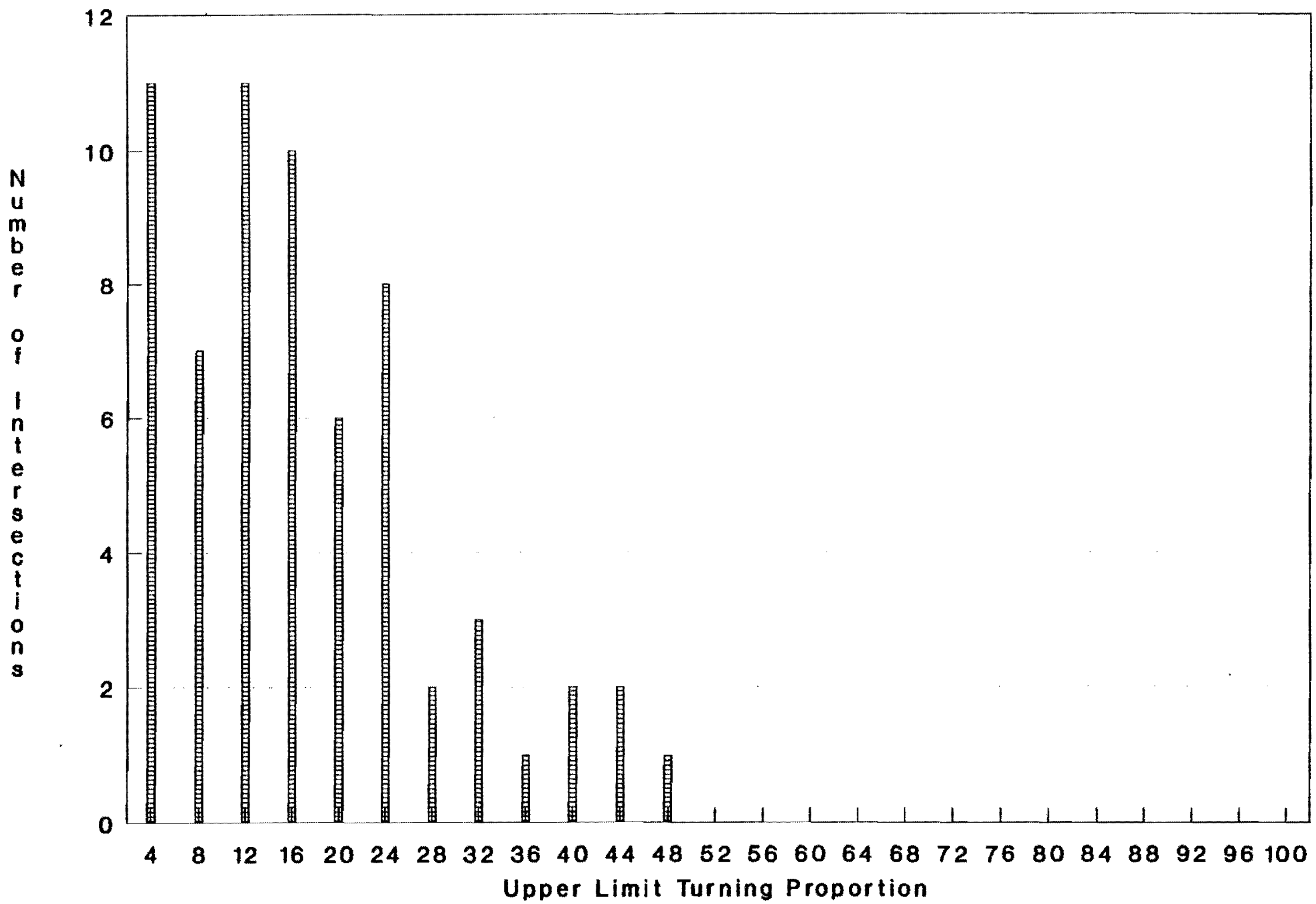
TURNING PROPORTION DISTRIBUTION
Minor Arterial to Minor Arterial



Through Traffic

TURNING PROPORTION DISTRIBUTION

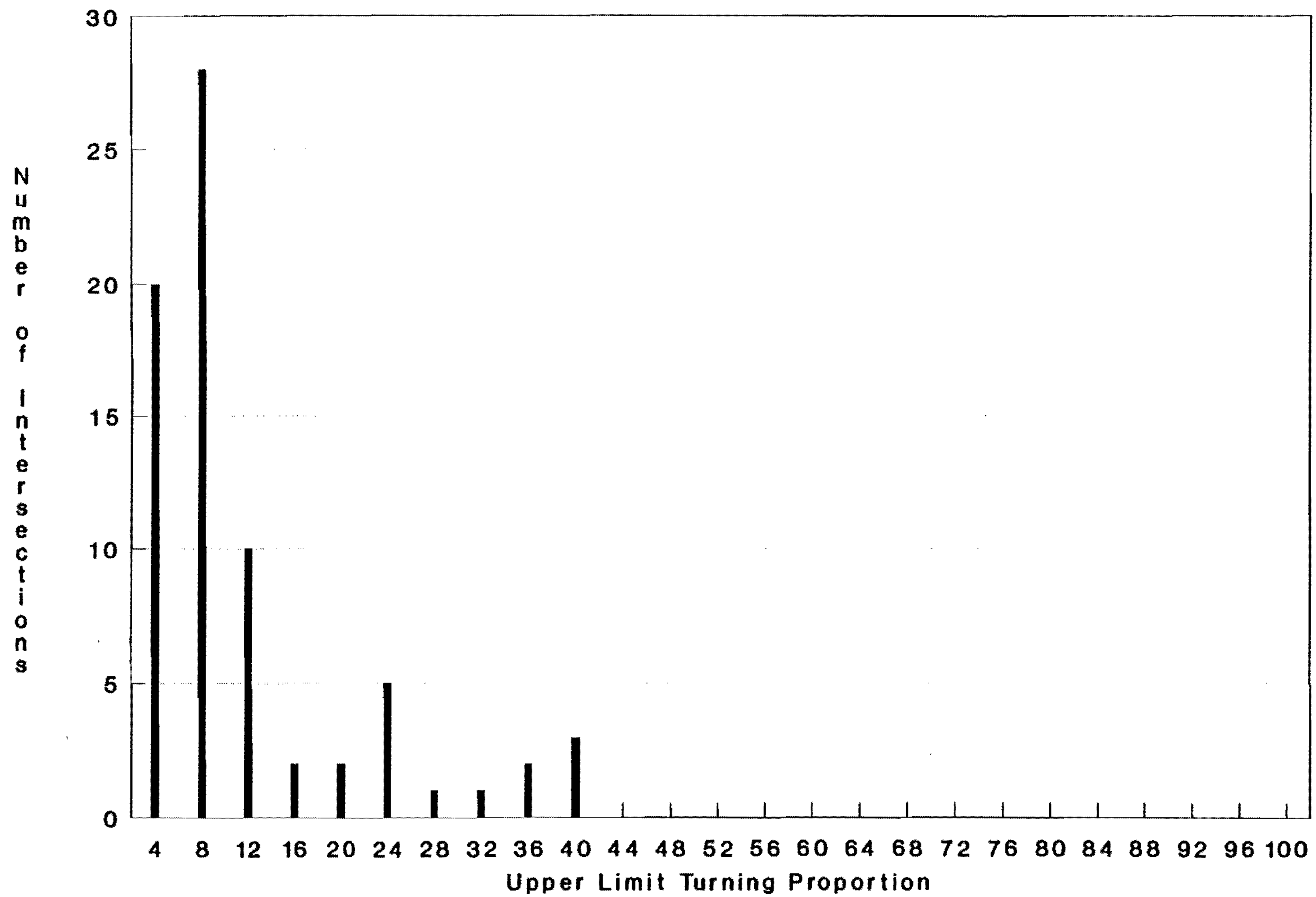
Minor Arterial to Minor Arterial



Right-Turning Traffic

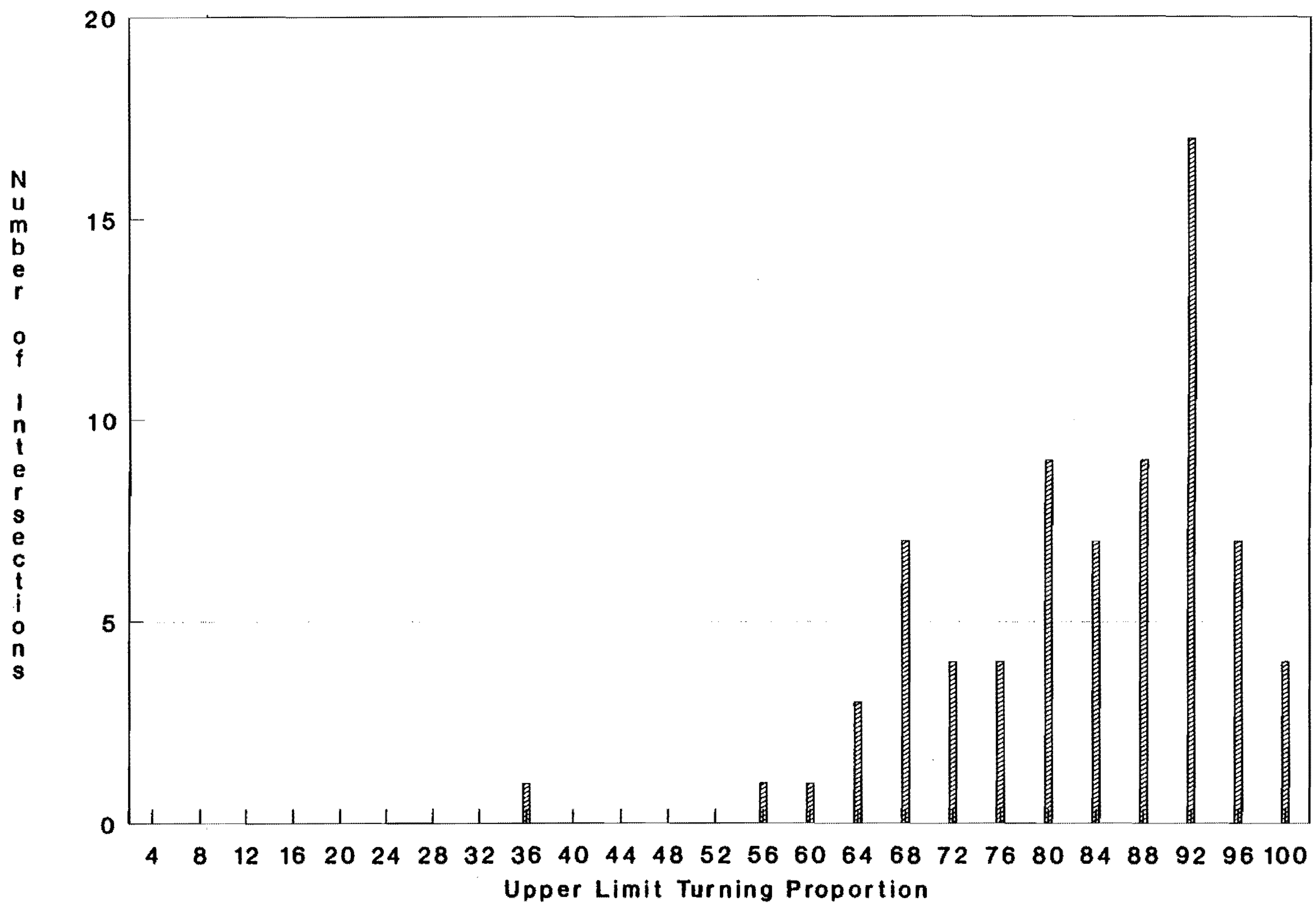
TURNING PROPORTION DISTRIBUTION

Minor Arterial to Collector



Left-Turning Traffic

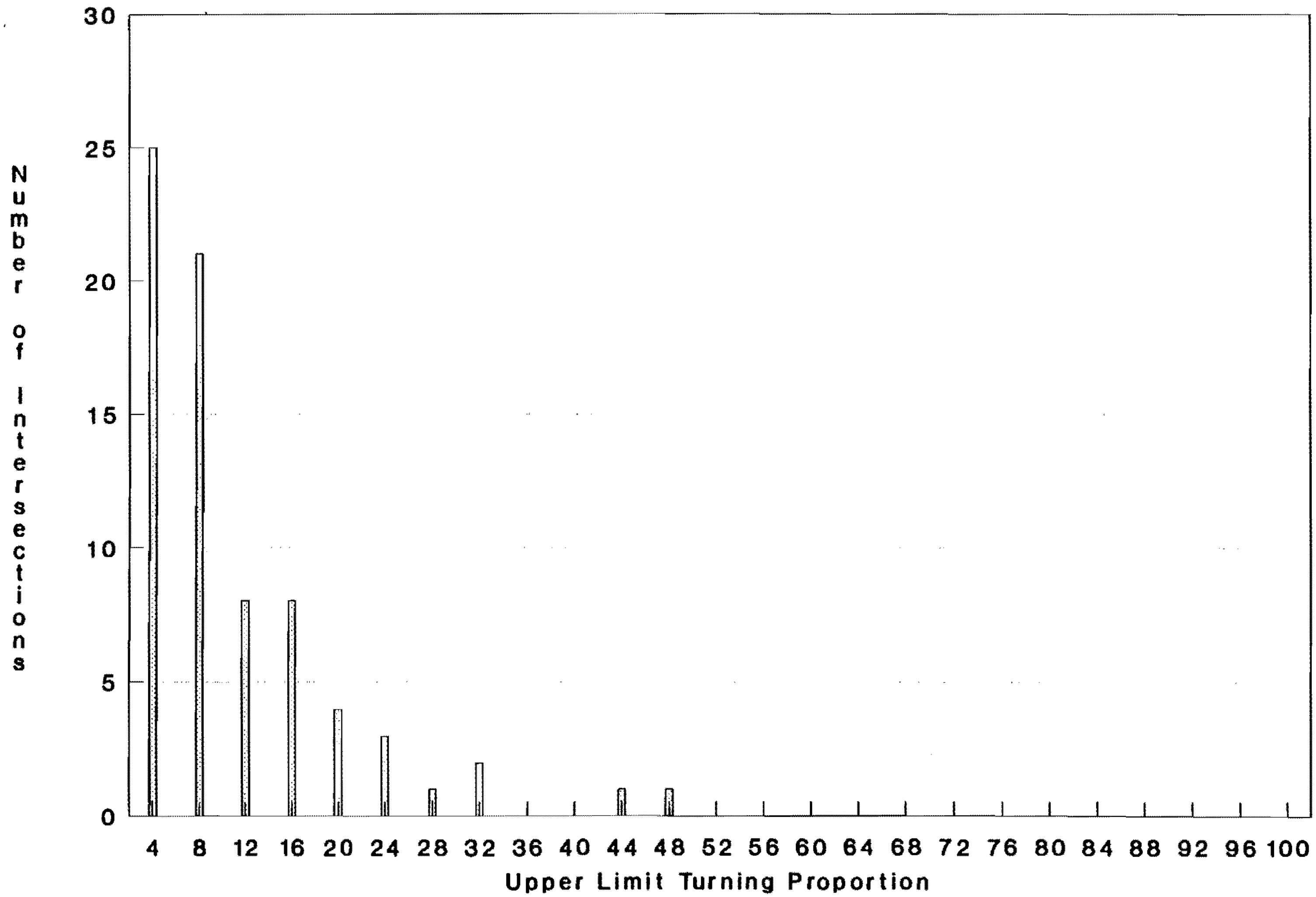
TURNING PROPORTION DISTRIBUTION
Minor Arterial to Collector



Through Traffic

TURNING PROPORTION DISTRIBUTION

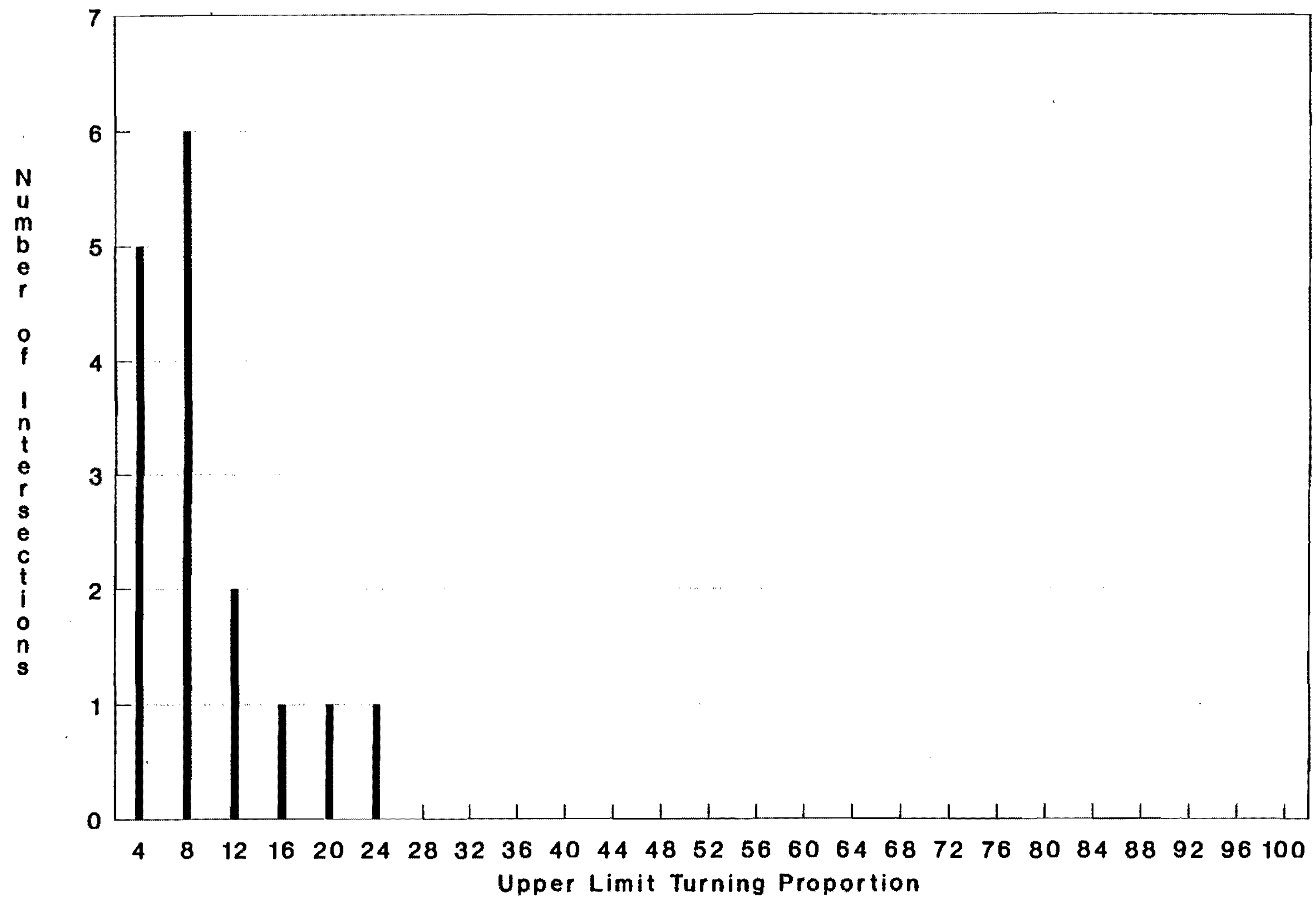
Minor Arterial to Collector



Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

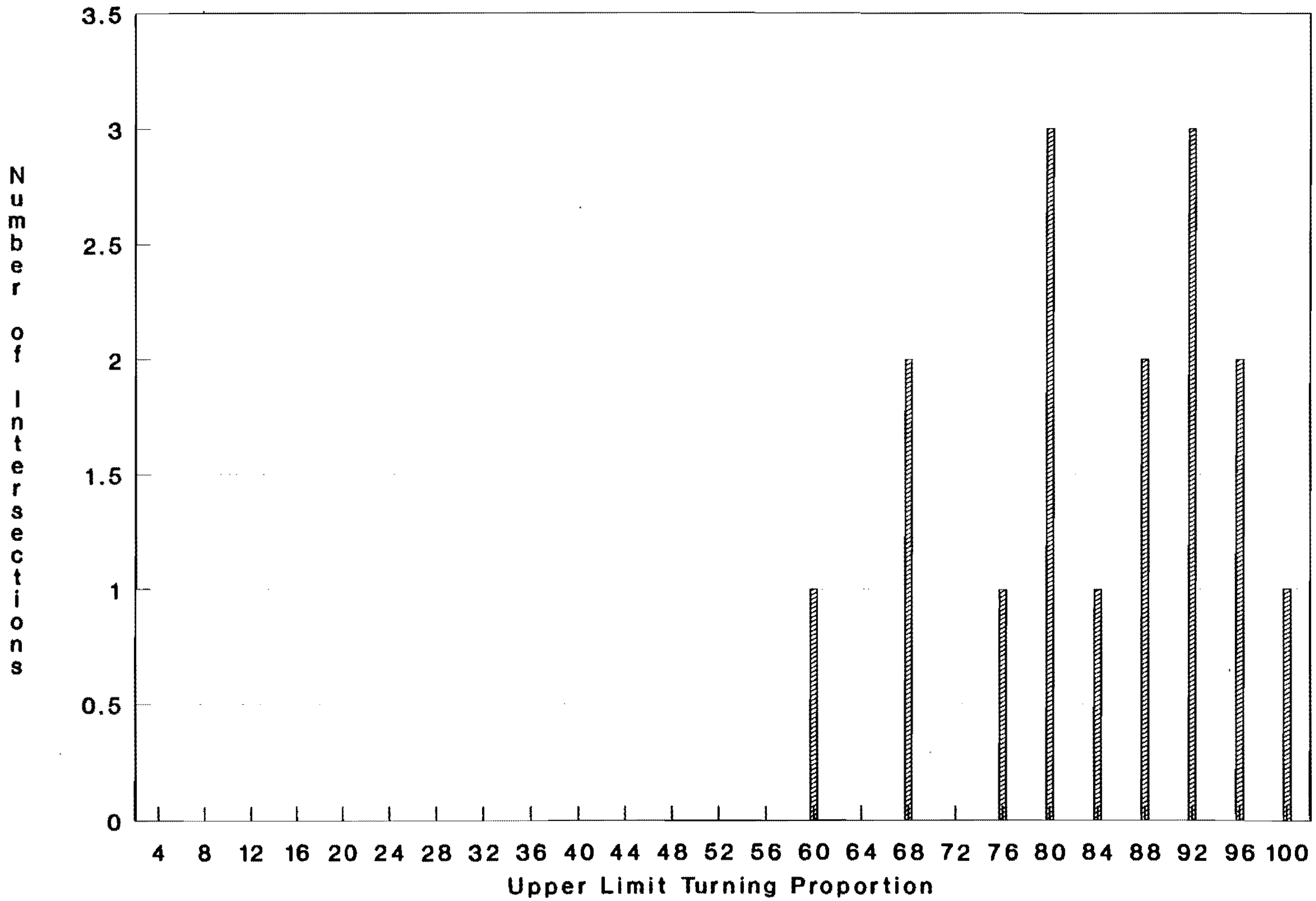
Minor Arterial to Local



Left-Turning Traffic

TURNING PROPORTION DISTRIBUTION

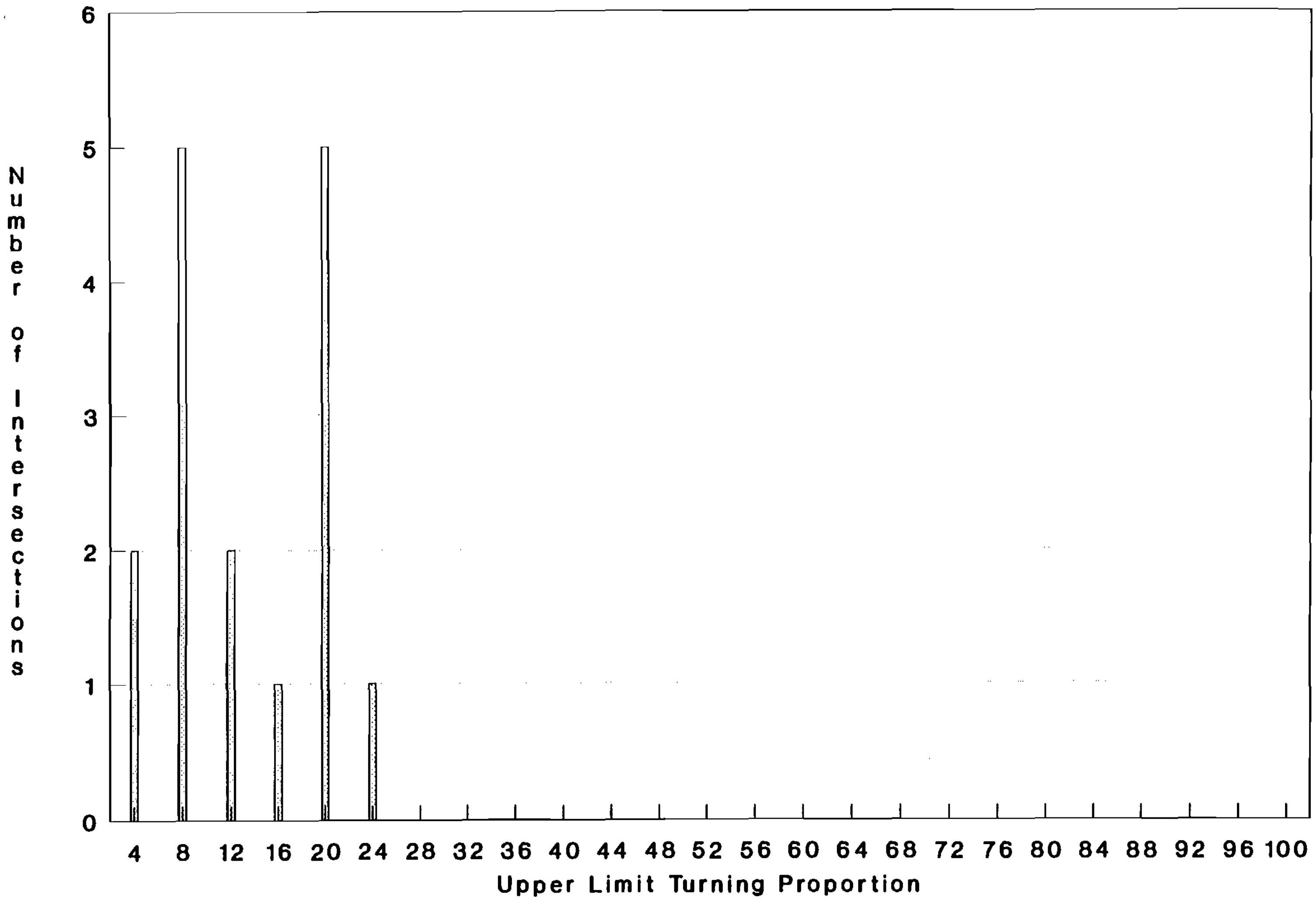
Minor Arterial to Local



Through Traffic

TURNING PROPORTION DISTRIBUTION

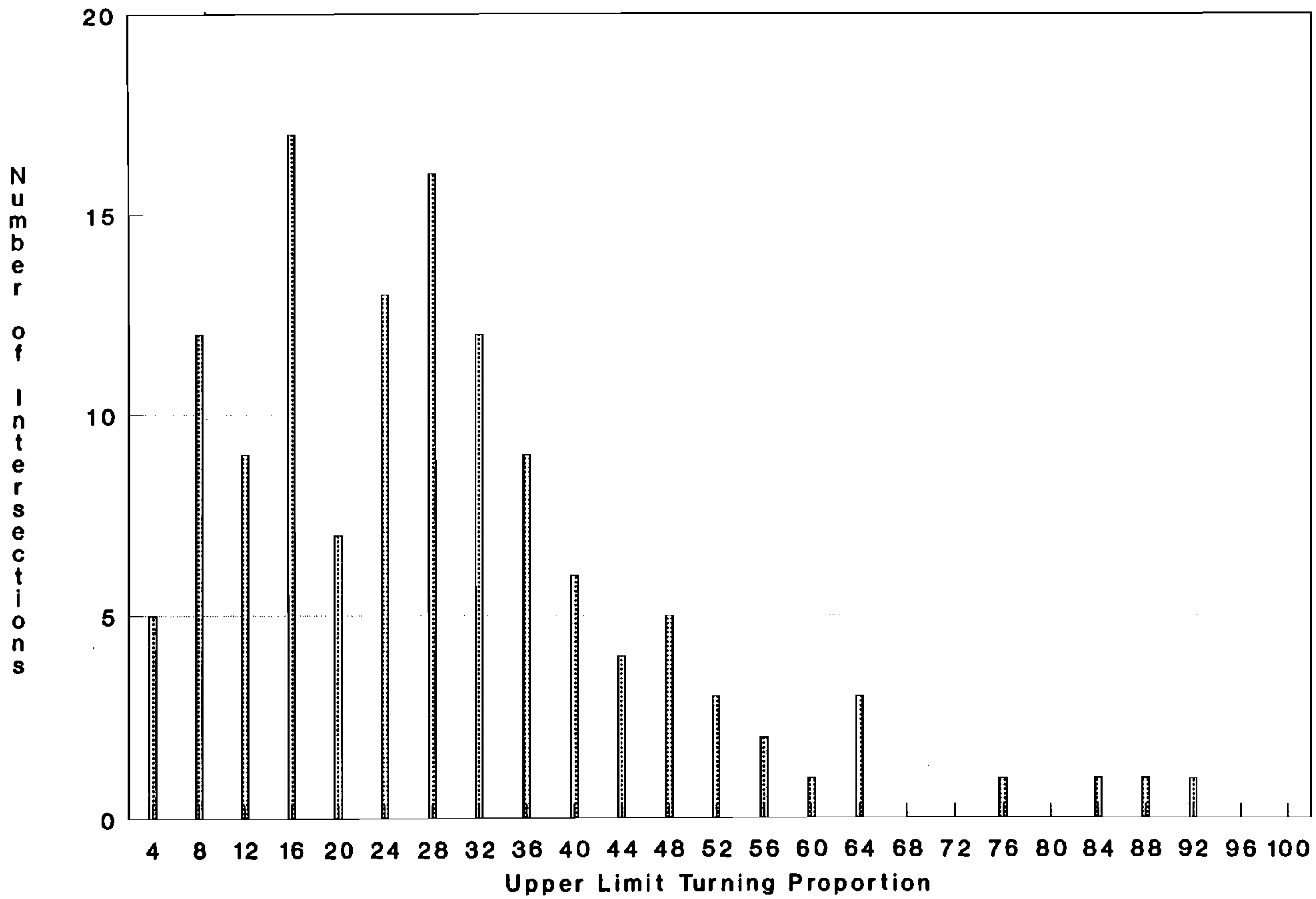
Minor Arterial to Local



Right-Turning Traffic

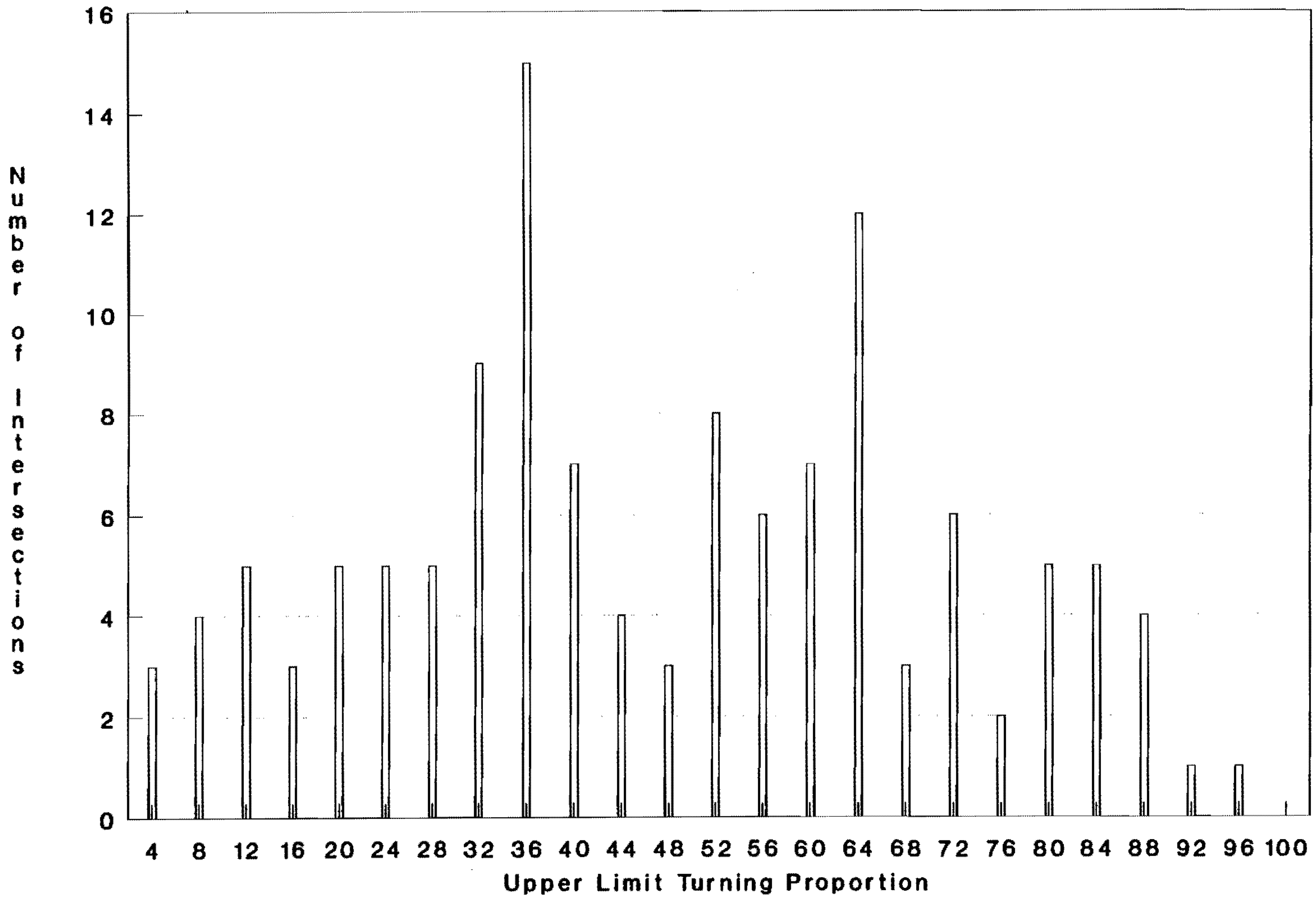
TURNING PROPORTION DISTRIBUTION

Collector to Major Arterial



Left-Turning Traffic

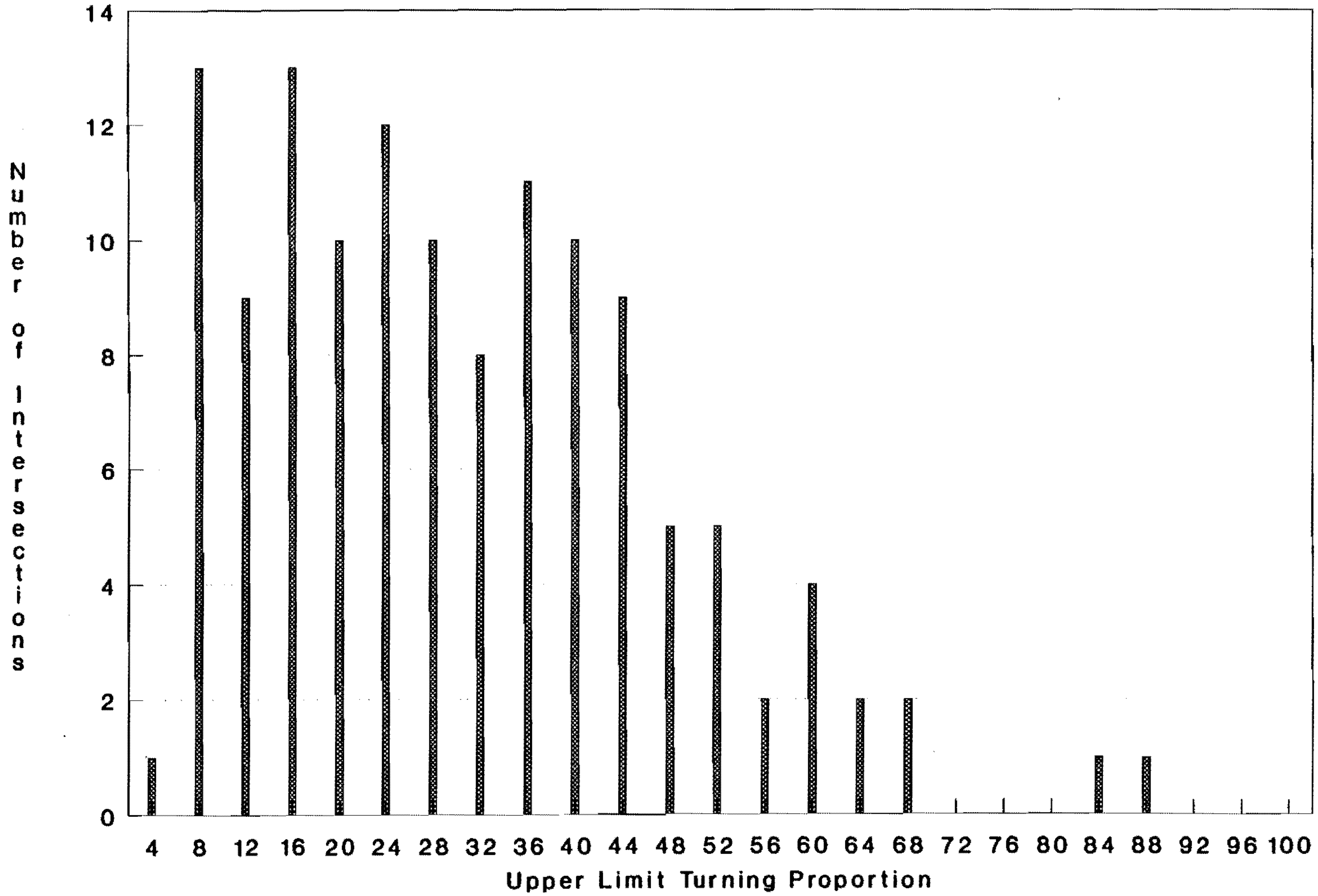
TURNING PROPORTION DISTRIBUTION
Collector to Major Arterial



Through Traffic

TURNING PROPORTION DISTRIBUTION

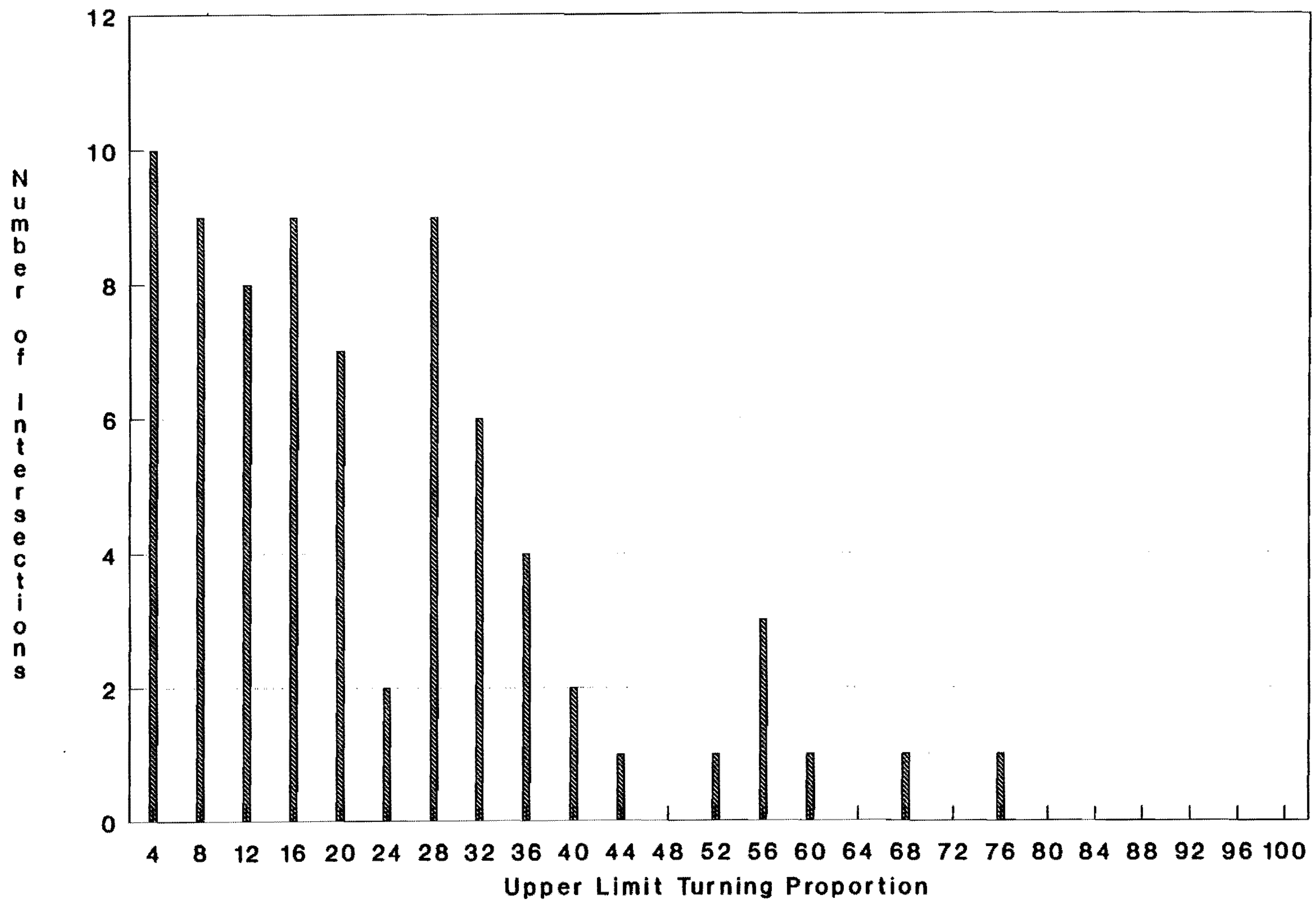
Collector to Major Arterial



Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

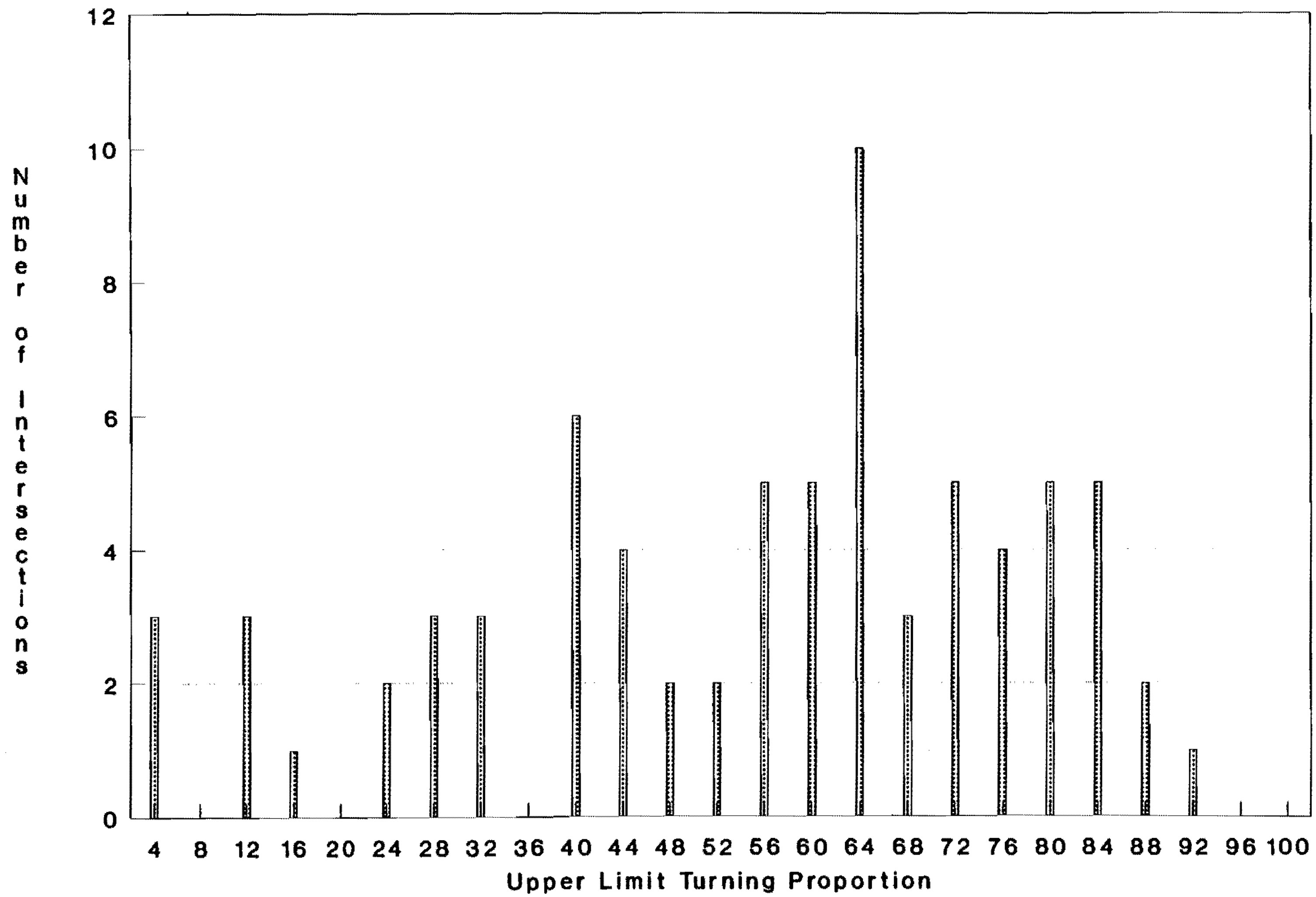
Collector to Minor Arterial



Left-Turning Traffic

TURNING PROPORTION DISTRIBUTION

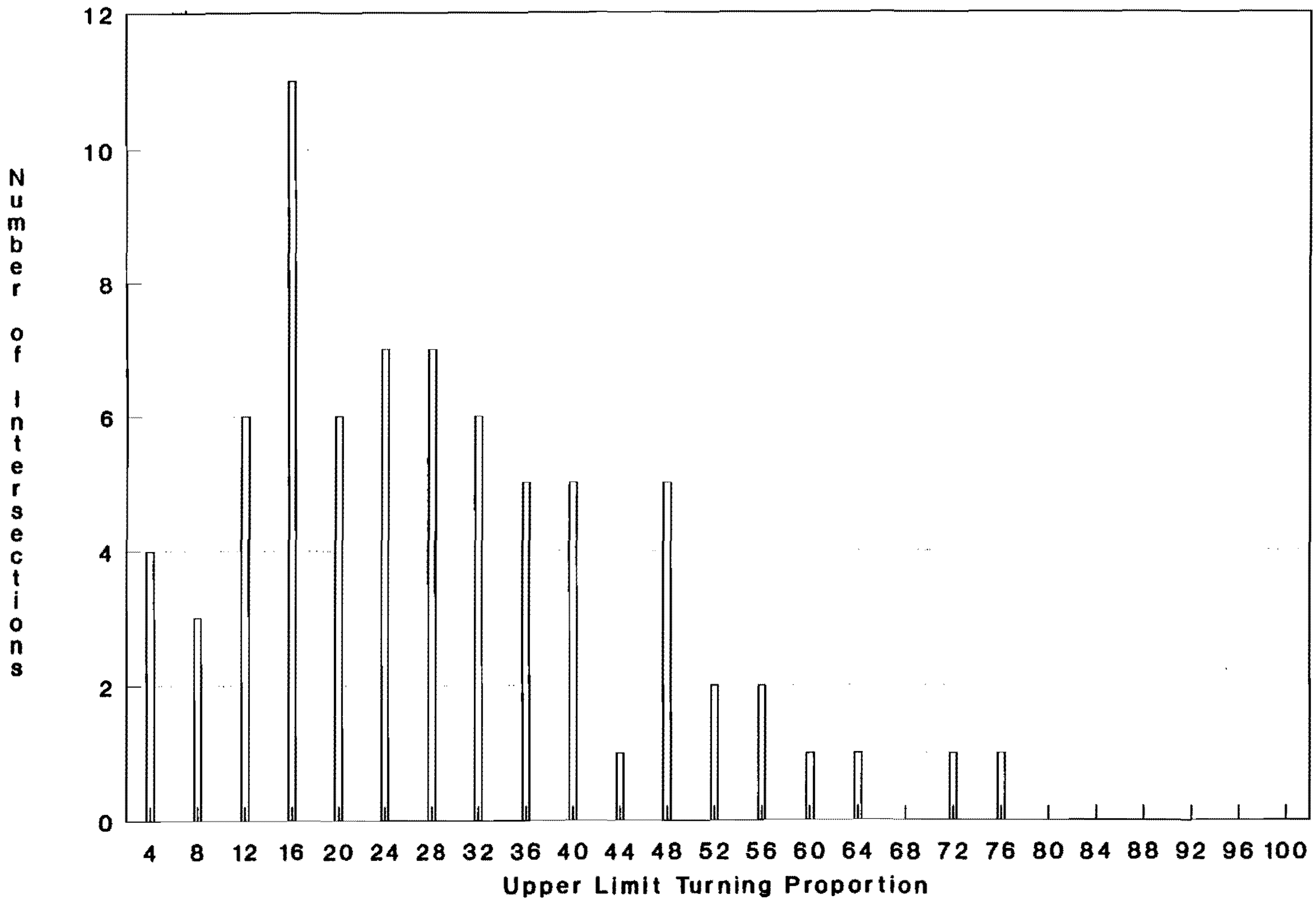
Collector to Minor Arterial



Through Traffic

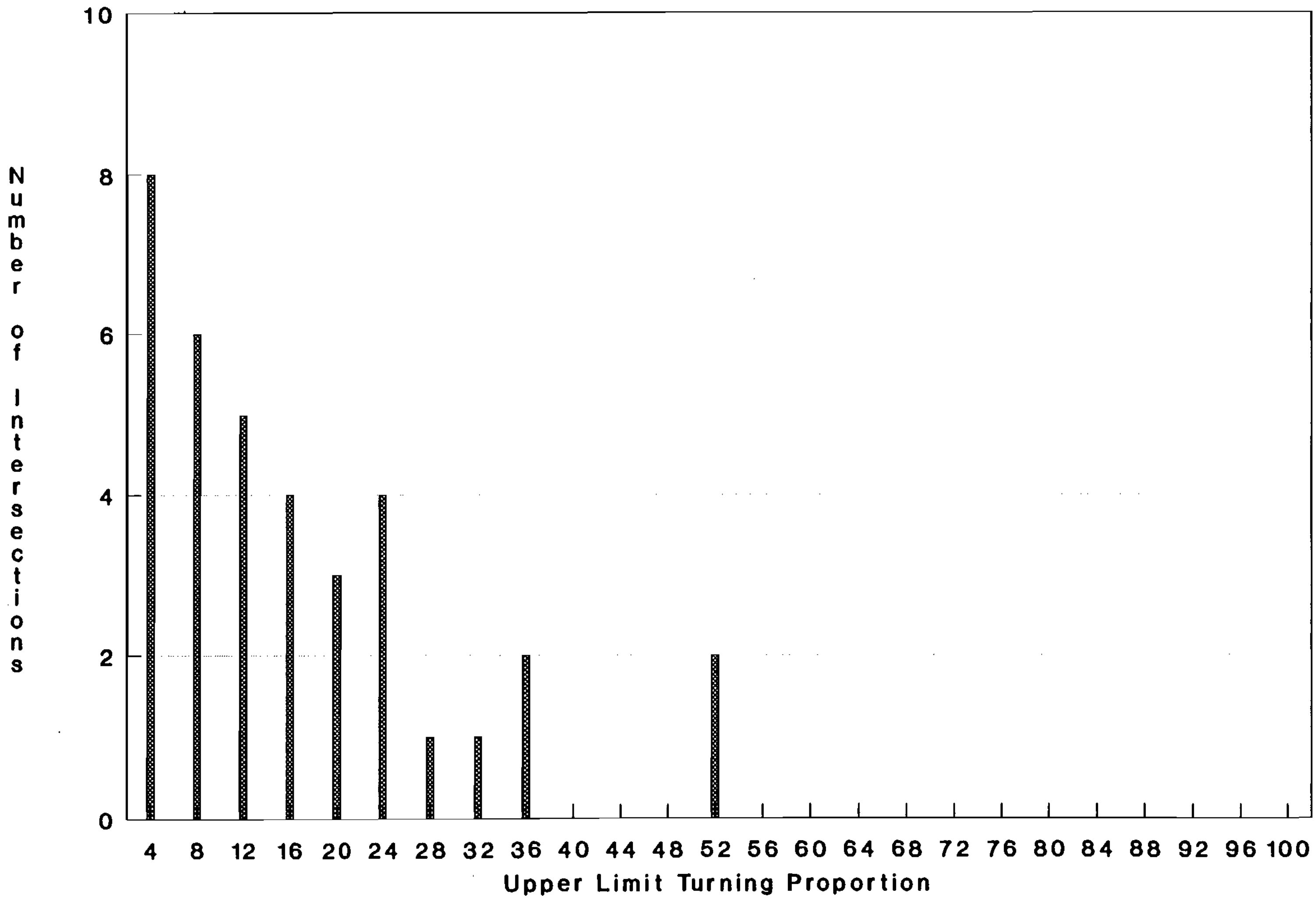
TURNING PROPORTION DISTRIBUTION

Collector to Minor Arterial

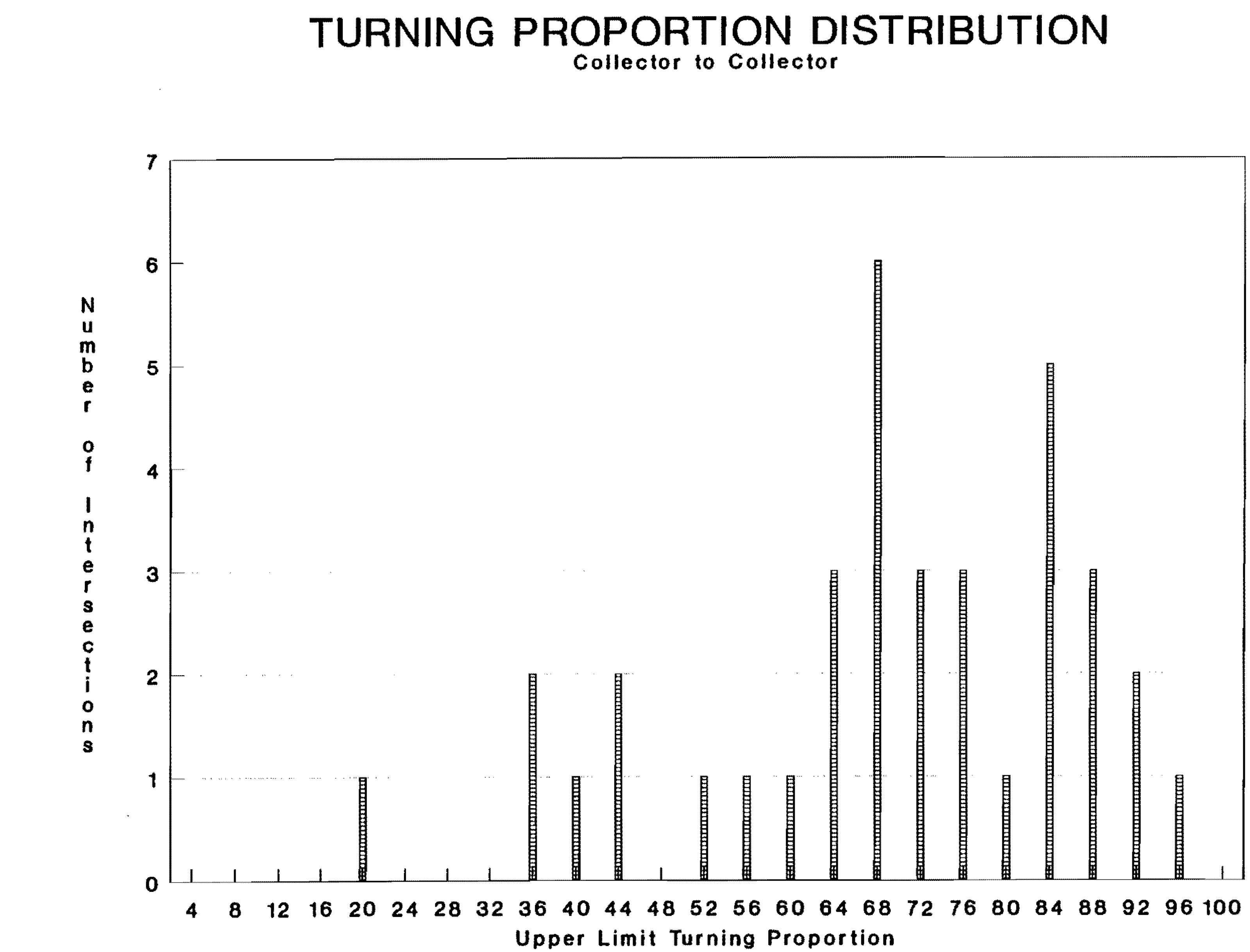


Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION
Collector to Collector



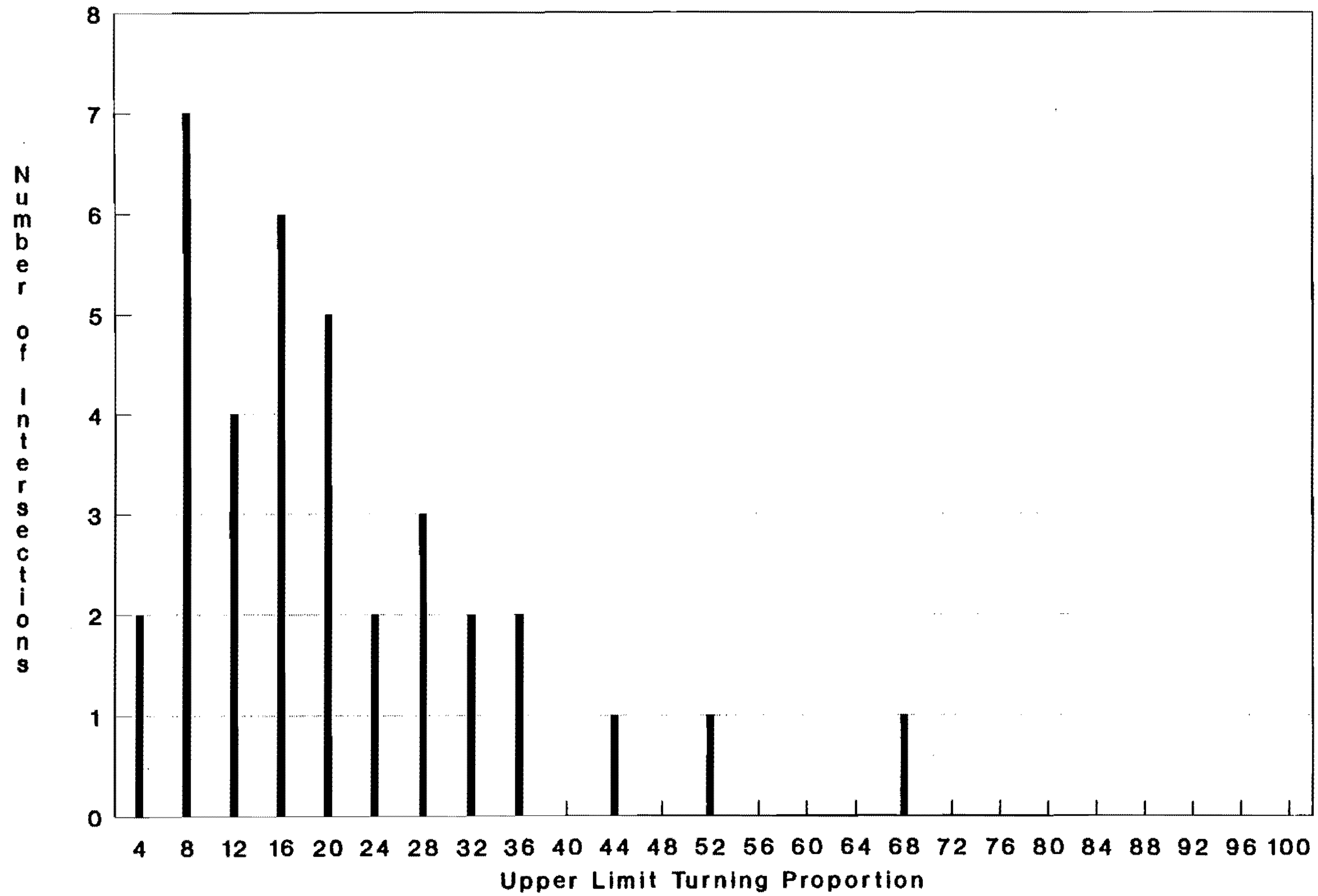
Left-Turning Traffic



Through Traffic

TURNING PROPORTION DISTRIBUTION

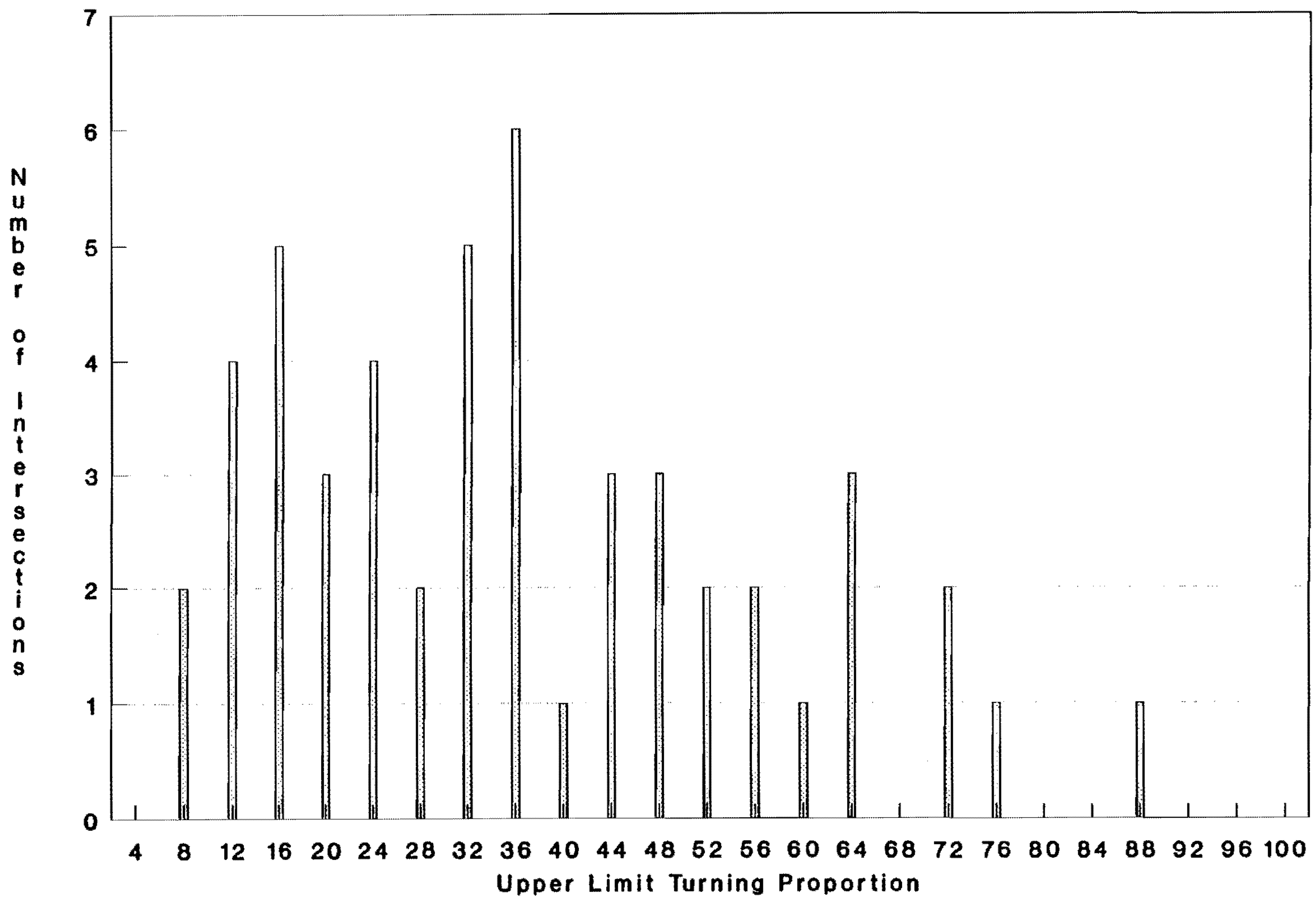
Collector to Collector



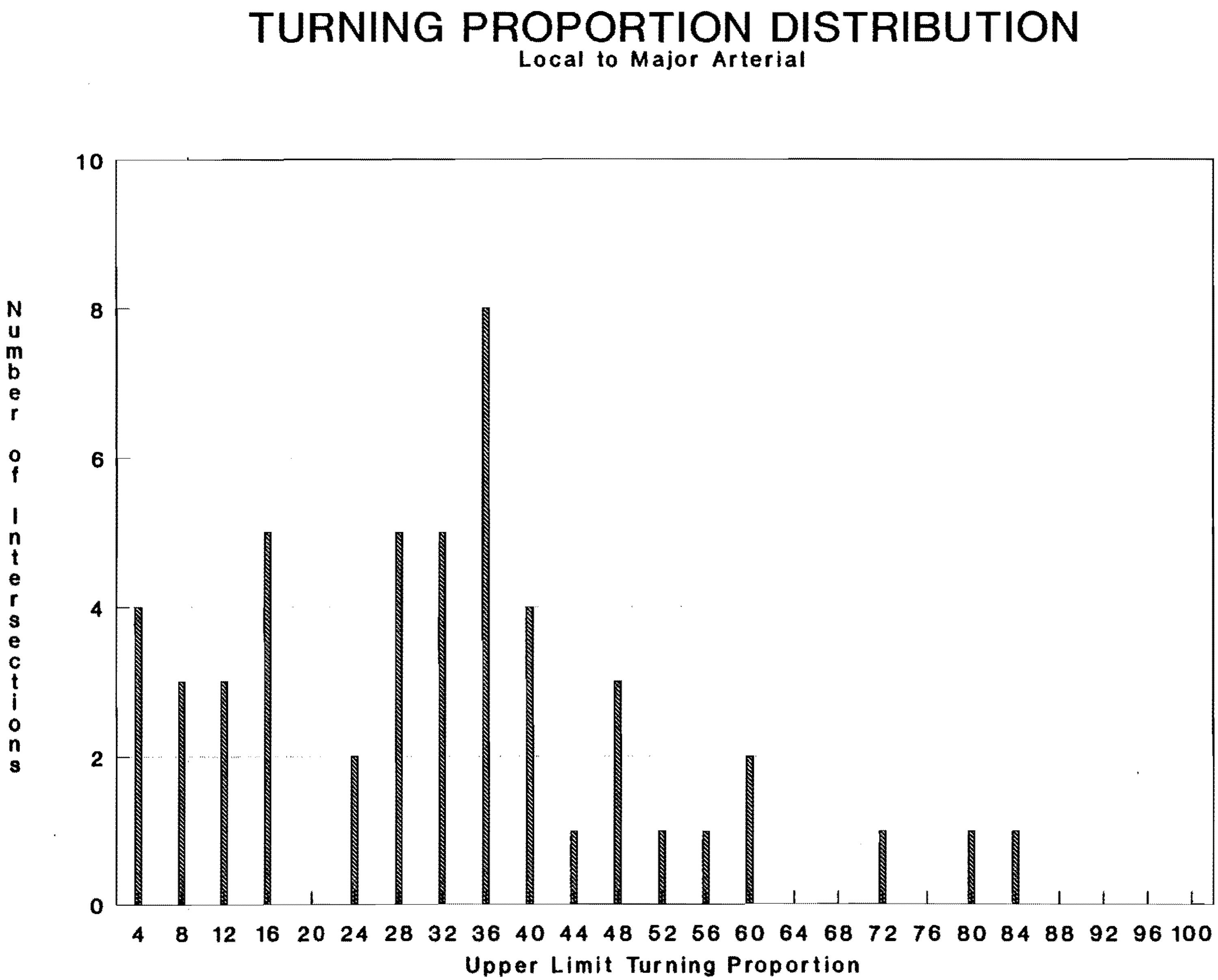
Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

Local to Major Arterial

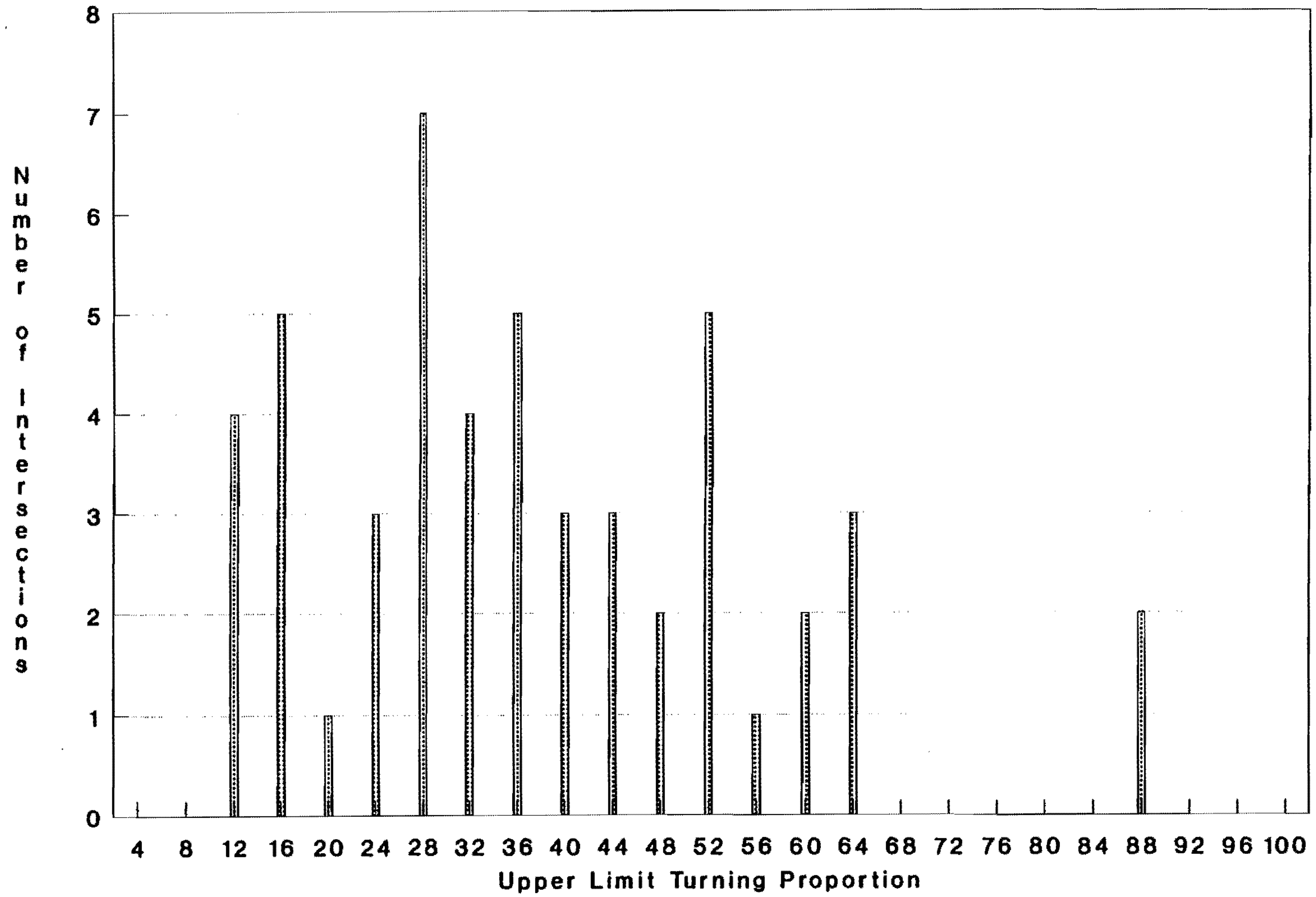


Left-Turning Traffic



Through Traffic

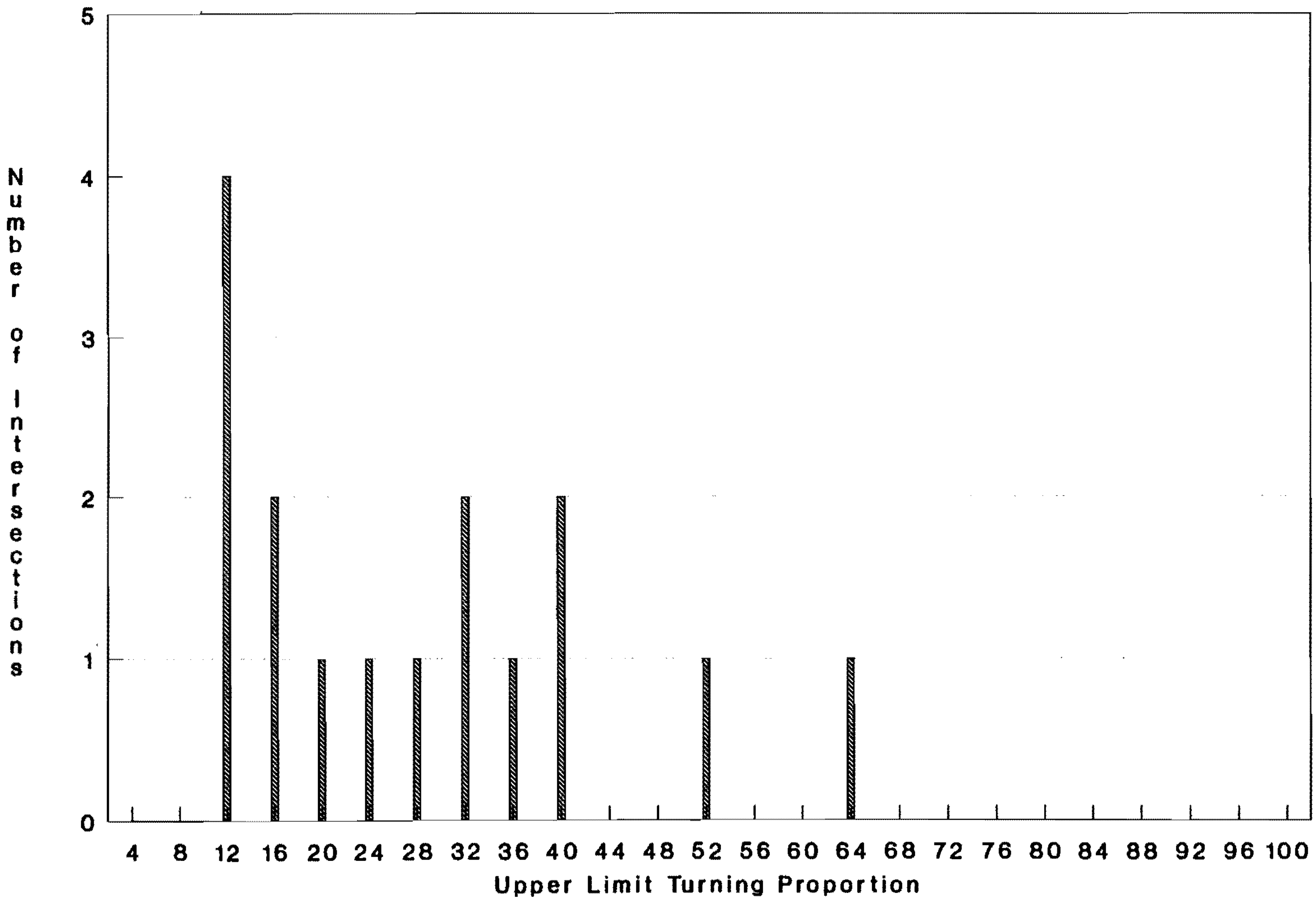
TURNING PROPORTION DISTRIBUTION
Local to Major Arterial



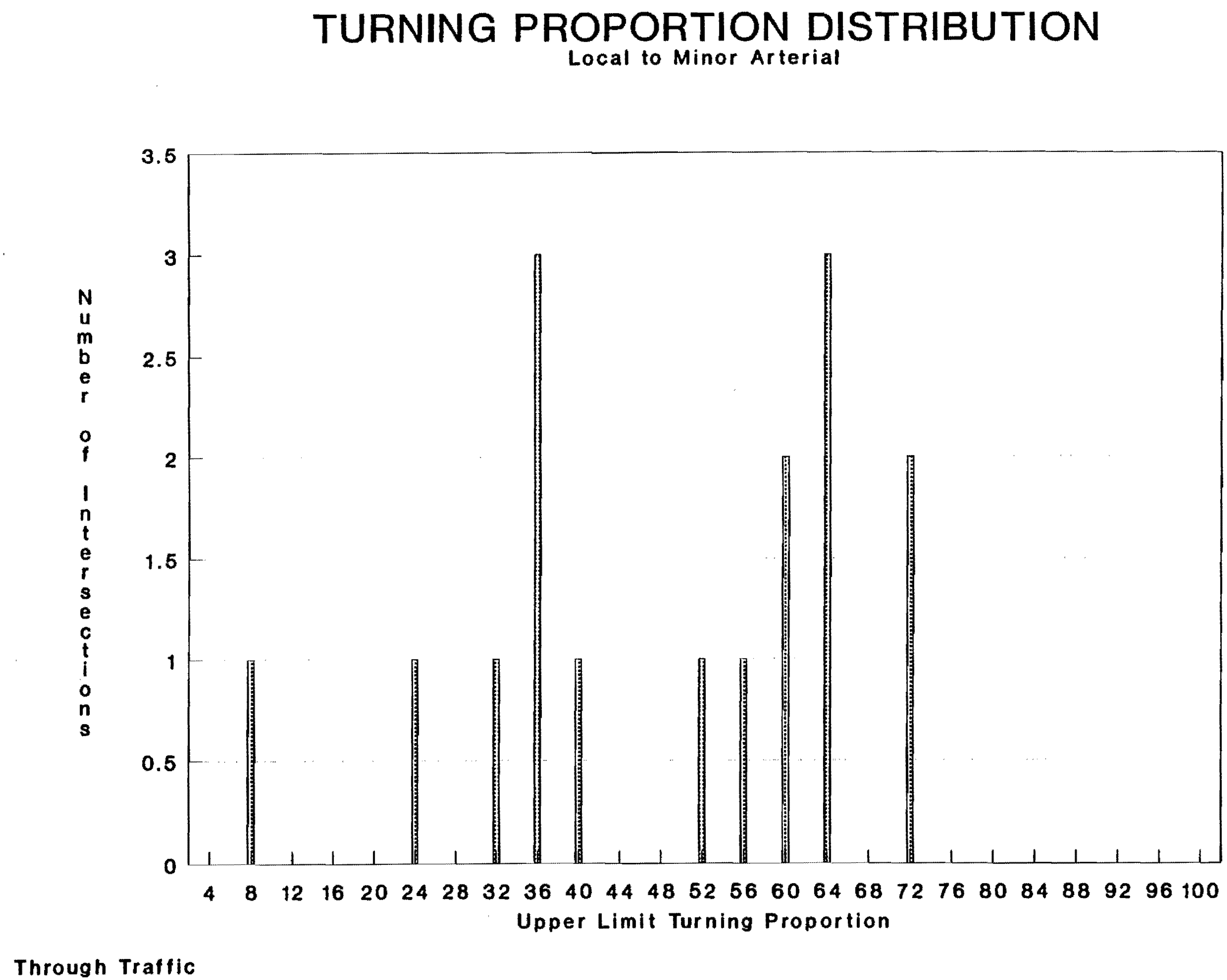
Right-Turning Traffic

TURNING PROPORTION DISTRIBUTION

Local to Minor Arterial

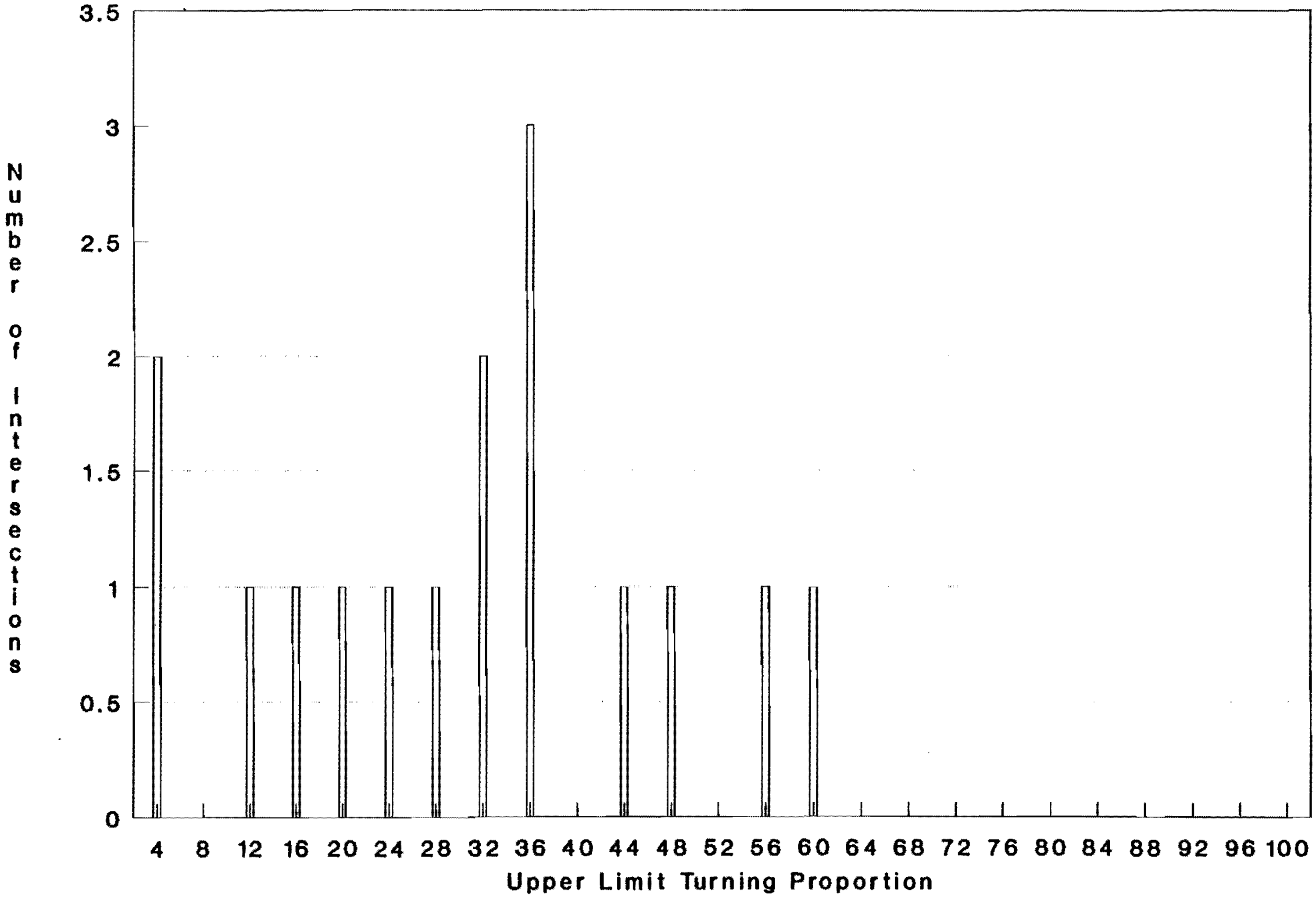


Left-Turning Traffic

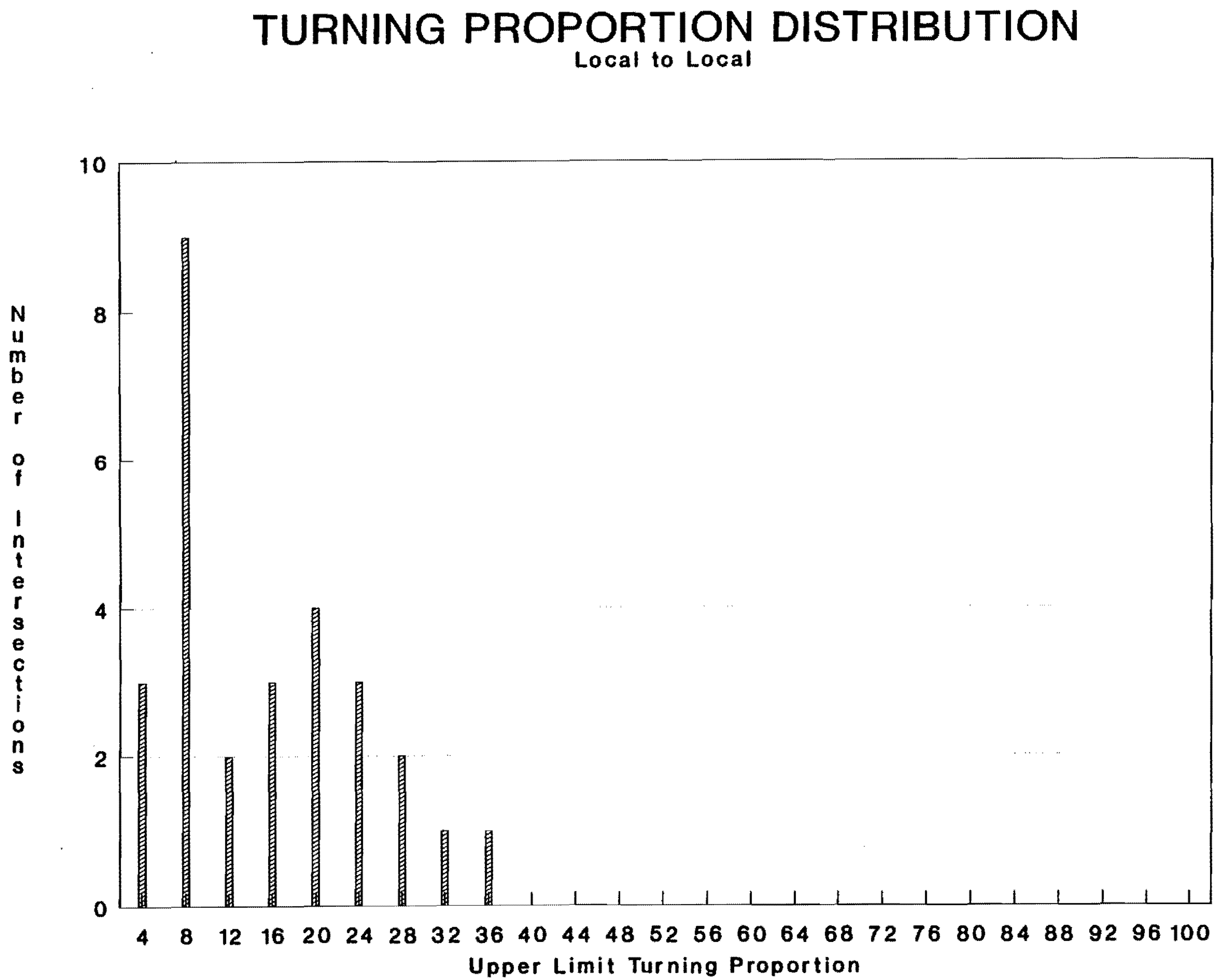

TURNING PROPORTION DISTRIBUTION
Local to Minor Arterial
Number of Intersections
3.5
3
2.5
2
1.5
1
0.5
0
4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Upper Limit Turning Proportion
Through Traffic

TURNING PROPORTION DISTRIBUTION

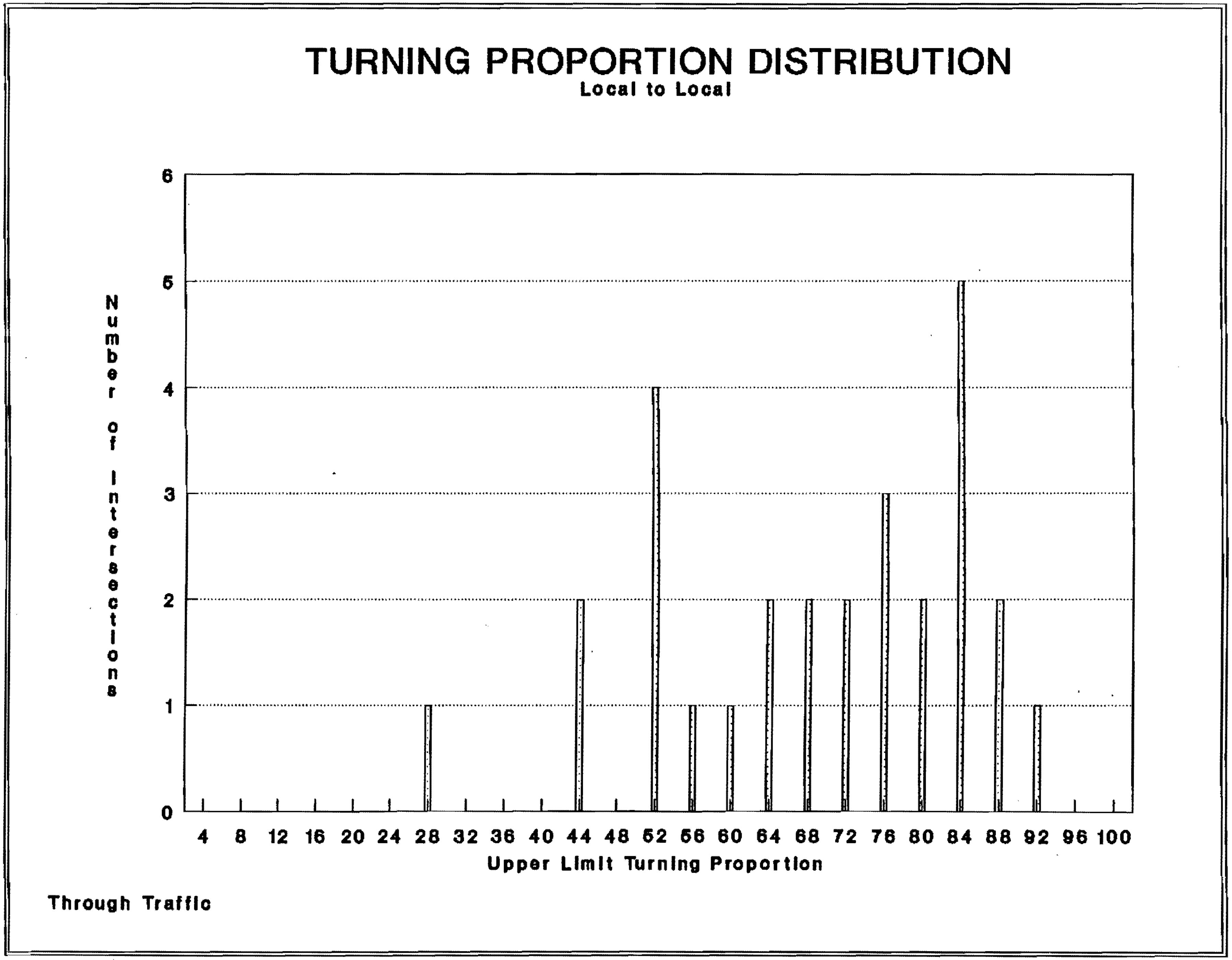
Local to Minor Arterial



Right-Turning Traffic

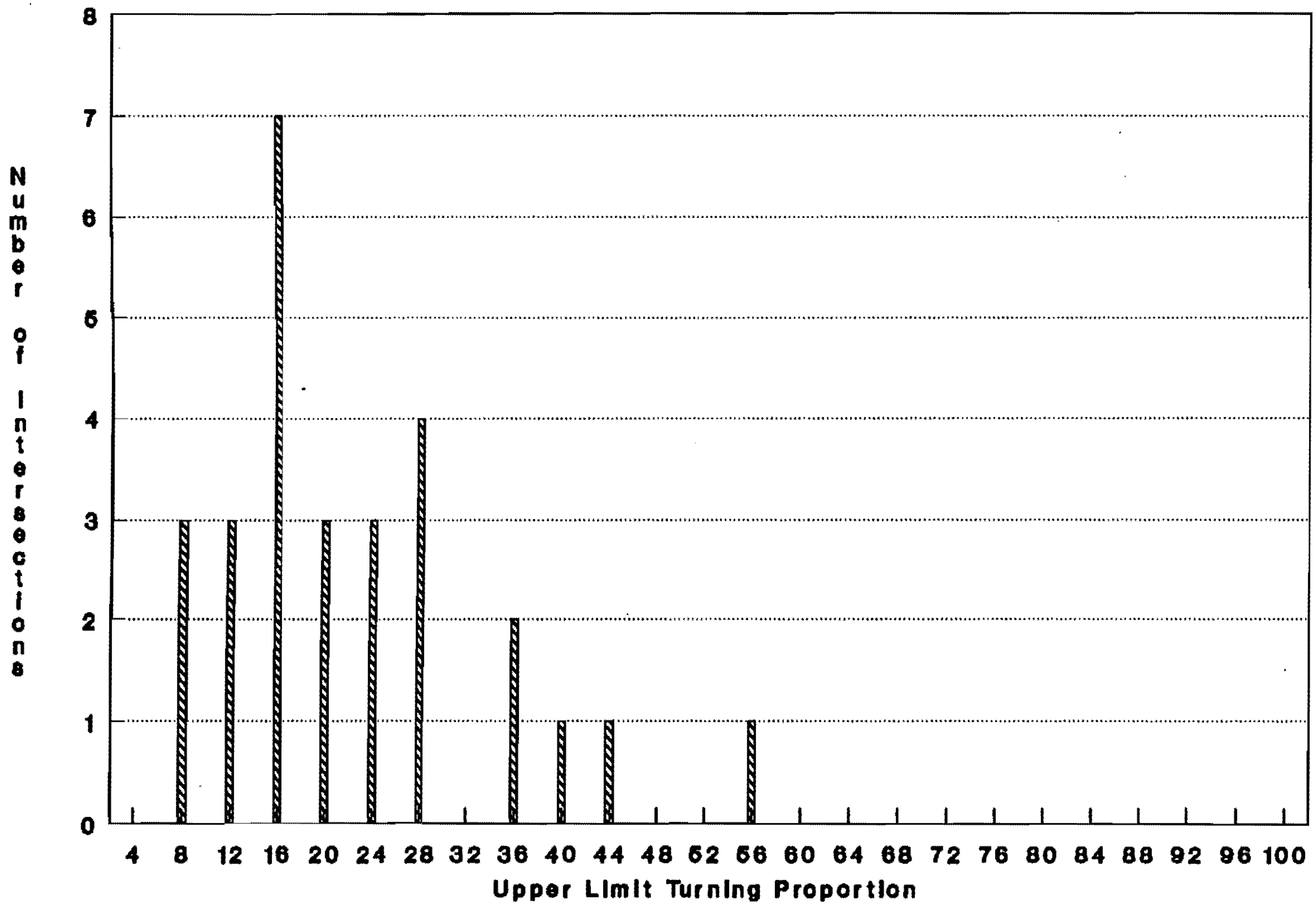


Left-Turning Traffic


TURNING PROPORTION DISTRIBUTION
Local to Local
Number of Intersections
0
1
2
3
4
5
6
4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Upper Limit Turning Proportion
Through Traffic

TURNING PROPORTION DISTRIBUTION

Local to Local



Right Turning Traffic