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TEXAS
TRANSPORTATION
INSTITUTE

STATE DEPARTMENT
OF HIGHWAYS AND
PUBLIC TRANSPORTATION

COOPERATIVE
RESEARCH

OPERATIONAL AND GEOMETRIC EVALUATION OF EXCLUSIVE TRUCK LANES

in cooperation with the
Department of Transportation
Federal Highway Administration

RESEARCH REPORT 331-3F
STUDY 2-18-84-331
TRUCK LANE DESIGN

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This report describes the development of a moving analysis program which can be used to identify candidate sections of highway which warrant the addition of exclusive truck facilities. The program will evaluate the feasibility of constructing these facilities in the median area. The I-35 corridor from Dallas to San Antonio was used as a case study to illustrate the use of the program. Present and future traffic conditions were considered in the evaluation of the impacts of separating trucks from the main stream of traffic.

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by

J. M. Mason

D. R. Middleton

and

H. C. Petersen

RESEARCH REPORT 331-3F
Research Study Number 2-18-84-331
Study of Truck Lane Needs

sponsored by

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U. S. Department of Transportation, Federal Highway Administration

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

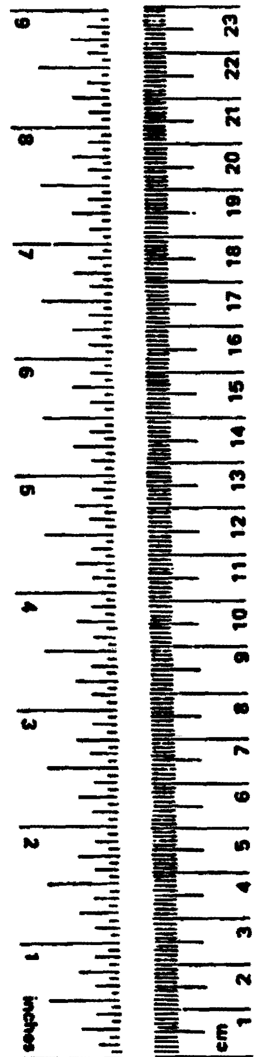
May 1986

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

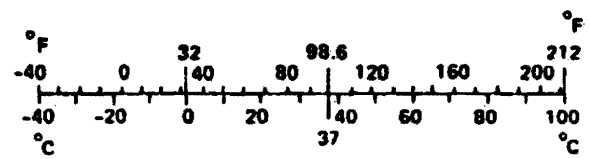
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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ABSTRACT

This report describes the development of a moving analysis program which can be used to identify candidate sections of highway which warrant the addition of exclusive truck facilities. The program will evaluate the feasibility of constructing these facilities in the median area. The I-35 corridor from Dallas to San Antonio was used as a case study to illustrate the use of the program. Present and future traffic conditions were considered in the evaluation of the impacts of separating trucks from the main stream of traffic.

SUMMARY

Traffic growth in Texas has resulted in the need to investigate the feasibility of exclusive truck lane facilities in the median area of existing interstate highways. This report describes the development of a moving analysis computer program to identify candidate sections that warrant the addition of truck lanes. Specific highway segments were analyzed to determine the feasibility of constructing exclusive truck lane facilities in the median area.

The computer program uses accepted methodologies to determine operational improvements on a section of roadway. Volume-to-capacity ratios (with and without trucks) indicate the improvement in operation when trucks are separated from the mixed flow of traffic. The level of service (LOS) for the two conditions is a resulting measure of the quality of traffic flow. The second major parameter considered by the program is effective median width. This is the width available in the median area after accounting for median obstructions and necessary longitudinal barriers.

The output suggested that geometric feasibility of exclusive truck lane facilities (ETF) exists along most of the I-35 corridor, but indicated that present traffic levels are not high enough over the majority of the route to warrant truck lane construction. Future traffic growth scenarios were also examined. The results are presented as the length of time each segment of the freeway is expected to operate at an acceptable level of service.

IMPLEMENTATION STATEMENT

The findings of this investigation provide an initial basis for examining the feasibility of constructing truck facilities within the median areas of existing interstate or similarly divided highways. The computer program also has potential application in a number of other areas where the user desires information on quality of traffic flow for existing or future growth scenarios. The program is easily adaptable to the use of various indices (i.e. accident evaluation).

DISCLAIMER

The material presented in this paper was assembled during a research project sponsored by the Texas State Department of Highways and Public Transportation and the Federal Highway Administration. The views, interpretations, analyses, and conclusions expressed or implied in this report are those of the authors. They do not represent a standard, policy, or recommended oractice established by the sponsors.

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1.0 INTRODUCTION

The rapid growth in traffic on the Texas highway system has prompted the State Department of Highways and Public Transportation (SDHPT) to examine various techniques of handling the simultaneous increase in truck traffic demands. The Texas SDHPT has decided to evaluate special truck lane needs along the I-35 corridor between Dallas-Ft. Worth and San Antonio. The overall objectives of this study were to identify areas of high truck volumes, to establish operational and design procedures to deal with truck traffic, and to evaluate the corridor and system-wide effects of the proposed recommendations.

One alternative of particular interest is the feasibility of using existing median rights-of-way for an exclusive truck lane facility. The I-35 corridor was selected as the first segment for evaluation. Findings of this initial study can be used in examining other candidate corridors in the state.

The analysis procedure involved two distinct phases. The first phase (Report 331-1) involved the review of current geometric design policy to determine applicability to exclusive truck facilities (ETFs). Major elements of the study included geometrics, right-of-way availability, operations, safety, pavement requirements, and costs of the potential improvements. Roadway geometry was the critical element in the first phase. The second phase, which is the subject of this report, resulted in a computer program to evaluate the feasibility of providing separate truck lanes in the median area of interstate highways.

The computer program calculates the level of service (LOS) of each half-mile segment of a selected highway (with and without trucks). The quality of total traffic flow (cars plus trucks) and the difference in this quality, after trucks are removed, are expressed in terms of volume-to-capacity (v/c) ratios as computed by techniques published in Transportation Research Board Special Report 209, "Highway Capacity Manual." (1)

1.1 STUDY OBJECTIVES

The goal of this study was to develop information that would be useful to SDHPT in solving the unique problems associated with heavy truck usage of highway facilities. Specific objectives include: (1) identify critical highway sections from the perspective of excessive truck traffic; (2) establish criteria or warranting procedures for measures to cope with truck traffic; and (3) evaluate the corridor and system-wide impacts of various relief or prevention measures.

This portion of the larger study effort had as its primary objective the development of a computer program which would identify candidate sections of a highway that could both physically accommodate separate truck lanes and improve the operational characteristics within a pre-selected corridor.

1.2 GENERAL PROCEDURE

Interstate 35 between Dallas/Fort Worth and San Antonio was selected as the corridor of intent. Considerations for choosing a corridor include:

total traffic, number of trucks in the traffic stream, anticipated traffic growth, and availability of median width for exclusive truck facilities.

The critical elements affecting decisions on truck facilities must be gathered and summarized in a manner which facilitates analysis and computer encoding. A strip map, scale 1" = 1 mile with horizontal alinement information and features such as rivers, interchanges, county boundaries, city limits on a plan view is very useful. Other essential information which must be gathered includes: ADT (average daily traffic), number of trucks, percent trucks, median width, median obstructions, grade, number of lanes, shoulder width, lateral obstructions, vertical clearance, and right-of-way. This information is necessary in performing level of service calculations. Most of the data can be found on construction drawings and verified with "as-built" drawings.

Aerial photographs are also used to update information taken from construction plans. The minimum scale for geometric design purposes is 1" = 200 feet. For land-use purposes, a scale of 1" = 1,000 feet is more appropriate because of the larger coverage along the corridor. If traffic count information is not current, manual or machine vehicle classification counts must be conducted. Even if recent daily traffic counts are available, the need for peak period traffic volume as well as the distribution of traffic by vehicle classification is critical. In other words, if recent traffic classification counts by 15-minute time intervals are not available, they must be acquired. This data becomes input for the computer program which identifies candidate sections of the selected corridor for exclusive truck facilities.

1.3 RELATED RESEARCH

In response to a need to better understand the current and future demands on the State's highways, the State Department of Highways and Public Transportation has initiated several truck studies. These address state roadway needs from the various perspectives of maintenance, planning, and design. An important impetus to additional truck research was the 1982 Surface Transportation Assistance Act (STAA) which allows longer and wider trucks on specified portions of the Texas highway network. Other reasons for truck related research are the continued rapid population growth resulting in increased goods movement and the lack of knowledge concerning certain commodity movements, particularly "special-use" commodities.

1.3.1 Project List

Several related research project numbers and titles are listed below:

Project 241 - "Truck Use of Highways in Texas," (CTR)

(Research Report 241-2, "An Assesment of Changes in Truck Dimensions on Highway Geometric Design Principles and Practices")

(Research Report 241-4, "An Assessment of Recent State Truck Size and Weight Studies")

(Research Report 241-5, "Truck Weight Shifting Methodology for Predicting Highway Loads")

(Research Report 241-6F, "An Assessment of the Enforcement of Truck Size and Weight Limitations in Texas")

Project 331 - "Study of Truck Lane Needs"

(Research Report 331-1, "Geometric Design Considerations for Separate Truck Lanes")

Project 356 - "Study of Truck Lane Needs" (CTR)

(Research Report 356-1, "Truck Lane Needs Methodology: A Heuristic Approach to Solve a Five Option Discrete Network Design Problem")

(Research Report 356-3F, "A Methodology for the Assessment of Truck Lane Needs in the Texas Highway Network")

Project 372 - "Effect of Truck Tire Pressure on Flexible Pavement"

Project 378 - "Evaluation of Truck Sizes, Weights, and Tire Pressures" (CTR and TTI)

Project 386 - "The Magnitude of Tire Pressure on Texas Highways and the Effect of Tire Pressure on Flexible and Rigid Pavements" (CTR)

(Research Report 386-1, "Experimental Investigation of Truck Tire Inflation Pressure on Pavement-Tire Contact Area and Pressure Distribution")

(Research Report 386-2F, "Effect of Truck Tire Inflation Pressure and Axle Load on Pavement Performance")

Project 393 - "Feasibility, Design Criteria, and Demonstration of Exclusive Truck Facilities"

Project 397 - "Longer and Wider Trucks on the Texas Highway System"

Project 420 - "Identification of Special-Use Truck Traffic"

Project 424 - "Evaluation of the Texas Truck Weighing Program"

Project 447 - "Longer and Wider Trucks on the Texas Highway System" (CTR)

1.3.2 Report Summaries

Summaries of all aforementioned final reports are presented below to give an overview of each study.

Project 241 - Truck Use of Highwaysin Texas

Report 241-2 - "An Assessment of Changes in Truck Dimensions on Highway Geometric Design Principles and Practices"

This report represents one element of a study to assess the various issues and effects of an increase in truck size and/or weights on the rural highways in Texas. The purpose of this report is to summarize a study of the effects that an increase in legal truck limits would have on highway geometric design elements, and the cost implications, should various segments of the Texas highway system require redesign and modification to facilitate their safe and efficient operation.

Report 241-4 - "An Assessment of Recent State Truck Size and Weight Studies"

This report documents the status of current legislation of each state with respect to laws governing truck size and weight. Emphasis was placed on laws pertinent to the operation of larger motor carriers such as "doubles" and "triples," overall vehicle length, width, axle weight, and gross vehicle weight. A survey of all states was made to ascertain the current status of truck size and weight studies and highway cost allocation studies.

Report 241-5 - "Truck Weight Shifting Methodology for Predicting Highway Loads"

As a part of the truck study, a shifting methodology was developed for the projection of future truck weight distribution patterns. The methodology can be applied either manually or by using a series of computer programs. It can be used to predict both gross vehicle weight and axle weight distributions.

Report 241-5 provides a brief review of available methodologies and a detailed discussion of the new methodology. Illustrative applications of predicting gross vehicle weight and axle weight distributions as a result of changes in weight limits are presented in the text. Comparison of prediction results generated by all the available shifting methodologies is also included.

Report 241-6F - "An Assessment of the Enforcement of Truck Size and Weight Limitations in Texas"

The current state regulations affecting motor vehicle sizes and weights, agencies involved directly or indirectly in the enforcement of these regulations, characteristics of oversize-overweight vehicle movements within the state (both legal and illegal movements), and the cost of these vehicle movements to the state were developed and are presented in this report. The characterization of oversize-overweight movements in the state is emphasized.

Project 331 - "Study of Truck Lane Needs" (Report 331-1)

Report 331-1 examines past truck related research to determine the applicability of current geometric design policies to special truck lane facilities. Recommendations are made to help fill the voids in existing design policy. The policies addressed include vehicle characteristics, sight distance, horizontal and vertical alinement, and cross section elements. The report describes specific design elements, discusses their appropriateness to special truck lane facilities, and recommends alternative design criteria where past research warrants possible changes.

Project 356 - "Study of Truck Lane Needs"

Report 356-1 - "Truck Lane Needs Methodology: A Heuristic Approach to Solve a Five Option Discrete Network Design Problem"

Special truck lanes have been proposed as a measure to deal with the increasing traffic of larger and heavier trucks on the Texas highway system. This report describes a procedure for the selection of an optimal subset of truck-related link improvements in the highway network. This procedure is a component of an integrated network modelling methodology for the study of truck lane needs in the Texas highway network.

Report 356-3F - "A Methodology for the Assessment of Truck Lane Needs in the Texas Highway Network"

This report describes an integrated network modelling methodology for the study of truck lane needs in the Texas highway network. It consists of three major components: critical link programming, network traffic assignment and optimal link selection/network design.

The potential of the network modelling methodology for the study of truck lane needs in the Texas highway network has been demonstrated. Further steps needed for its effective implementation and enhancement as a decision support system for truck-related network planning issues are also discussed.

Project 372- "Effect of Truck Tire Pressure on Flexible Pavement"

The objectives of this study were two-fold: 1) to determine by actual measurement the distribution of tire pressures on Texas highways, and 2) to determine by computation the effect of these tire pressures on the life and cost of typical flexible pavements. Data gathered from the field indicated that truck tire pressures on Texas highways have increased in the last few years. The effect on the pavement of such an increase would be an accelerated rate of pavement deterioration. The Final Report includes an analysis of tire pressures by the various commodities, AASHTO classification, roadway type, tire construction (radial vs. bias), and by vehicle axle number.

Project 378 - Evaluation of Truck Sizes, Weights, and Tire Pressures

During the past fifty years, truck weights, sizes, and tire pressures have consistently increased. Pavement and geometric designs have been similarly upgraded in an attempt to accommodate larger trucks and heavier axle loads. Nevertheless, deterioration of pavements has appeared to be accelerating. This study is designed to assess the long-term potential impacts of truck sizes, weights, and tire pressures using three carefully designed scenarios.

Project 386 - The Magnitude of Tire Pressure on Texas Highways and the Effect of Tire Pressure on Flexible and Rigid Pavements

Report 386-1 - "Experimental Investigation of Truck Tire Inflation Pressure on Pavement-Tire Contact Area and Pressure Distribution"

This report contains the results of an experimental investigation into the gross contact areas and contact pressure distributions produced by statically loaded truck tires. The gross contact areas are determined using an automatic imaging system that computes the contact area from a digitized data base obtained from an inked tire print. Contact pressure distributions produced by statically loaded tires are determined using a pressure sensitive film technique.

Report 386-2F - "Effect of Truck Tire Inflation Pressure and Axle Load on Pavement Performance"

This report presents the results of an investigation into the effect of truck tire inflation pressure and axle load on flexible and rigid pavement performance as determined using computer analysis.

The flexible pavement analysis was conducted with both a nonuniform pressure model and a uniform pressure model as input to the elastic layer program BISAR and the 3D finite element program TEXGAP-3D. The results show that (1) the uniform pressure model overestimated the increase in tensile strain at the bottom of the surface for overinflated tires, (2) both high inflation pressure and heavy load caused a high increase in tensile strain at the bottom of the surface and a significant reduction of the pavement fatigue damage life, and (3) the axle load (not the inflation pressure) played a major role in the subgrade rutting life.

Project 393- "Feasibility, Design Criteria, and Demonstration of Exclusive Truck Facilities"

Part of the scope of work in this project includes examining the feasibility of segregating trucks from other vehicular traffic in separate designated lanes or on exclusive facilities. These facilities might be in the median, near the outside lanes of freeways, on or near frontage roads, or on a completely separate alinement. The economic feasibility of this concept will be evaluated and appropriate design guidelines will be established. Based upon the feasibility analysis, a demonstration project of an exclusive intercity truck facility will be conducted.

Project 397- "Longer and Wider Trucks on the Texas Highway System"

The Surface Transportation Assistance Act (STAA) of 1982 allowed longer and wider trucks on the nation's highways. The impacts of the use of these vehicles on the Texas highway network is being evaluated in this project. Included are: 1) a comprehensive documentation of available literature describing essential operational characteristics of large trucks which will result in an annotated bibliography; 2) a detailed analysis of crucial implications of these vehicles upon selected geometric, traffic, and safety features of roadway design and operations; 3) documentation and statistical analysis of accidents involving large trucks; and 4) a final synthesis which focuses the research results upon the standards, procedures, and policies needed to insure safe and efficient accommodation of these vehicles on the highway system.

Project 420- "Identification of Special-Use Truck Traffic"

Special-use truck traffic involves the traffic associated with the processing and/or transporting of timber, grain, beef cattle, cotton, produce, sand/gravel, and limestone. Industry and vehicle characteristics for each of these commodities were determined. The impact of each special-use activity center was assessed in terms of trip generation. Specific activity centers were selected for each industry. The number of trips generated, radius of influence, loads, axle spacing, and seasonal variations were determined for each selected activity center.

Project 424- "Evaluation of Texas Truck Weighing Program"

The sample of weight data being collected and recorded for all trucks on Texas highways has been done at six loadometer stations located along major highways. This sample was recognized as being inadequate. To correct this deficiency, the following were done: 1) existing estimating procedures were reviewed; 2) concentrations of truck activities were identified; 3) the estimation procedure requirements were specified; 4) alternate estimating procedures to meet these requirements were developed; 5) a selection of the best option was made; and 6) a recommendation of the selected weighing and estimating procedure was made to the State Department of Highways and Public Transportation.

Project 447 - Longer and Wider Trucks on the Texas Highway System

The overall objective of this project is to study the impacts on the Texas highway system of the use of longer and wider trucks on geometric design, traffic operation, and roadside safety. Examples of such trucks are Turnpike Doubles, Rocky Mountain Doubles and Triples. The project includes the analysis of offtracking characteristics of these trucks with regard to critical segments of the Texas highway system, such as diamond interchanges, loop ramps, roadside rest areas, etc. This analysis is done with the aid of a computer model called TOM (Truck Offtracking Model). The final synthesis of the research results will form a set of standards, procedures, and policies for use by SDHPT decision-makers to ensure safe and efficient accommodation of these vehicles onto the highway system.

2.0 GEOMETRIC DESIGN CONSIDERATIONS

A comprehensive discussion of design vehicles and the critical geometric design elements are presented in Research Report 331-1. Following is a brief summary of the information found in that document. The findings of Report 331-1 were used in establishing the geometric design requirements of the exclusive truck lane facilities.

2.1 DESIGN VEHICLES

The geometric design of the roadway and its appurtenances is influenced by both the physical and operational characteristics of the intended vehicles. AASHTO (2) uses the design vehicle approach, where all vehicles utilizing the facilities are grouped into classes of similar operational and physical characteristics, and a "critical" design vehicle selected. The chosen design vehicle usually has the largest dimensions, heaviest weight, and longest turning radius. By identifying these critical characteristics and selecting the vehicle type with the most severe attributes, it is assumed that any smaller vehicle will be accommodated.

The geometric design of any roadway facility must consider unique vehicle characteristics. Vehicle characteristics of interest in truck facilities design are vehicle height, width, length, driver eye height, weight-to-horsepower ratio, and braking capability.

2.1.1 Vehicle Height and Width

The design vehicle height is 13.5 feet. Overhead clearances of bridges, utilities, and traffic control devices are controlled by the height of the design vehicle. Superelevation and superelevation transition are influenced by vehicle heights since a higher center of gravity increases the probability of overturning.

AASHTO assumes a width of 102 inches for all truck design vehicles. This is in accordance with the 1982 Surface Transportation Assistance Act (3). Vehicle widths affect lane widths, width of turning roadways, pavement widening on curves, and horizontal clearances on tunnels and bridges.

2.1.2 Vehicle Length

AASHTO design vehicle lengths are as follows: single unit truck - 30 feet, single unit bus - 40 feet, articulated bus - 60 feet, intermediate semi-trailer - 55 feet, and "double bottom" semi-trailer - trailer - 65 feet. In comparison, Texas laws allow for a 45-foot single unit truck, and a 65-foot tractor-semi-trailer combination.

2.1.3 Driver Eye Height

AASHTO uses a 3.5 feet driver eye height for design purposes for passenger cars. For trucks, higher eye heights compensate for a longer required stopping distance. Critical truck driver eye heights can be grouped into speeds between 20-30 mph, 35-45 mph, and 50-70 mph. The critical truck driver eye heights associated with the groups are 6 feet, 7 feet, and 8 feet, respectively. (See Report 331-1 for details)

2.1.4 Vehicle Headlight Height

Vehicle headlight heights are used mainly for determining available sight distance in the design of sag vertical curves. AASHTO assumes a 2-foot headlight height and 1-degree upward divergence of the light beam from the longitudinal axis of the vehicle. The distance at which the light beam strikes the pavement is assumed to be the sight distance on curves. Gordon (4) found that there has been no unusual visibility problems encountered by trucks on sag vertical curves because the rise angle from the truck driver's eye to the top of the windshield permits the driver to see beyond the area lit by the 1-degree rise angle of the headlight.

2.1.5 Weight-to-Horsepower Ratio

AASHTO defines the weight-to-horsepower as the gross weight of the vehicle divided by the net engine horsepower. Net engine horsepower is the horsepower obtained at the flywheel, and is usually within 90 percent of the gross horsepower. AASHTO currently uses a new weight-to-horsepower ratio of 300 to 1 in determining profile grades.

2.1.6 Vehicle Braking Distances

Heavy vehicle braking performance is affected by many factors: tire type and condition, weight of the vehicle, road surface characteristics, the number of axles, and the number of tires per axle. Analysis of the several studies conducted on this topic indicates varying results due to unique conditions found in each test. They do agree, however, that the AASHTO braking equation is not adequate for today's larger and heavier trucks.

Peterson points out that the U.S. DOT, FHWA "Motor Carrier Safety Regulations" (5) specify deceleration rates of 21 feet per second per second for passenger cars and 14 feet per second per second for truck combinations. As a result, a car should stop in two-thirds the distance required by a truck. DOT regulations also specify that a truck must stop within a distance of 40 feet from an initial velocity of 20 miles per hour. Figure 1 demonstrates the stopping distance requirement for trucks and passenger cars on wet and dry pavements.

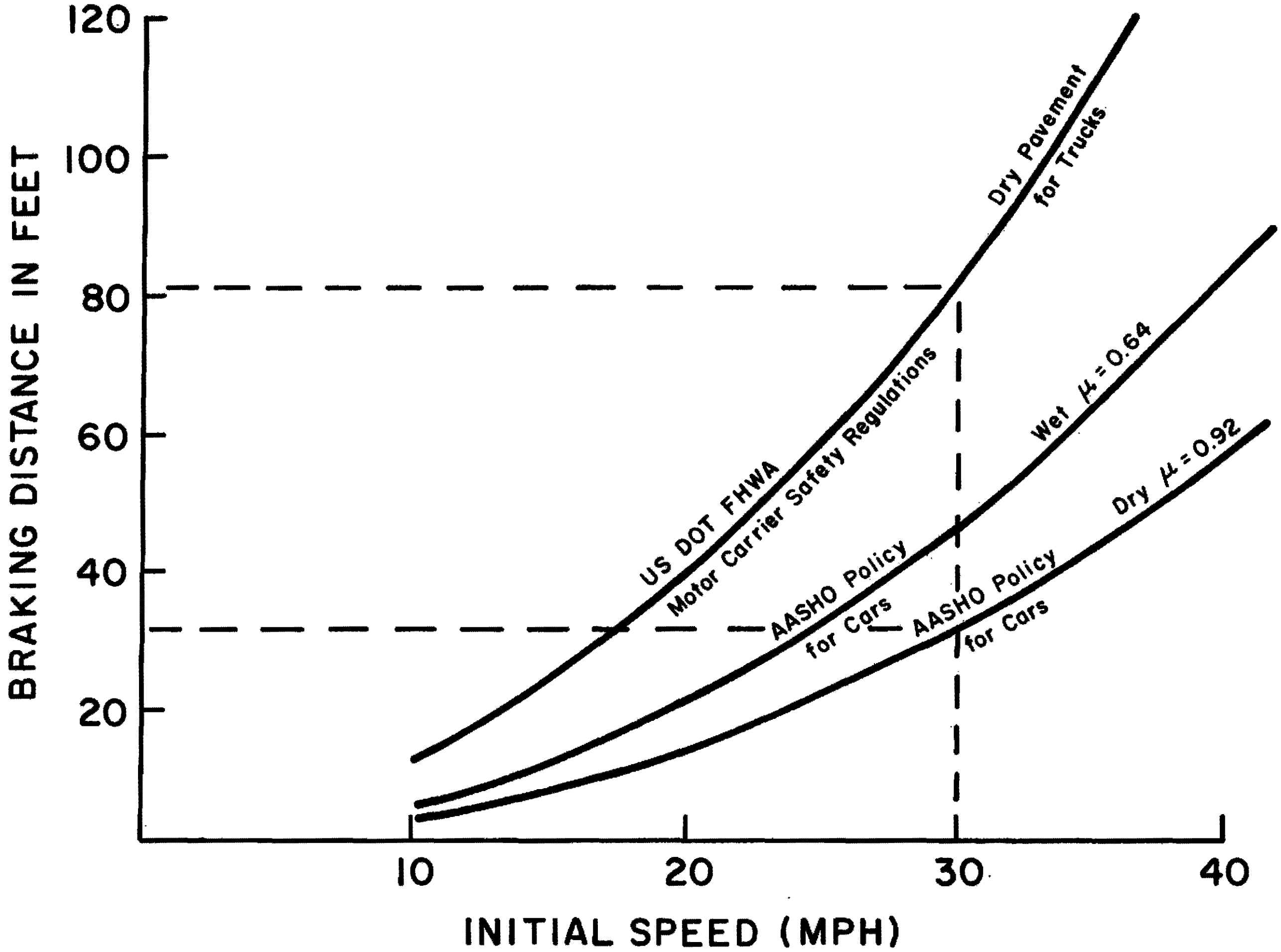


Figure 1. Braking Distances of Various Combinations Compared to AASHTO and U.S. DOT Stopping Distance Values (8)

2.2 GEOMETRIC DESIGN ELEMENTS

2.2.1 SIGHT DISTANCE

2.2.1.1 Perception-Reaction Time

Brake reaction time is defined by AASHTO (2) as the interval between the instant the driver recognizes the existence of an object or hazard on the roadway ahead and the instant that the driver actually applies the brakes. It is commonly referred to as perception-reaction time.

Some controversy exists as to the appropriate perception-reaction time to be used. AASHTO uses 2.5 seconds. Hooper and McGee, in cooperation with Gordon (6) et al., suggest that a 3.2 second perception-reaction time be used in braking distance determination. This value represents the 85th percentile perception-reaction time for the driving population. In contrast, Middleton et al. (7) suggest that since truck drivers represent a more experienced portion of the driving population that they should not be assigned the same driving abilities. Further study is necessary in order to investigate perception-reaction for differences due to driver experience.

2.2.1.2 Braking Distance

It has been shown that cars stop in approximately two-thirds of the distance of heavy trucks. Combining the perception-reaction time and the braking equation proposed by Peterson (8) results in the following equation for stopping-sight distance (SSD):

$$SSD = 1.47(V)T + V^2/20(f \pm g) \qquad (1)$$

where:

V = vehicle speed, mph;
T = perception-reaction time, sec;
f = coefficient of friction; and
g = percent grade divided by 100

2.2.1.3 Decision Sight Distance

AASHTO recommends an increased perception-reaction time when drivers are faced with complex or instantaneous decisions, when information is difficult to perceive, or when unusual maneuvers are required. In these instances, longer sight distance should be provided through the use of decision-sight distance. Due to decreased maneuverability and increased stopping distances of trucks as compared to passenger cars, it is suggested that decision-sight distance be considered in the design of exclusive truck facilities.

2.2.1.4 Passing Sight Distance

The AASHTO design policy establishes minimum passing sight distances for two lane highways. These distances were derived from operational characteristics of passenger cars and are not directly applicable to the design of truck facilities. Additional evaluation is necessary to determine appropriate values for exclusive truck lane facilities.

2.2.2 HORIZONTAL ALINEMENT

AASHTO has adopted a formula which indicates the relationship between horizontal curvature, vehicle speed, superelevation rate, and side friction factor. This equation was derived from studies of passenger car operations. It involves the principle of developing enough side friction for the vehicle negotiating a curve to cause discomfort to the driver. Weinberg and Tharp (9) have expressed the concern that the maximum side friction factors used by AASHTO fail to take into account the overturning tendency of a vehicle on a turn. A side friction factor which has not exceeded the "driver comfort" range may be of sufficient magnitude to cause a heavily loaded vehicle with a high center of gravity to overturn while negotiating a turn (10).

Rollover thresholds of trucks have been established based on truck axle load, gross weight, width, and height of the center of gravity of the payload. Rollover threshold is defined as the maximum value of lateral acceleration which the vehicle can tolerate without rolling over. It has been found that the threshold of rollover of a typical truck is approximately 0.25 g's.

2.2.2.1 Pavement Widening on Curves

AASHTO recommends pavement widening on curves to make operating conditions on curves comparable to tangent sections. If exclusive truck lane facility design is based on current legal sizes of trucks in Texas, then current AASHTO policy on pavement widening on curves is applicable. However, if truck facilities are to be designed on the premise that 105-foot double and triple combinations are to be accommodated, current AASHTO guidelines are not completely descriptive.

2.2.2.2 Sight Distance on Horizontal Curves

Horizontal curves on exclusive truck lane facilities must be checked considering truck stopping distance requirements. The higher eye height advantage given truck drivers for vertical curve design may be reduced significantly on horizontal curves. This is especially noted where roadside features intercept the truck driver's line of sight.

2.2.3 VERTICAL ALINEMENT

2.2.3.1 Vehicle Operating Characteristics On Grades

AASHTO uses a 300 pound per horsepower ratio as representative of the operational characteristics of trucks on grade. This value is considered appropriate until other changes in truck performance are identified. Current speed-distance curves for 300 pound per horsepower trucks operating on various grades are shown in Figure 2.

2.2.3.2 Critical Length of Grade for Design

AASHTO has adopted a vehicle entry speed for trucks on grades of 55 miles per hour. Glennon and Joyner (11) and others (see Report 331-1) found that a 10 mph reduction in speed as compared to other traffic on the roadway was appropriate to determine critical length of grade. This is now used by AASHTO to determine critical grade lengths. Critical grade lengths are shown in Figure 3.

2.2.3.3 Climbing Lanes

For exclusive truck facility (ETF) design, the need for climbing lanes will be a function of the difference in operating characteristics of various trucks in the traffic stream. Information is not currently available for designing climbing lanes on ETFs.

2.2.3.4 Vertical Curves

Figure 4 shows vertical curve lengths calculated from stopping sight distance values obtained for trucks. See Equation (1) and Report 331-1 for Stopping Sight Distance values.

2.2.4 CROSS SECTION ELEMENTS

2.2.4.1 Lane Widths

Twelve-foot lane widths are considered essential by AASHTO for adequate clearance of commercial vehicles on two-lane pavements. For exclusive truck facilities design, the following expression could be used as desirable lane widths where trucks are adjacent to existing travel lanes.

$$W = W_v + 4.5 \text{ ft.} \qquad (2)$$

where:

W = width of one lane, ft.
W_v = width of the vehicle, ft.

2.2.4.2 Shoulder Width

AASHTO policy provides for a desirable width of shoulder which will enable a stopped vehicle to clear the roadway by at least 1 foot and preferably by two feet. AASHTO recommends a 12 ft shoulder along heavily traveled and high-speed facilities which carry large amounts of truck traffic.

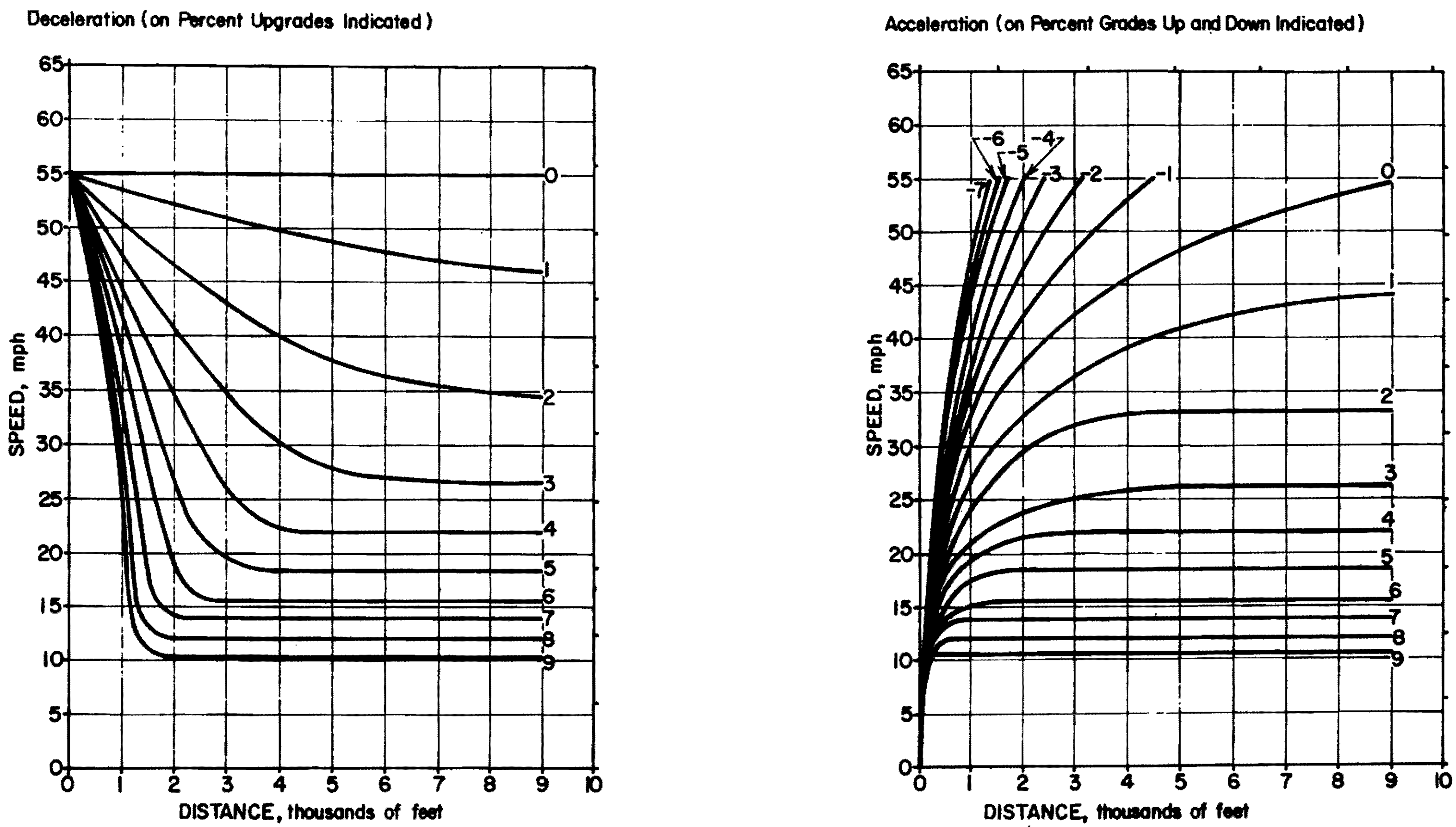


Figure 2. Speed-Distance Curves on Various Grades (2)

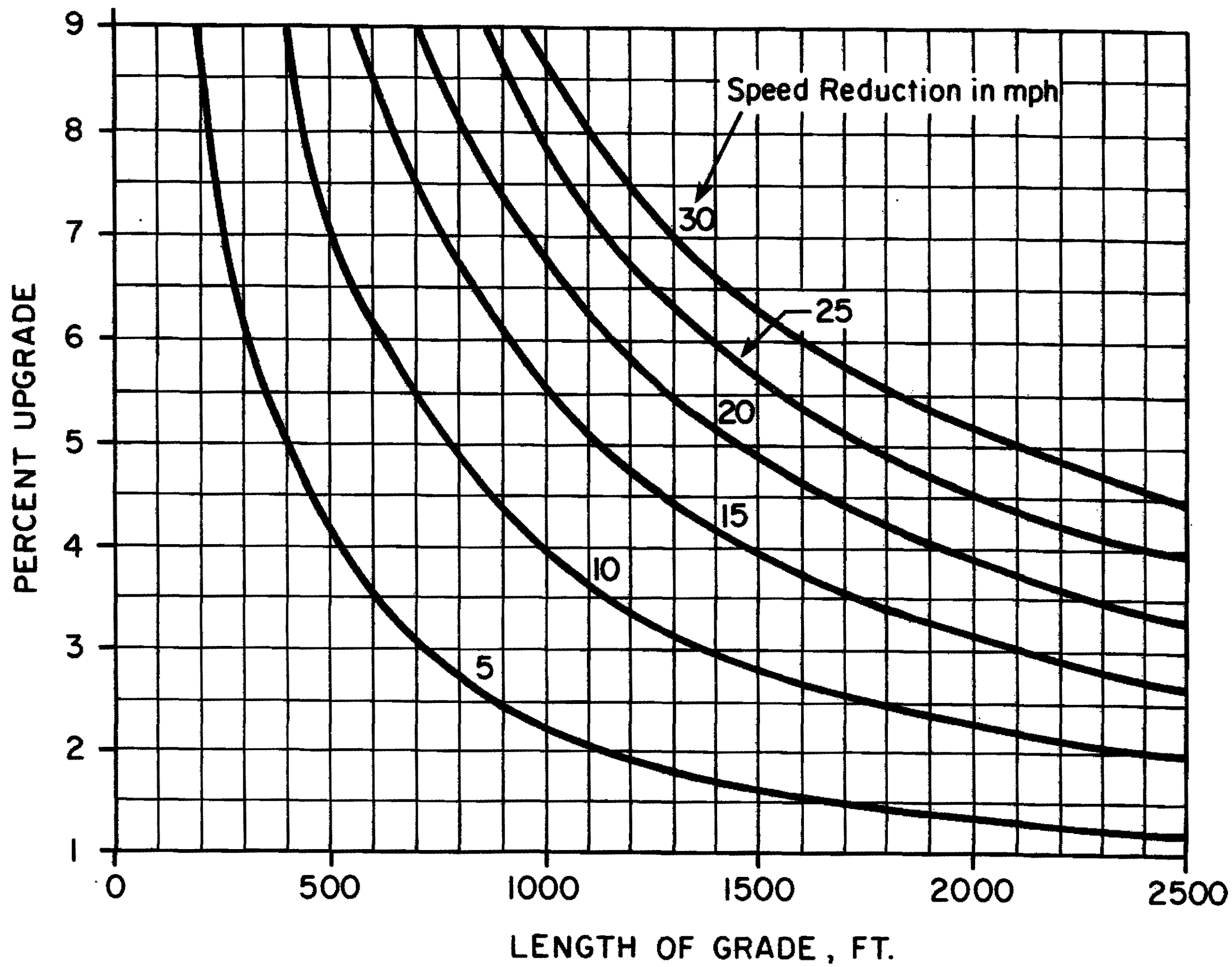
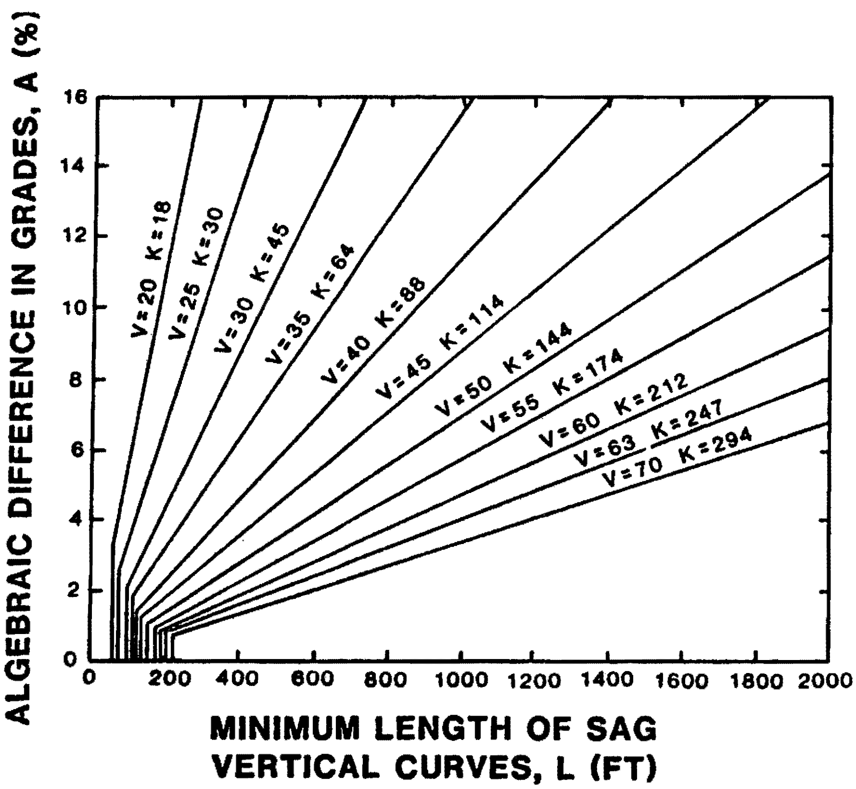


Figure 3. Critical Length of Grade for 300 lb/hp Trucks (2)



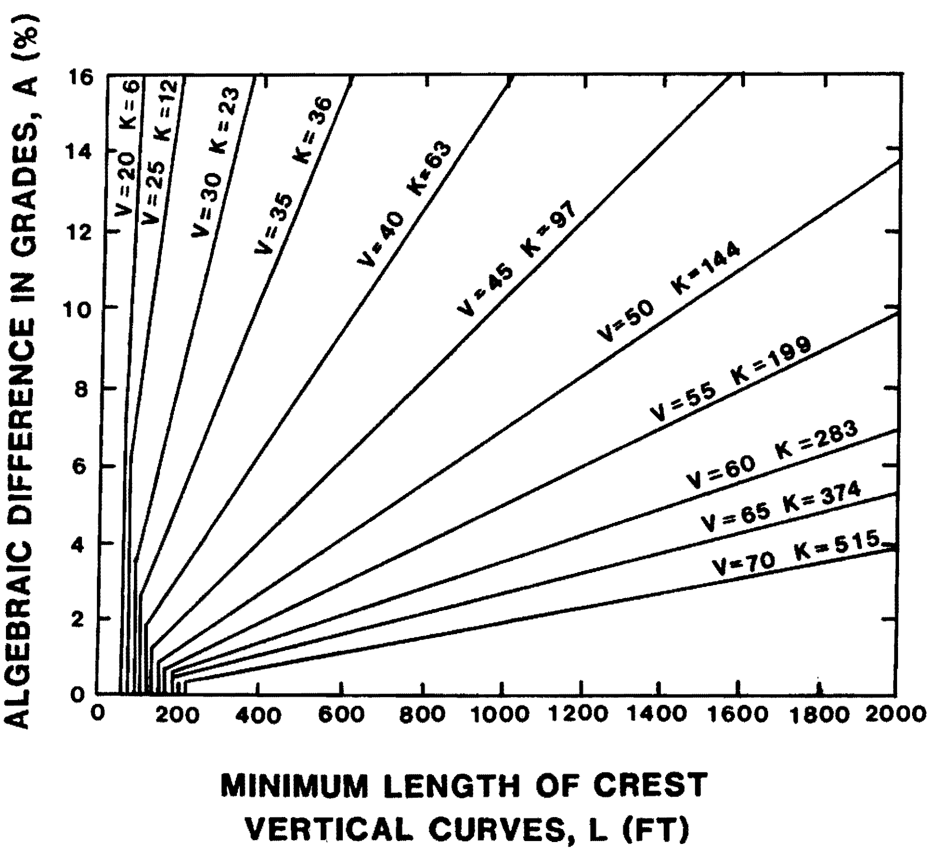


Figure 4. Minimum Length of Vertical Curves (2)

2.2.4.3 Guardrails

Existing roadside hardware may be inadequate for heavy vehicles such as trucks and buses (12). However, several types of guardrails and bridgerails have successfully redirected heavy vehicles with minimal property damage. The most common is the concrete median barrier, or "safety shape." Full scale impact testing with heavy vehicles resulted in the successful restraining and redirection of the vehicle at speeds of up to 45 miles per hour and a 15-degree impact angle (13).

2.2.4.4 Drainage Channels and Sideslopes

Drainage channels, while performing the vital task of directing water away from the highway, should not pose a serious safety hazard to errant vehicles. Current standards for safe roadside cross sections were obtained using passenger car data. Information on heavy trucks traversing drainage channels and sideslopes is not currently available.

3.0 ACCOMMODATING EXCLUSIVE TRUCK LANES

3.1 TYPICAL EXCLUSIVE TRUCK LANE CROSS-SECTIONS

Only the median portion of the divided highway was considered in accommodating truck traffic. Since the available median width varied throughout the selected corridor, several options were reviewed. Other strategies, such as a parallel alinement on separate right-of-way or truck lanes between the mainlanes and frontage roads, are possible but were beyond the scope of this project. Project 393, "Feasibility, Design Criteria, and Demonstration of Exclusive Truck Facilities," includes within its scope the evaluation of other alternative strategies.

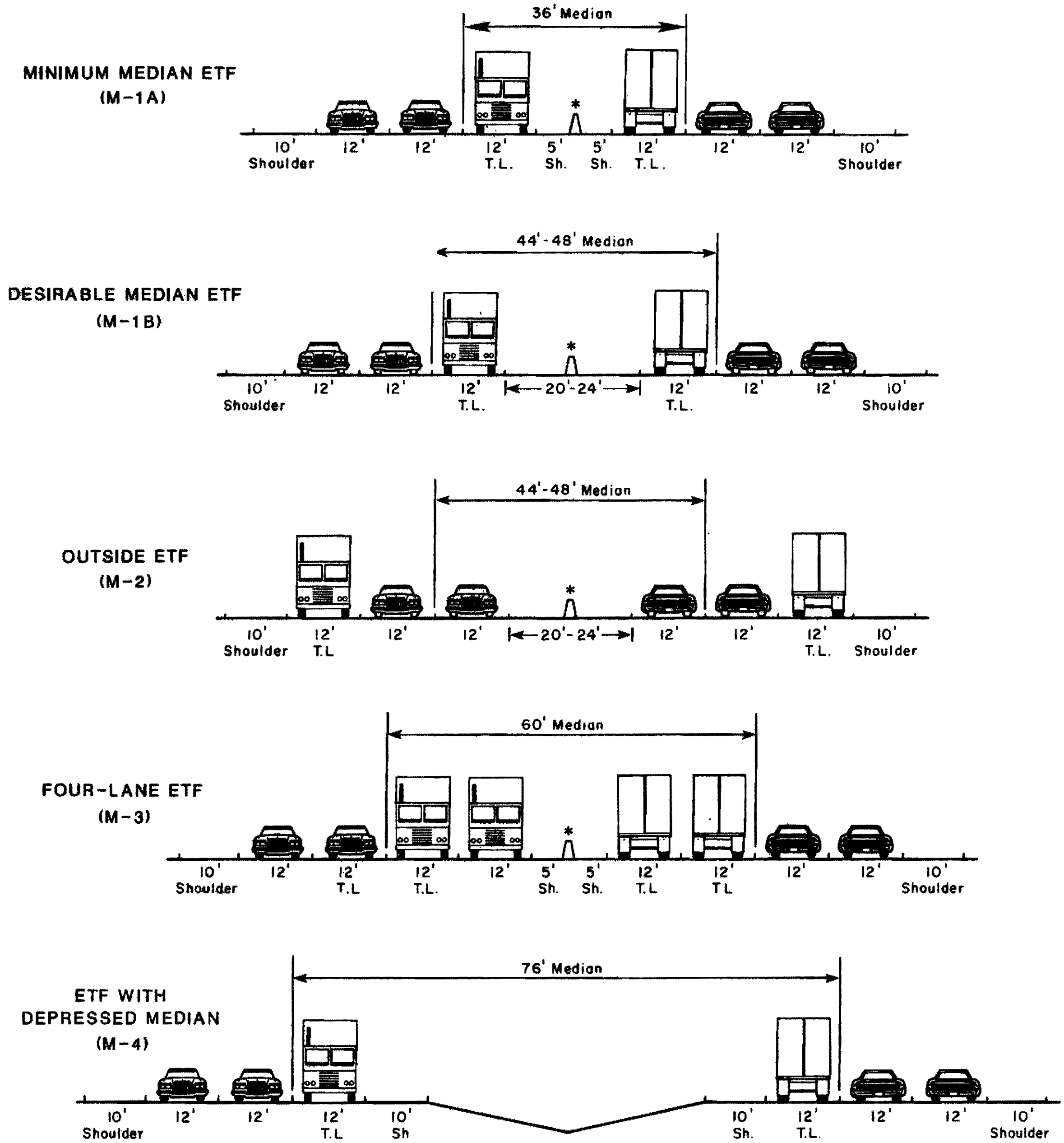
Figure 5 shows seven typical truck lane cross-sections. All except one (M-2) place trucks in the median area. The development of these cross-sections considers typical SDHPT median widths -- 36 feet, 44 feet, 48 feet, 60 feet, and 76 feet. The first (designated M-1A) exhibits minimum widths while the second (M-1B) shows desirable widths. These two configurations do not physically separate trucks from other traffic by positive barriers. Special lane designations, unique raised pavement markers, and regulatory signing such as "Trucks Only" could be used to define the authorized lane. Option (M-4) in Figure 5 shows an existing 76-foot median which can accommodate an additional lane in each direction utilizing a depressed median. This same median width is also sufficient for three truck lanes (providing for passing maneuvers alternating back and forth by direction) as shown in cross-section M-5. Cross-Sections M-5, M-6, and the outside truck lane are particularly relevant to urban areas.

Where positive barriers are needed to separate directional flows of trucks or to separate trucks from other vehicles, a substantially taller barrier is needed such as that developed by Hirsch and others (14). This is an important safety issue because of possible restrictions in sight distances caused by the aforementioned taller (90 inches in the reference cited) barrier. Additional research is needed on the subject of truck driver eye height to document the sensitivity of variation among truck cab configurations.

The minimum "effective median width" is one of the most important considerations when evaluating truck lane feasibility. The effective median width is the available clear width of median measured from the nearest edge of each inside travel lane. Any obstructions such as piers for overhead structures are subtracted from this clear width. The width of a positive barrier such as the concrete "safety shape" is also subtracted from the total median width to establish the effective median width. Figure 6 illustrates these measurements.

3.1.1 ETF's for Median Widths of 36 to 48 feet: M-1A, M-1B, and M-2

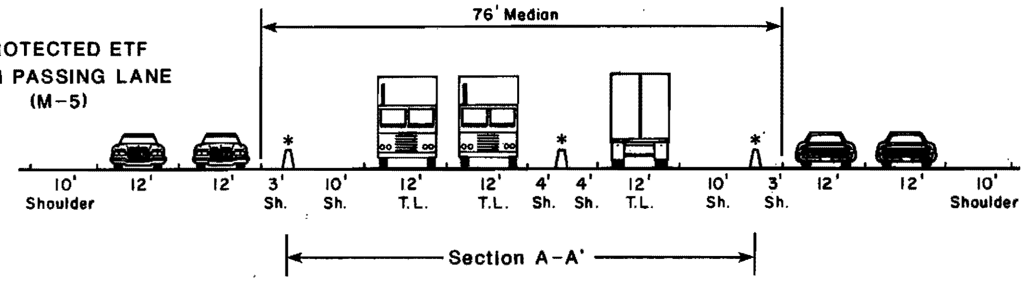
To accommodate the continuous "through" truck nature of traffic along rural segments, cross-sections M-1A and M-1B appear feasible. M-1A should be considered as a minimum cross-section with 12 foot travel lanes and shoulders of only about five feet. M-1B depicts a more desirable cross-section, using 12 foot travel lanes with 20 to 24 feet remaining for the inside shoulders and barrier. For cross-sections such as these, the designer should consider barriers that can withstand the impact of large vehicles.



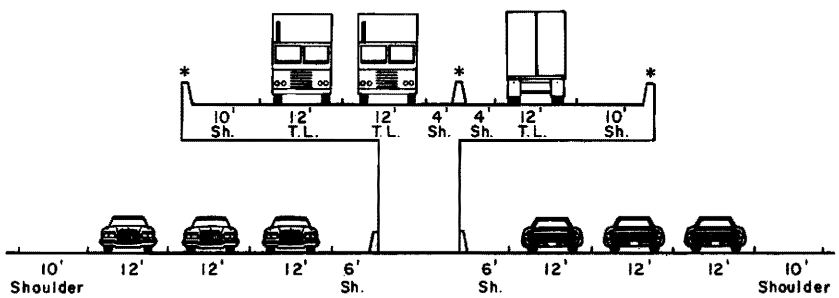
*Note: Barrier not to scale.

Figure 5. Typical Truck Lane Cross Sections

PROTECTED ETF
WITH PASSING LANE
(M-5)

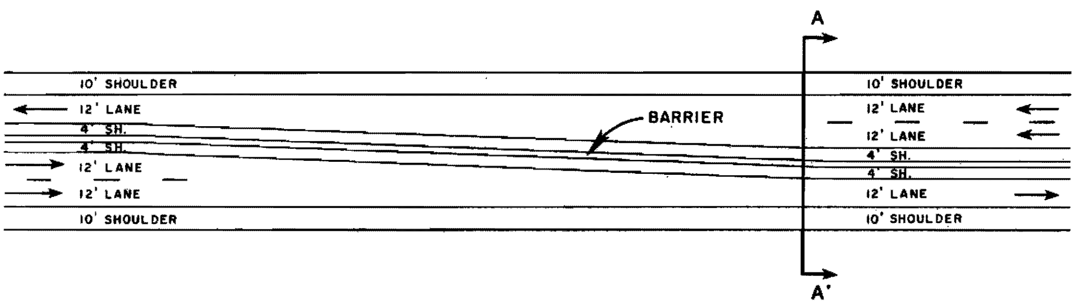


ELEVATED ETF
(M-6)



Section A-A'

*Note: Barrier not to scale.



PLAN OF ETF M-5 OR M-6
TRANSITION AREA

Figure 5 (Continued). Typical Truck Lane Cross Sections

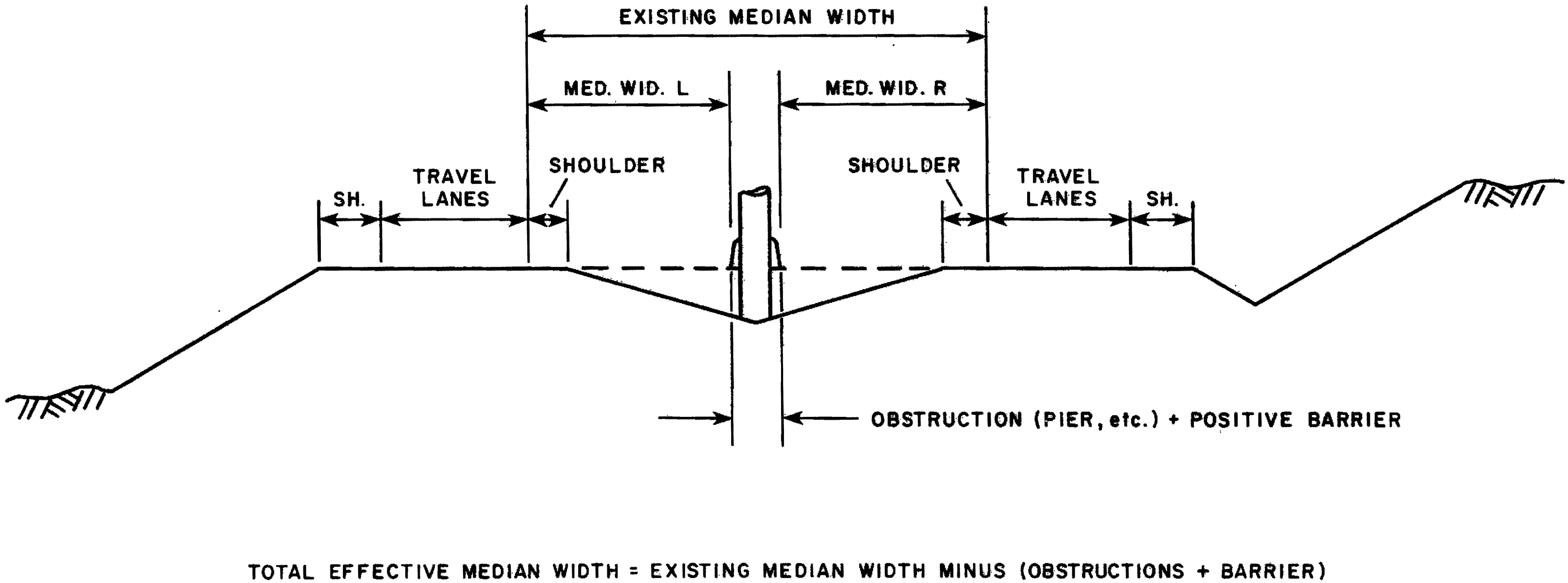


Figure 6. Effective Median Width

Cross-Section M-2 is suitable for either urban or rural applications. An Operational advantage occurs in urban areas in that trucks are not required to weave across two or more lanes of heavy traffic to enter or exit the truck lanes as in M-1A and M-1B. In this case, the median is not used for trucks per se, but autos are shifted toward the median so that trucks can be accommodated in the outside lane(s).

One advantage of M-1A, M-1B and M-2 is their application in narrow medians. Further, for M-1A and M-1B, the pavement structure would be specifically designed to carry the anticipated truck traffic. The existing travel lanes would experience a longer service life due to the reduced heavy axle load repetitions. This option is the most economical in comparison to the other alternative schemes. For M-2, other advantages include: smoother operation of traffic with slower vehicles to the right, overall weaving is minimized, median barrier is the smaller version designed for autos, and wide loads can be accommodated without special provisions.

Disadvantages to M-1A and M-1B include: limited control of entering/exiting maneuvers, no provision for truck passing maneuvers except by other traffic lanes, insufficient inside shoulder for a stalled truck (M-1A), and long weaving distances necessary near interchanges. Disadvantages of the outside truck lane (M-2) include: existing pavement design may be insufficient for total truck loading, lack of capacity near interchange ramps for all trucks plus entering/exiting traffic, and generally provides a small incremental improvement in operations.

3.1.2 ETF for Median Width of 60 feet: M-3

Cross-Section M-3 is similar to M-1A and M-1B. The difference is that the additional median width allows for construction of a second lane in each direction of travel. This second lane can be designated as a passing lane for trucks only, thus improving the operation of the ETF.

The advantages of M-3 are: pavement designed exclusively for trucks and improved operations due to the passing lane. Disadvantages include: limited control of entering/exiting maneuvers, insufficient inside shoulders for stalled trucks, and long weaving distances necessary near interchanges.

3.1.3 ETF for Median Width of 76 feet: M-4 and M-5

For very wide medians, a single lane might be added for trucks as shown by cross-section M-4. Since opposing directions of traffic are still sufficiently separated, a positive barrier is not needed. Traffic operations are the same as M-1A and M-1B.

Advantages of M-4 are: low cost since no barrier is needed and a pavement designed specifically for trucks. Disadvantages include: limited control of entering/exiting maneuvers, no provision for truck passing maneuvers except by other traffic lanes, and long weaving distances necessary near interchanges.

Separation of trucks from smaller vehicles is achieved by positive barriers on each side of the exclusive truck facility as shown by M-5 in Figure 5. Again, the designer should consider the use of a barrier to withstand impact by these larger vehicles. Minimum travel lanes and outside shoulders are 12 feet and 10 feet, respectively. Provision for passing is accomplished by a second truck lane which alternates from one side to the other. The plan view of this traffic scheme is shown in Figure 5. At any location except transition areas, one direction of traffic will have two twelve-foot travel lanes, while the other has only one. After a sufficient distance has been provided for passing in a particular direction, the passing lane will be shifted to the the opposite side.

Advantages of M-5 include: total control of entering/exiting movements, provision for passing maneuvers, and compatibility with the separate truck intersection or interchange and with the elevated truck lane, M-6.

Disadvantages include: greater required median width and less clear width for some wide loads.

3.1.4 Elevated Median Truck Lane, M-6

In urban areas where available median width is at a premium, this cross-section is a viable option. Cost effectiveness is the primary consideration. However, the facility could also be used by line-haul transit or by express bus from outlying park-and-ride lots. Buses generally have operating characteristics which are similar to large trucks. Special consideration must be given pavement drainage, lighting and vertical clearance for vehicles at ground level, and the problem of icing during winter months. A combination of this cross-section and M-5 is appropriate near the urban fringe.

Advantages of M-6 are: minimum median width required, passing maneuvers provided, control of access by large vehicles, potential use by transit vehicles, and compatibility with the M-5 cross-section.

Disadvantages are: high cost, difficulty in future expansion, icing in winter months, less clearance for wide loads, and potential noise problems near environmentally sensitive areas.

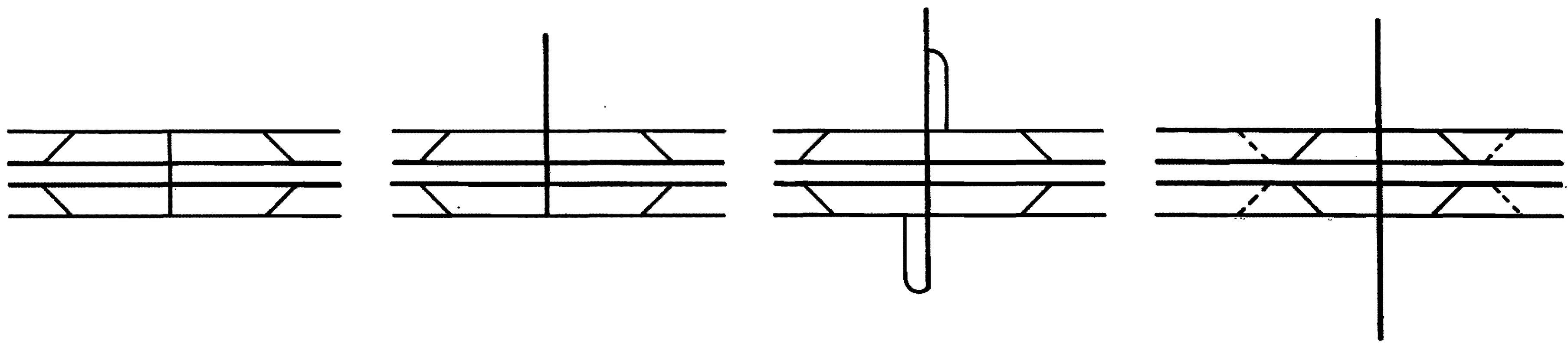
3.2 INTERCHANGE TYPES

Almost all interchanges in Texas incorporate frontage roads. The exchange of traffic from a typical interstate highway to secondary cross road therefore occurs in a hierarchical movement pattern. The pattern is: interstate main lane to ramp to interstate frontage road to secondary frontage road to ramp to main lanes. The frontage roads also act as collector-distributor roads. These movements are more thoroughly discussed in the following sections.

3.2.1 Diamond Interchange

Several types of diamond interchanges exist along Texas interstate highways. Figure 7-A shows a simple cross-over using diamond ramps. This provides access for both directions of interstate traffic to either side of the highway even though there is no intersecting public road at this location.

Figure 7-B is a 3-leg interchange using diamond ramps. Traffic is



CROSS-OVER
7A

3-LEG
7B

3-LEG OR 4-LEG
WITH JUGHANDLE LOOPS
7C

4-LEG
7D

Figure 7. Diamond Interchanges

dispersed from the interstate via frontage roads, then at-grade intersections.

Figure 7-C represents a 3- or 4-leg diamond with Jughandle loops. Connection of the interstate frontage road and cross road is by way of slow speed ramps which involve stop or yield situations.

Figure 7-D is a high volume to high volume 4-leg interchange which might use either diamond or X-ramps. X-ramps are commonly found in relatively large urban areas where numerous intersecting streets with relatively high traffic volume dictate the need for atypical ramp configurations.

3.2.2 Other Interchanges

Figure 8 shows other interchange types less frequently found on Texas freeways. Partial cloverleafs (Figure 8A) can be found with one, two or three loop ramps, none of which are very common. They can also be found with frontage roads on one or both of the intersecting highways.

Figure 8B is a full cloverleaf. Connections from one highway to another are made by going from main lane to ramp to frontage road to semi-direct ramp to second frontage road to ramp to main lane. Frontage roads between loop ramp termini serve as collector-distributor roads. Only a few of these interchanges can be found in the state.

A few interchanges exist in the state which involve two interstate highways or an interstate and another major highway. These interchanges are relatively complex and do not fit a particular pattern. One example is shown in Figure 8C. This involves a complex network of direct ramps resulting in high speed traffic movement from one highway to another.

Still other interchanges exist throughout the state besides those already mentioned. They are generally unique to a specific area and do not represent one particular category.

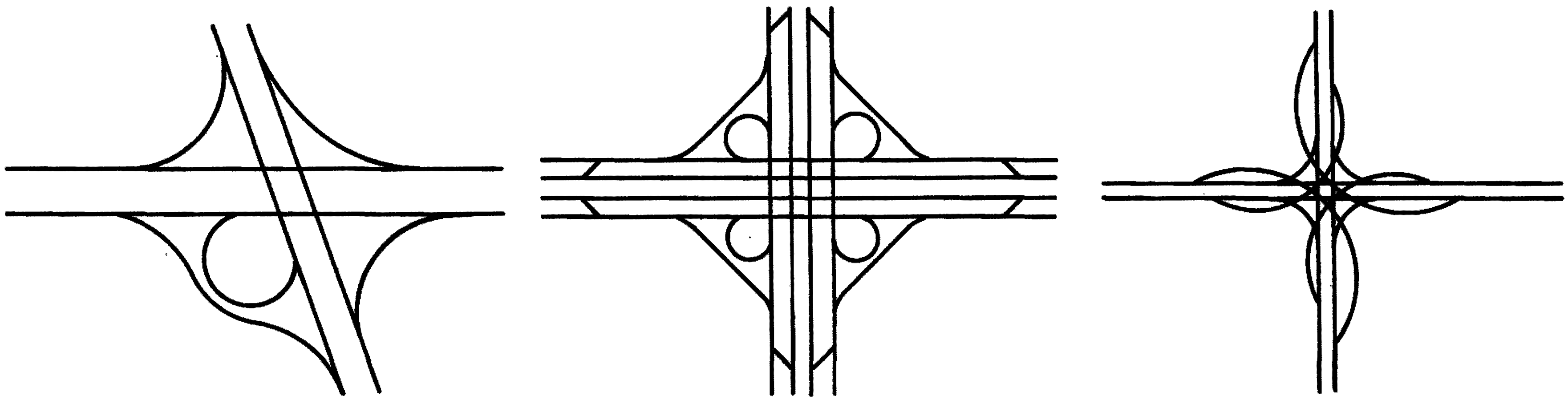
3.3 ACCESS TO EXCLUSIVE TRUCK FACILITIES (ETF)

3.3.1 Existing Ramps

Accessibility to exclusive truck lane facilities depends upon the type of ETF involved as well as the existing interchange configuration. In the lowest order of access to the ETF, little or no change to existing ramps or other access features will occur. Trucks will simply enter the freeway on ramps designated for both cars and trucks and then move to the appropriate lane(s) designated for trucks only. Adequate advance signing and decision sight distance are necessary for successful operation. The plan and profile of a typical interchange of this type is shown in Figure 9.

3.3.2 Frontage Roads

The second level of control gives trucks access to exclusive truck lanes from the frontage roads. Trucks must still interface with other



PARTIAL CLOVERLEAF
8A

CLOVERLEAF
8B

FREEWAY TO FREEWAY
8C

Figure 8. Other Interchange Types

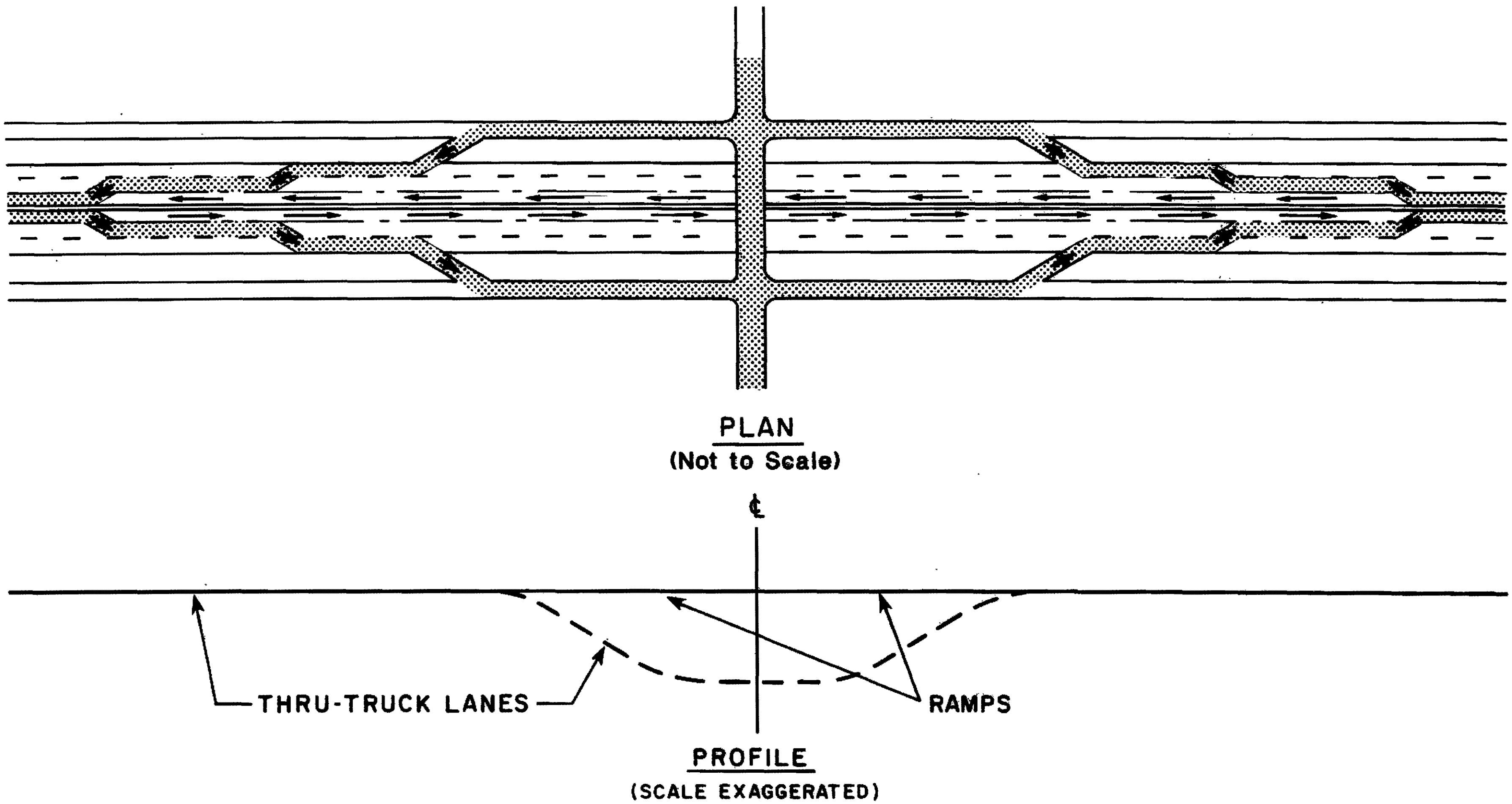


Figure 9. Truck Access to ETF by Existing Ramps

traffic on the cross street intersections near the truck ramp terminals. This situation may be a shortcoming of this scheme due to its adverse effects on intersection capacity. The plan and profile of a typical interchange of this type is shown in Figure 10.

Typical on-ramp and off-ramp designs for cross-section M-6 (elevated) using the frontage roads for exit/entry are shown in Figures 11 and 12. These drawings portray conceptual layouts, and are not intended to represent design standards. Appropriate AASHTO (2) and Texas (15) design standards should be used in designing a specific facility, given a specific design speed for frontage roads, truck lanes, and ramps. Desirable design speed for the truck lanes is 70 miles per hour.

The ramp width in Figures 11 and 12 should be consistent with AASHTO "traffic condition C" (sufficient bus and combination-type vehicles to govern design), Case II (One-lane, one-way operation - with provision for passing a stalled vehicle) in Table X-3 of AASHTO (2). Maximum grade should be 5 per cent with horizontal and vertical curvature consistent with the selected design speed.

3.3.3 Exclusive Truck Routes

The third scenario represents the highest level of control. In this situation, large vehicles can only enter or exit at an interchange or intersection specifically designed for trucks or other large vehicles. This is advantageous in providing direct access to specific truck traffic generators such as large industrial complexes or in avoiding congested areas. Figures 13 and 14 depict the schematic for this concept.

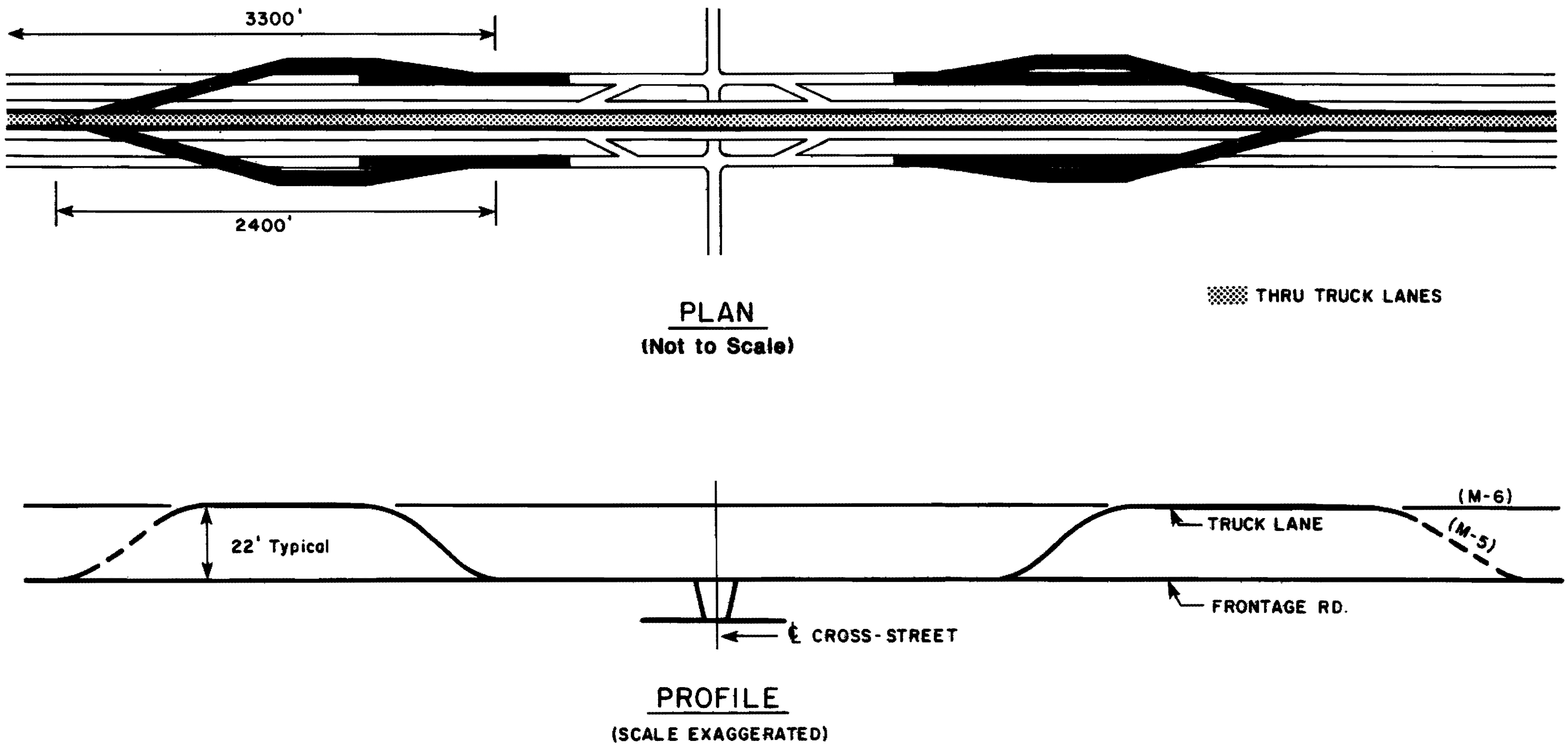
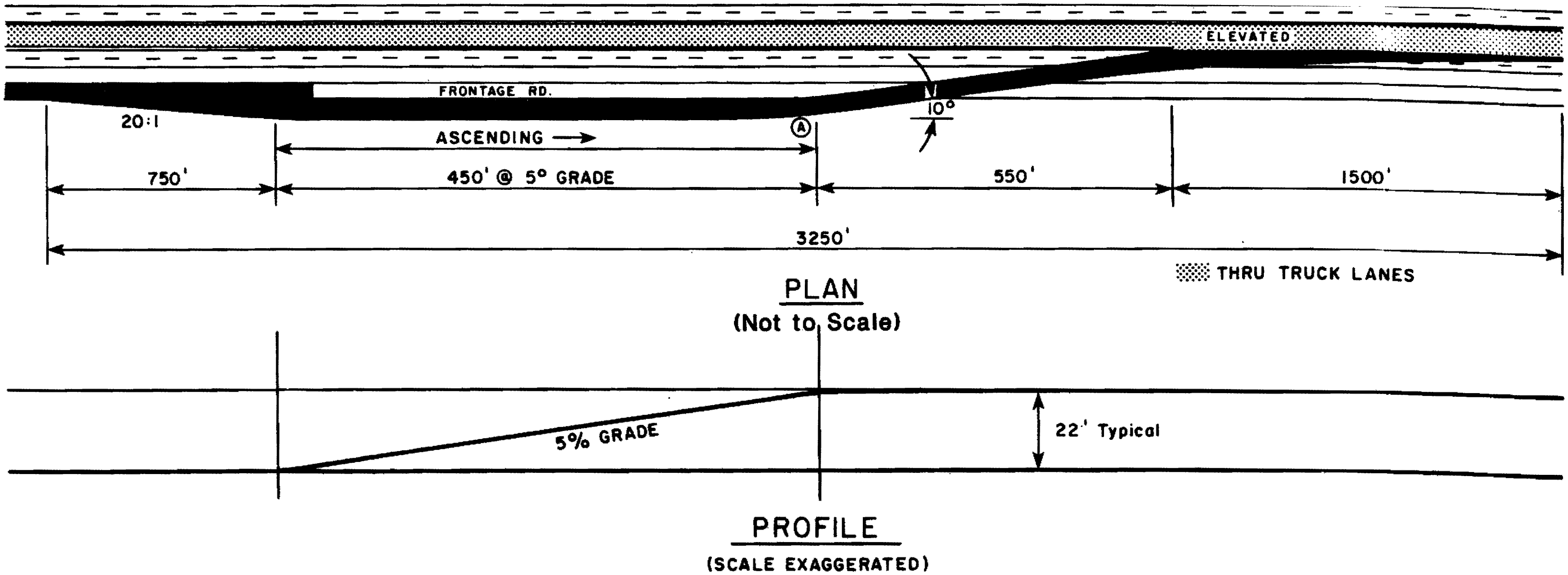


Figure 10. Truck Access to ETF by Frontage Roads



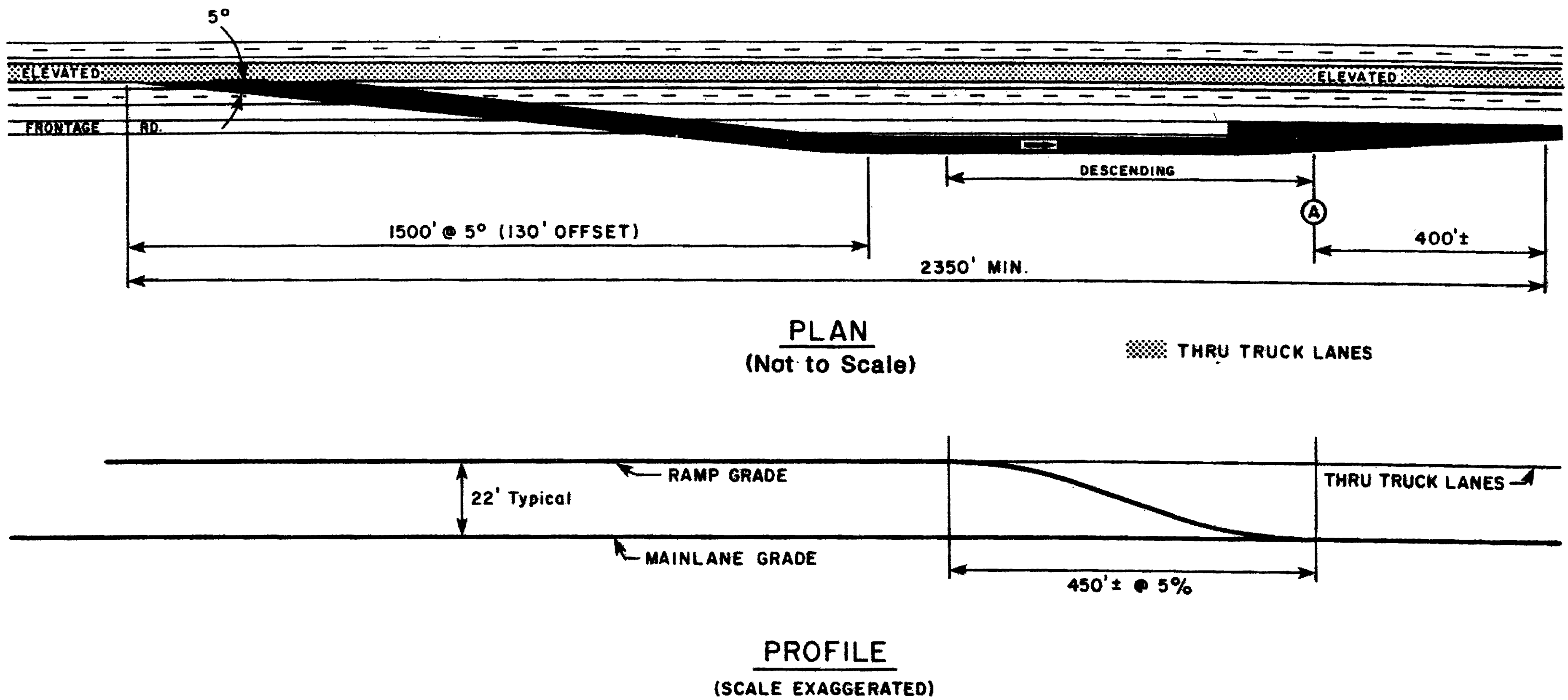
NOTES:

(1) Assume design speed of ETF 70 mph.

(2) Ramp width 27 ft. (22 ft. pavement, 5 ft. shoulder).

(3) Assume speed at Ⓐ 20 mph.

Figure 11. Typical Truck Lane On-Ramp for M-5 or M-6



NOTES:

(1) Assume frontage road design speed 50 mph; speed @ Ⓐ 30 mph.

(2) Assume design speed of ETF 70 mph.

(3) Ramp horizontal curve radius (40 mph) is 500 ft.

(4) Ramp width 27 ft. (22 ft. pavement, 5 ft. shoulder).

Figure 12. Typical Truck Lane Off-Ramp for M-5 or M-6

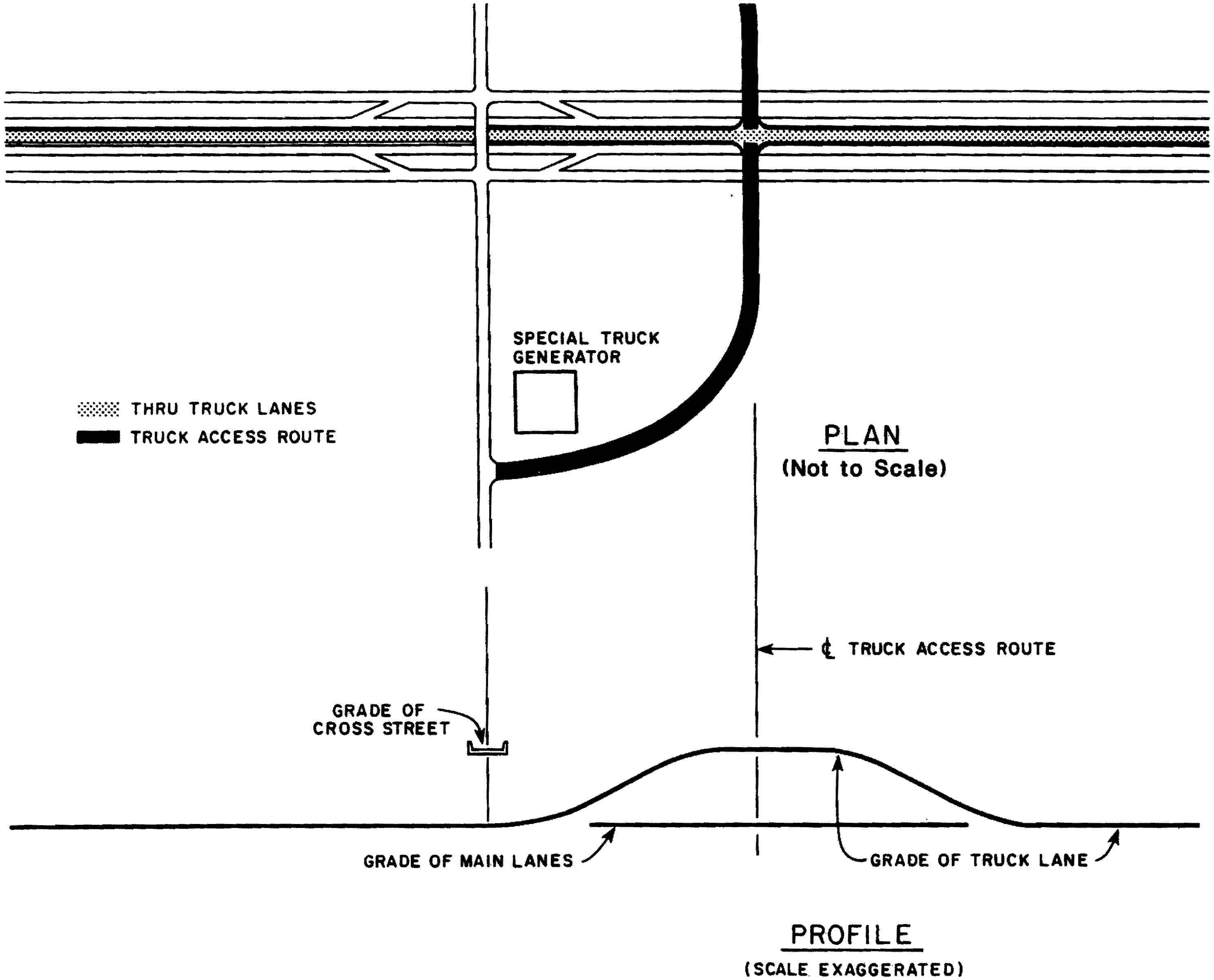


Figure 13. Truck Access to ETF by Elevated Intersection

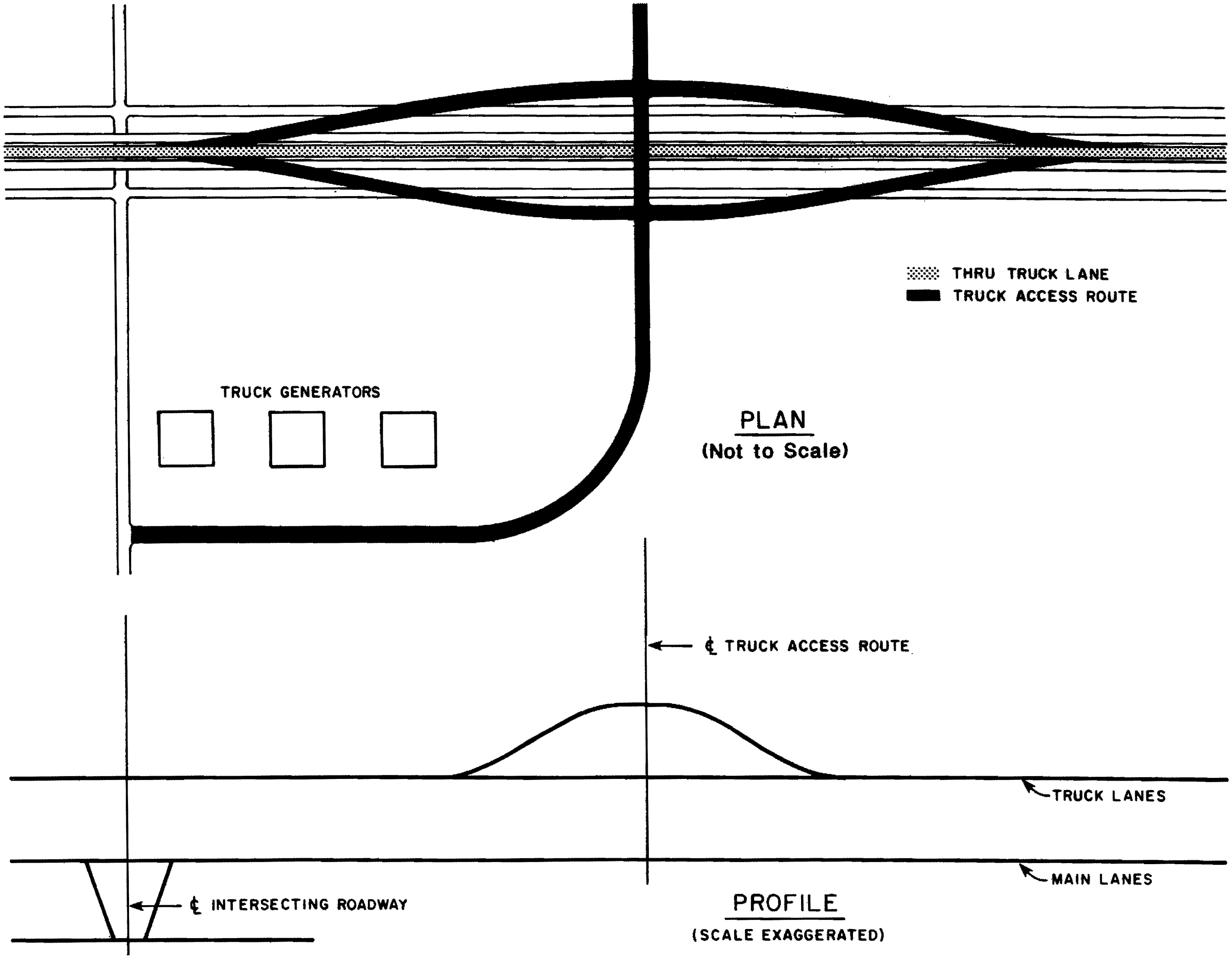


Figure 14. Truck Access to ETF by Elevated Interchange

4.0 STUDY PROCEDURE

The overall study procedure is depicted in Figure 15. The primary components include the selection of the corridor, preparation of a strip map, development of a moving analysis computer program, level of service computations, traffic projections, and evaluation of the results.

4.1 CORRIDOR SELECTION

Corridor selection was the first step in this study process. Criteria included: average daily traffic (ADT) on the corridor, number of trucks, percent trucks, existing and predicted population growth along the corridor, size of urban areas along the corridor, and horizontal and vertical alinement of the highway. The entire length of Interstate 35 from San Antonio to Dallas, a distance of almost 250 miles, was selected for the case study.

4.2 CORRIDOR DESCRIPTION

The termini of the selected Interstate 35 corridor are milepost 168.0 just north of the I-35/I-410 interchange near San Antonio and milepost 415.0 just north of the I-35/I-20 interchange near Dallas. Interstate 35E was used instead of I-35W. The major urban areas along the corridor are: Austin, Temple, Waco, and small portions of San Antonio and Dallas. Project length was 247.0 miles through terrain which was flat to gently rolling. Several individual grades were considered for the level of service calculations. Most of the corridor - 228 miles - has two lanes in each direction; 19 miles of urban freeway have three or more lanes each direction.

A number of different interchange types were found along the corridor. The identification of the various configurations is important in establishing access control. Table 1 shows the major existing interchange types used along the corridor and their frequency of occurrence.

Daily traffic volume along rural areas of the corridor ranged from 15,000 to 25,000 vehicles per day (vpd). Urban area traffic volumes were as follows: San Antonio 71,000 vpd near the project terminus, Austin 70,000 to 130,000 vpd, Temple 40,000 vpd, Waco 50,000 vpd, Dallas 44,000 vpd south of the I-20 interchange and 51,000 just north of this interchange (16).

Traffic classification counts were made by the project staff at 10 strategic locations to supplement the 1983 traffic count information available from SDHPT. The counts were conducted manually for almost a full day (approximately 18 hours) at eight locations and for approximately eight hours at the other two. The counts were tallied by 60 minute intervals. From these counts, K-factors (percent peak hour of ADT) were selected for the corridor and truck percentages selected for level of service calculations. Table 2 is a summary of pertinent information gathered during the manual counts.

4.3 STRIP MAP

A strip map was developed showing the plan view of the roadway at a scale of 1 inch = 1 mile. Figure 16 illustrates the general concept. Additional information included: milepost at 10 mile increments, bridges, over-

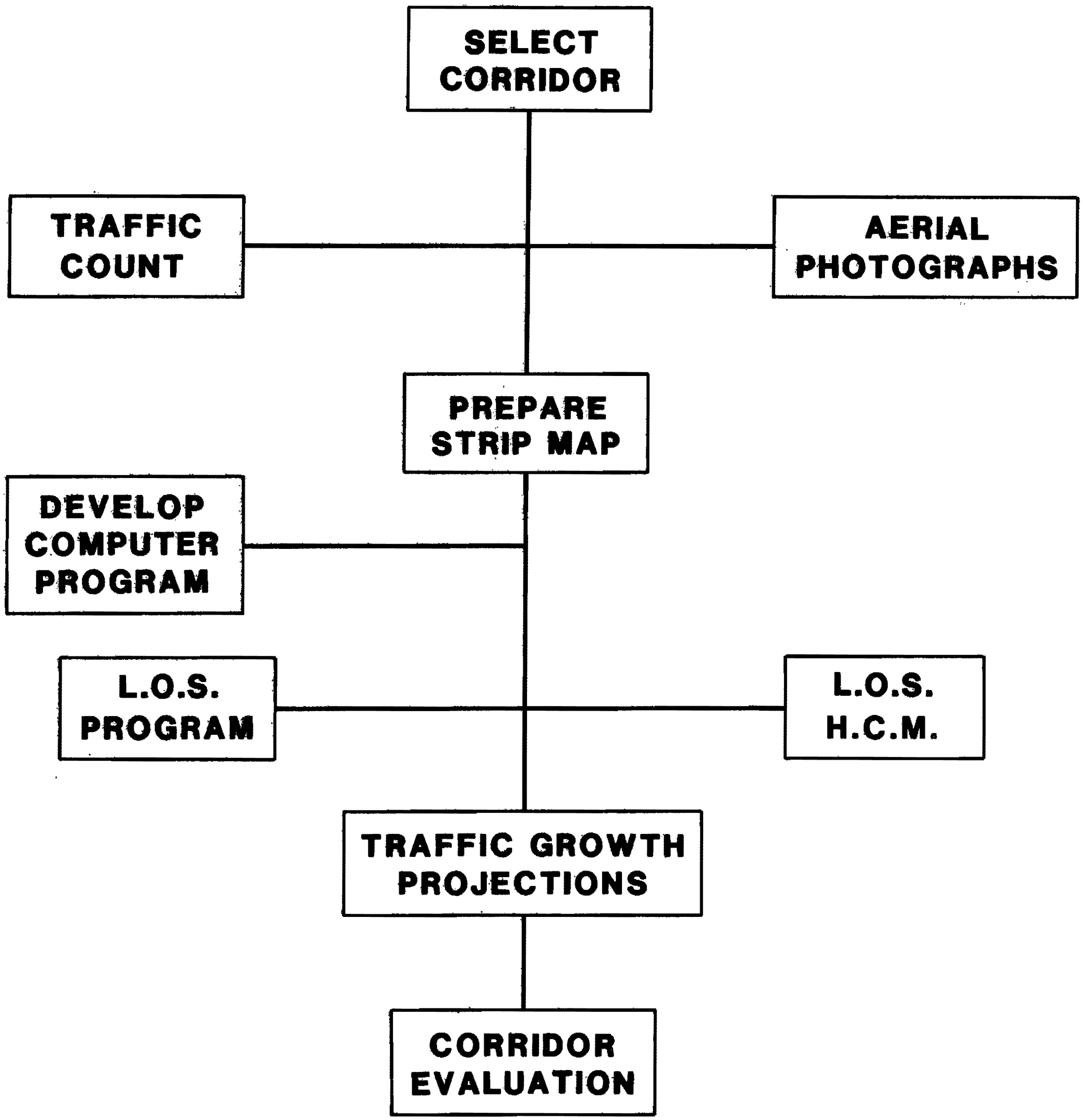


Figure 15. Flow Chart of Study Procedure

Table 1. I-35 Study Corridor Interchanges

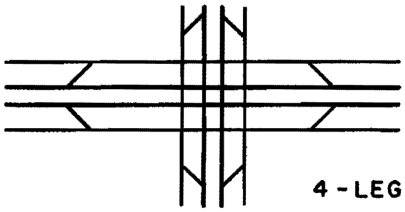
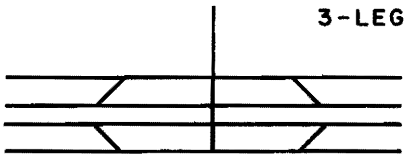
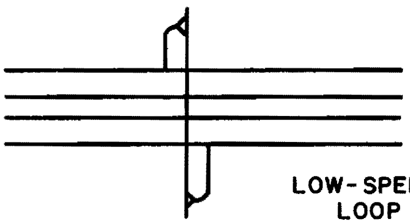
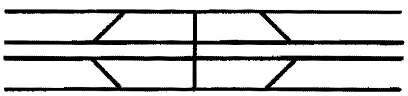
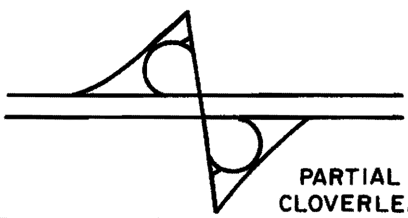
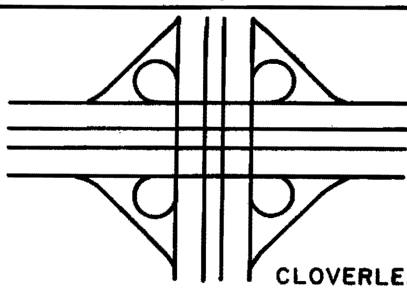
INTERCHANGE TYPE	URBAN / RURAL	PERCENT OF TOTAL
 4-LEG	U-R	52%
 3-LEG	U-R	13%
 LOW-SPEED LOOP	R	7%
 CROSS-OVER	R	5%
 PARTIAL CLOVERLEAF	U-R	4%
 CLOVERLEAF	U-R	1%

TABLE 2. I-35 MANUAL TRAFFIC COUNT SUMMARY[1]

MP	Location	Count Date	24-Hour Traffic	Peak Hour Volume		% Trucks	
				Truck[2] Traffic	Total Traffic	Day	Peak Hour
185.0	6 mi. S. New Braunfels	3/11/85	32,158	188	1,191	17	16
209.5	5 mi. N. San Marcos	3/13/85	34,498	153	1,521	16	10
253.5	1 mi. N. Round Rock	12/18/84	37,985	159	1,917	18	8
283.0	1 mi. N. Prairie Dell	12/17/84	14,288	104	549	31	19
305.5	4 mi. N. Temple	11/28/84	16,452	135	964	25	14
326.5	8 mi. N. Waco	11/28/84	20,648	151	833	27	18
351.5	15 mi. N. Waco	10/04/84	19,474	164	1,026	30	16
359.0[3]	12 mi. S Hillsboro	9/18/84	--	166	571	29	29
371.0	I-35 E @ Hillsboro	3/13/85	12,203	130	480	32	27
392.0[3]	20 mi. N. Hillsboro	9/14/84	--	102	305	27	33

(1) Raw traffic count, no adjustment factors have been applied.

(2) Trucks: excludes panel, pickup truck, and bus.

(3) Less than 10 hour count.

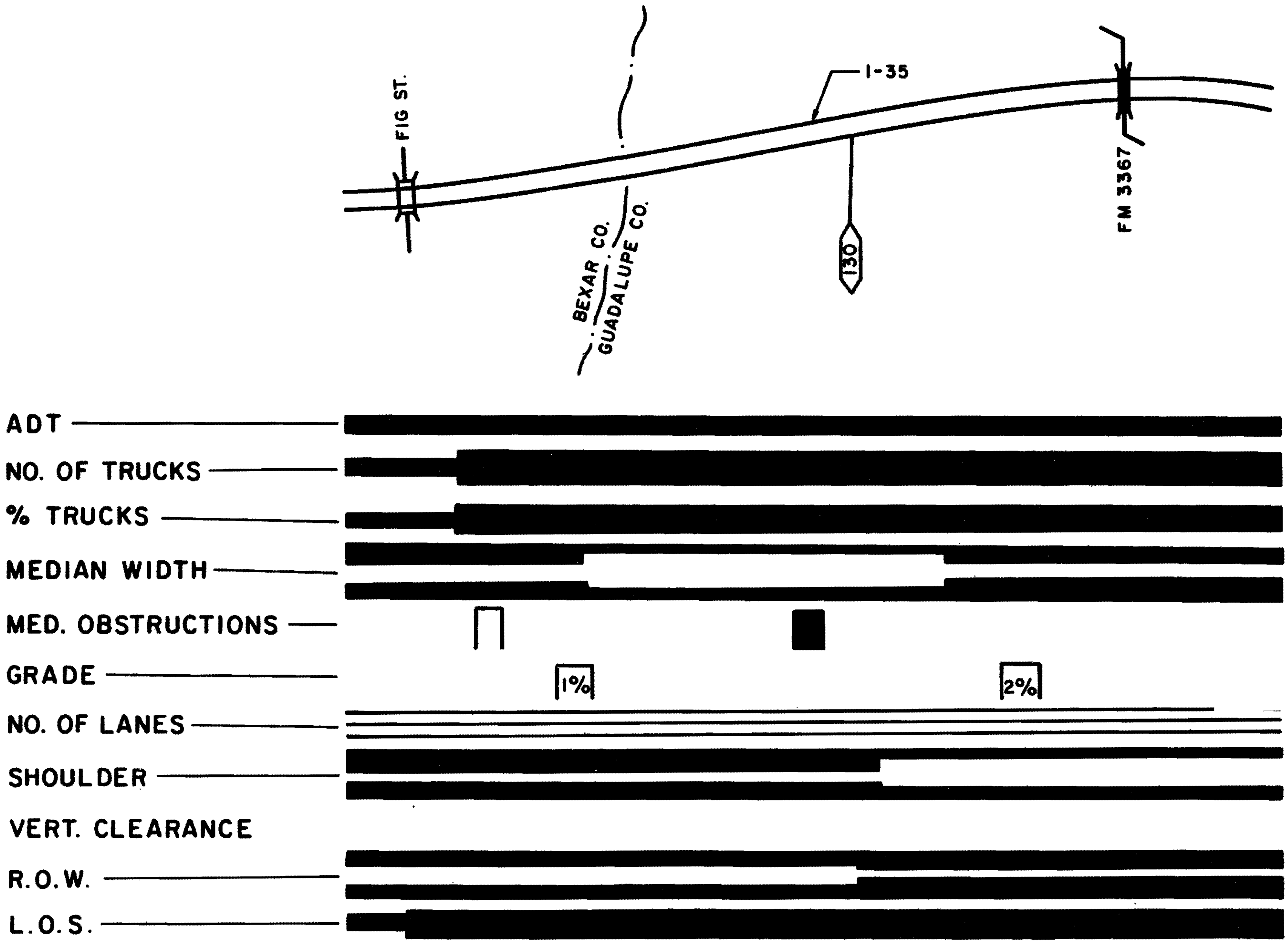


Figure 16. Strip Map

passes, interchanges and their ramp configurations, median obstructions, county lines and their angle of intersection with highway alinement, city limit boundaries and their alinement near the highway, rivers, and other pertinent geographic features. This information was positioned on the top one-third of the strip map.

Information contained on the lower two-thirds of the map was plotted to scale pictorially such that "problem areas" could be spotted at a glance: ADT (average daily traffic), number of trucks, percent trucks, median width, median obstructions, grade, number of lanes, shoulder width, vertical clearance, right-of-way, and level of service. The thickness of the black bands is an indicator of the severity of each of the aforementioned eleven criteria. This information came directly from the detailed design drawings.

Traffic counts were conducted at selected sites along the corridor and supplemented by SDHPT annual count information. Unfortunately, neither "K-factors" (peak-period percentage of ADT) nor hourly vehicle classification counts were available from SDHPT for the urban areas along the corridor. Level of service determinations were made using the methodology contained in the Highway Capacity Manual (1).

Detailed geometric information was verified by aerial photographs of the entire study corridor at a scale of 1 inch = 200 feet. Appropriate scale for geometric design purposes is 1 inch = 200 feet, while a scale of 1 inch = 1,000 feet is more appropriate for planning purposes due to its larger coverage area. Aerials were helpful in determining changes made since the original construction of the corridor.

4.4 COMPUTER PROGRAM

A computer program was developed as the next step in the truck lane evaluation process. Data input in half-mile segments were: milepost, peak hour volume, number of trucks or percent trucks, percent grade, grade length, terrain factor, number of lanes, distance to lateral obstructions, total median width, and effective median width. The computer evaluates each half-mile segment independently and calculates a volume-to-capacity ratio (v/c). Two v/c ratios are computed by the HCM method: v/c with total traffic and v/c without trucks. This comparison was used to determine the impact of removing trucks from the main stream of traffic. Two key parameters are determined by the program: effective median width (Figure 6), and improvement in v/c ratio by removing trucks. The computer program is described in detail in the Appendix, Section 8.1.

5.0 CASE STUDY EXAMPLE

The increase in truck traffic growth on Texas highways led to the study of the feasibility of exclusive truck lane facilities in the median area of existing interstate highways. The initial phase established the geometric requirements for exclusive truck lanes along this corridor (16). The objective of the second phase was to develop a computer program to analyze specific highway segments so as to identify candidate sections that warrant the addition of truck lanes based on operational improvements.

5.1 PURPOSE OF PROGRAM

A major, time-consuming problem in determining the feasibility of truck lanes is that each segment of highway must be individually examined to determine the feasibility and benefits of truck lane construction. The interactions between segments must be further analyzed before the overall desirability of an exclusive truck lane facility can be evaluated for a given corridor. Therefore, to expedite this evaluation process, a methodology was developed which would consider appropriate variables of each roadway segment in terms of accepted criteria.

It was decided that a "moving analysis" computer program could most effectively evaluate each individual segment and print the results in an easily-interpreted format. Such a technique required an iterative, multi-step type of development to identify the pertinent variables, to develop the analysis model, and to present the results in a meaningful manner.

5.2 PROGRAM DEVELOPMENT

The structure of the program as it was finally developed can be more easily understood if the method of development is known. First, a Basic program simulating high speed trains (18) was re-programmed in Fortran 77 to run on the mainframe computer. The program was rewritten to perform volume-to-capacity computations. Modifying the existing program (19) was found to expedite the overall development process. As revised, the program separates each function into a separate subroutine, each called in turn by the master control subroutine. This revision resulted in much greater flexibility, given that parts of the program and model may need to change with each user. A complete description of the general architecture and operation of the revised program can be found in Appendix 8.1.

5.3 OPERATIONS MODEL (Model 2)

Other models were developed before Model 2 was finally determined to best meet the objective of determining candidate sections of a pre-selected roadway for exclusive truck facilities. The other models are described in detail in the Appendix, Section 8.1.

The output of Model 2 allows the user to evaluate a given corridor by two basic criteria: volume-to-capacity ratios and effective median width. Subroutine MODEL2 is used with Model 2; it calculates the v/c ratios for each half-mile segment, both with and without trucks, and plots the percent improvement in the v/c ratio to be obtained by removing the truck traffic. No criteria were developed for evaluation of improvement in v/c; the level of service with and without trucks is, however, used as the criteria for decision makers.

The effective median width is as important to the designer as the v/c ratio. The program output for Model 2 was designed to allow a quick evaluation of a selected corridor. The printout shows flags indicating medians less than 36 feet and Level of Service F. Other levels of service with and without trucks are printed out for each half-mile segment (or other segment lengths as programmed).

5.3.1 Input Data

This subroutine reads a single line of data for a single half-mile segment of highway. Each 80-column line of data, one for each half-mile segment of the highway, is read from the WYLBUR file named "RUNDATA," and must contain the following formatted information: milepost (F5.1), traffic volume (I5), truck volume or percent trucks (F8.2), truck index (I2 - not used at this time but must be entered), median width between shoulders (I4), percent grade (I2), length of grade (I6 - total, not just within the half-mile segment), number of lanes in a single direction (I2), total width of both inside shoulders (I3), default terrain factor as listed in the Highway Capacity Manual (HCM) (1) (I1 - 1 = level terrain, 2 = rolling, and 3 = mountainous; if a zero is entered, grades are used to calculate passenger car equivalents as presented in HCM), number of feet from the pavement to the nearest lateral obstruction (I3), main lane pavement type index (I1 - not used at this time but must be entered), level of service (I2 - A = 1, B = 2, etc., use LOS = 0 if unknown - computer calculates LOS according to HCM), overpass (I3 - integer number of feet width of overpass piers in the median), bridge and other obstruction indices (2I3 - not used at the present time but must be entered, and comment (A20).

Input format is F5.1, I5, F8.2, I2, I4, I2, I6, I2, I3, I1, I3, I1, I2, 3I3, and A20.

5.4 BASE YEAR RESULTS - INTERPRETATION OF COMPUTER OUTPUT

A portion of the computer program output for I-35 is reproduced in Table 3. The section represented begins at milepost 168.0 and ends at milepost 254.0. Input variables printed with the output are: milepost, peak hour volume, number of trucks or percent trucks, percent grade, grade length, terrain factor, number of lanes in each direction, and distance to lateral obstructions. The evaluation criteria (actual computer-generated output) in this table are: effective median width, volume-to-capacity (v/c) ratios, and level of service (LOS), each printed out by half-mile segment.

5.4.1 Effective Median Width

Table 3 should again be used for an interpretation of effective median width. For a definition of this width, see Figure 6. The effective median width is evaluated according to the following categories: less than 36 feet, between 36 feet and 52 feet, and over 52 feet. Exclusive truck facilities can be built at grade if the effective median width is at least 36 feet (see Figure 5). If the width is less than 36 feet and if other messages are not called, a message is printed out under the heading "IMPROVEMENT IN V/C" which overrides the actual plot of change in v/c. A good

Table 3. TTI Truck Lane Analysis Program

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF FULL ADT DATA: I-35

MP	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW: -36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
168.0	2080	229	11	0	0	0	2	6	24	37 : . * . :	0.66	0.54	21	C:B	: * . I . :	0	
168.5	2080	229	11	0	0	0	2	6	24	37 : . * . :	0.66	0.54	21	C:B	: * . I . :	0	
169.0	2080	229	11	0	0	0	2	6	24	37 : . * . :	0.66	0.54	21	C:B	: * . I . :	0	
169.5	2080	229	11	0	0	0	2	6	24	37 : . * . :	0.66	0.54	21	C:B	: * . I . :	0	
170.0	2080	229	11	0	0	0	2	6	24	37 : . * . :	0.66	0.54	21	C:B	: * . I . :	0	
170.5	2080	229	11	0	0	0	2	6	24	21 : * . . :	0.66	0.54	21	C:B	: MEDIAN TOO NARROW :	0	
171.0	2080	229	11	0	0	0	2	6	24	29 : * . . :	0.66	0.54	21	C:B	: MEDIAN TOO NARROW :	0	
171.5	1280	141	11	0	0	0	2	6	24	23 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	2MID
172.0	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	
172.5	1280	141	11	0	0	0	2	6	24	23 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	2MID
173.0	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	
173.5	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	
174.0	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	RIVER
174.5	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	
175.0	1280	141	11	0	0	0	2	6	24	29 : * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	0	
175.5	1313	144	11	0	0	0	2	6	24	29 : * . . :	0.42	0.34	21	B:A	: MEDIAN TOO NARROW :	0	
176.0	1313	144	11	0	0	0	2	6	44	49 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
176.5	1313	144	11	-3	1500	0	2	6	44	49 : . * . :	0.56	0.34	62	C:A	: .* I . :	0	
177.0	1313	144	11	0	0	0	2	6	44	43 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	2MID
177.5	1313	144	11	0	0	0	2	6	44	49 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
178.0	1313	144	11	-3	1500	0	2	6	44	43 : . * . :	0.56	0.34	62	C:A	: .* I . :	0	2MID
178.5	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
179.0	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
179.5	1313	144	11	-3	1600	0	2	6	48	53 : . . * :	0.56	0.34	62	C:A	: .* I . :	0	
180.0	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
180.5	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
181.0	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
181.5	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
182.0	1313	144	11	0	0	0	2	6	48	53 : . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
182.5	1313	144	11	-3	1600	0	2	6	48	53 : . . * :	0.56	0.34	62	C:A	: .* I . :	0	
183.0	1313	144	11	0	0	0	2	6	44	49 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
183.5	1313	144	11	0	0	0	2	6	44	43 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	2MID
184.0	1313	144	11	0	0	0	2	6	44	49 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
184.5	1313	144	11	0	0	0	2	6	44	49 : . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	0	
185.0	1313	144	11	0	0	0	2	6	44	35 : * . . :	0.42	0.34	21	B:A	: MEDIAN TOO NARROW :	0	17%;6MI S N BRANFEL;
185.5	1313	144	11	4	1500	0	2	6	44	41 : . * . :	0.60	0.34	74	C:A	: . * I . :	0	
186.0	411	45	11	0	0	0	2	6	44	41 : . * . :	0.13	0.11	21	A:A	:- - . - -I- - . - -:	0	19%;RA 5MI S N BRAN;
186.5	411	45	11	0	0	0	2	6	44	41 : . * . :	0.13	0.11	21	A:A	:- - . - -I- - . - -:	0	
187.0	429	47	11	-2	2500	0	2	6	44	41 : . * . :	0.17	0.11	49	A:A	:- - . - -I- - . - -:	0	20%;30MI N SAN ANTO:
187.5	429	47	11	0	0	0	2	6	44	41 : . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
188.0	429	47	11	0	0	0	2	6	44	41 : . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
188.5	429	47	11	0	0	0	2	6	44	41 : . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
189.0	429	47	11	0	0	0	2	6	48	45 : . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
189.5	429	47	11	0	0	0	2	6	48	45 : . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
190.0	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
190.5	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
191.0	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
191.5	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
192.0	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
192.5	429	47	11	0	0	0	2	6	48	53 : . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	0	
193.0	429	47	11	-4	1200	0	2	6	48	47 : . * . :	0.17	0.11	49	A:A	:- - . - -I- - . - -:	0	2 SETS OF 2 PIERS

Table 3 (Continued)

193.5	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
194.0	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
194.5	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
195.0	429	47	11	5	1000	0	2	6	48	53	: . . * :	0.18	0.11	62	A:A	:- - . - -I- - . - -:	O	
195.5	429	47	11	-3	2300	0	2	6	48	47	: . * . :	0.18	0.11	62	A:A	:- - . - -I- - . - -:	O	2MID
196.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
196.5	429	47	11	0	0	0	2	6	48	47	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	4 SETS OF 2 PIERS
197.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	RIVER
197.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
198.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
198.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
199.0	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	17%;5MI S SN MR;INCD
199.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
200.0	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	2MID
200.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
201.0	423	42	10	1	4100	0	2	6	48	47	: . * . :	0.15	0.11	34	A:A	:- - . - -I- - . - -:	O	2MID
201.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
202.0	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
202.5	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	2MID
203.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
203.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
204.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
204.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	SAN MARCOS RIVER
205.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
205.5	1414	141	10	3	1500	0	2	6	48	53	: . . * :	0.58	0.37	56	C:B	: * I . :	O	
206.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	R/R
206.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
207.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
207.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
208.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	BLANCO RIVER
208.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
209.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
209.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	16%;5MI N SAN MARCOS
210.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
210.5	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	15%;20MI S AUS;2MID;
211.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
211.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
212.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
212.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
213.0	533	53	10	3	2000	0	2	6	48	53	: . . * :	0.22	0.14	55	A:A	:- - . - -I- - . - -:	O	
213.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
214.0	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
214.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
215.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
215.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
216.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	S FORK PLUM CREEK
216.5	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
217.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	PLUM CREEK
217 5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
218.0	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
218.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
219.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
219.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
220.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
220 5	533	53	10	-1	4800	0	2	6	48	53	: . . * :	0.19	0.14	33	A:A	:- - . - -I- - . - -:	O	
221.0	533	53	10	0	0	0	2	6	48	47	: * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
221.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
222 0	533	53	10	4	1700	0	2	6	48	53	: . . * :	0 24	0 14	67	A:A	:- - . - -I- - . - -:	O	
222.5	533	53	10	1	4700	0	2	6	48	53	: . . * :	0.19	0.14	33	A:A	:- - . - -I- - . - -:	O	
223.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
223.5	1200	96	8	-4	1800	0	2	6	48	47	: . * . :	0.49	0.32	52	B:A	:- - . - -I- - . - -:	O	2MID

Table 3 (Continued)

224.0	1200	96	8	0	0	0	2	6	51	56	: . . * :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	
224.5	1200	96	8	0	0	0	2	6	51	56	: . . * :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	
225.0	1200	96	8	5	3000	0	2	6	51	56	: . . * :	0.64	0.32	96	C:A	: . *I . :	O	ONION CREEK
225.5	1200	96	8	0	0	0	2	6	51	50	: . * . :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	2MID
226.0	1200	96	8	4	528	0	2	6	51	42	: . * . :	0.44	0.32	35	B:A	:- - . - -I- - . - -:	O	2MID
226.5	1200	96	8	0	0	0	2	6	51	48	: . * . :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	SLAUGHTER CR
227.0	2160	173	8	0	0	0	2	6	51	48	: . * . :	0.67	0.58	15	C:C	:* . I . :	O	
227.5	2160	173	8	0	0	0	3	6	51	48	: . * . :	0.45	0.39	15	B:B	:- - . - -I- - . - -:	O	
228.0	2160	173	8	5	2000	0	3	6	51	48	: . * . :	0.59	0.39	52	C:B	: * I . :	O	
228.5	2160	173	8	-5	1600	0	3	6	51	48	: . * . :	0.59	0.39	52	C:B	: * I . :	O	
229.0	2160	173	8	0	0	0	3	6	51	48	: . * . :	0.45	0.39	15	B:B	:- - . - -I- - . - -:	O	
229.5	2160	173	8	5	1548	0	3	6	51	50	: . * . :	0.59	0.39	52	C:B	: * I . :	O	4MID
230.0	2160	173	8	5	1100	0	3	6	20	19	: * . . :	0.56	0.39	43	C:B	: MEDIAN TOO NARROW :	O	4MID
230.5	2160	173	8	-3	1500	0	3	6	20	25	: * . . :	0.56	0.39	43	C:B	: MEDIAN TOO NARROW :	O	
231.0	2160	173	8	0	0	0	3	6	20	25	: * . . :	0.45	0.39	15	B:B	: MEDIAN TOO NARROW :	O	WILLIAMSON CR
231.5	2160	173	8	0	0	0	3	6	20	25	: * . . :	0.45	0.39	15	B:B	: MEDIAN TOO NARROW :	O	
232.0	4360	349	8	4	1500	0	3	6	20	19	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	4MID
232.5	4360	349	8	0	0	0	3	6	20	25	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
233.0	4360	349	8	5	1100	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	NO PLANS?
233.5	4360	349	8	5	1000	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	
234.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	NO PLANS?
234.5	4360	349	8	-4	1584	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	
235.0	4360	349	8	6	1000	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	NO MED./NO E.H.
235.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
236.0	4360	349	8	4	1600	0	3	6	20	11	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	4MID
236.5	4360	349	8	-5	2600	0	3	6	20	17	: * . . :	1.20	0.79	52	F:D	: #### LOS = F #### :	O	NO PLANS?
237.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
237.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
238.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
238.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
239.0	4360	349	8	0	0	0	3	6	32	37	: . * . :	0.90	0.79	15	D:D	:* . I . :	O	
239.5	3760	301	8	3	2300	0	8	6	32	31	: * . . :	0.36	0.25	43	B:A	: MEDIAN TOO NARROW :	O	3MID
240.0	2800	224	8	0	0	0	8	6	32	37	: . * . :	0.22	0.19	15	A:A	:- - . - -I- - . - -:	O	
240.5	2800	224	8	-2	3000	0	8	6	32	37	: . * . :	0.27	0.19	43	A:A	:- - . - -I- - . - -:	O	
241.0	2800	224	8	0	0	0	8	6	32	37	: . * . :	0.22	0.19	15	A:A	:- - . - -I- - . - -:	O	
241.5	2800	224	8	-2	2700	0	8	6	32	37	: . * . :	0.27	0.19	43	A:A	:- - . - -I- - . - -:	O	
242.0	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
242.5	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
243.0	2800	224	8	0	0	0	3	6	54	53	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	4MID
243.5	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
244.0	2800	224	8	3	3200	0	3	6	54	59	: . . * :	0.72	0.51	43	C:B	: *. I . :	O	
244.5	2800	224	8	0	0	0	3	6	54	53	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	3MID
245.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
245.5	1680	134	8	-5	1000	0	2	6	54	53	: . . * :	0.65	0.45	43	C:B	: *. I . :	O	2MID
246.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
246.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
247.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
247.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
248.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
248.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
249.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
249.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
250.0	1680	134	8	2	5000	0	2	6	54	53	: . . * :	0.65	0.45	43	C:B	: *. I . :	O	2MID
250.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
251.0	1680	134	8	0	0	0	2	6	44	49	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
251.5	1680	134	8	0	0	0	2	6	44	43	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	2MID
252.0	1680	134	8	0	0	0	2	6	44	49	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
252.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
253.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
253.5	1603	128	8	0	0	0	2	6	44	43	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	17%;1MI N RONDROCK;2
254.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	

example is the section from milepost 170.5 to 175.5.

For the entire length of the I-35 corridor under study, or 247.0 miles, a total of 35 miles of roadway (14.2 % of the total) has a median width less than 36 feet. The length of roadway with median width which is between 36 and 52 feet is 144.5 miles (58.5 %), while 67.5 miles (27.3%) has a median width greater than 52 feet.

5.4.2 Volume-to-Capacity Ratios

Volume-to-capacity ratios can occur in the range of 0.0 (no traffic) to 1.0 (maximum traffic volume and density). Procedures in the Highway Capacity Manual (HCM) yielded v/c ratios for this corridor in the range of 0.03 to 1.20 during the peak hour, given the various input factors, some of which were not exact, but were simply good approximations. For example, the accuracy of traffic classification counts was limited in that only ten sites were counted for a time period of less than 24 hours at each site. No seasonal or other correction factors were applied to the raw counts. The highest v/c value (1.20) occurred at milepost 236.5 which is in Austin. The number of trucks in the Austin area was determined, not from actual current manual or machine counts in Austin, but by applying a percentage factor taken from vehicle classification counts conducted elsewhere along the I-35 corridor.

It should be noted that a v/c ratio greater than 1.0 is questionable and should be investigated since this is an unlikely occurrence. All factors used to determine LOS include: peak hour volume (or ADT/K-factor), percent trucks, length of grade, percent grade, number of lanes, and lateral obstructions should be checked. Future traffic projections may result in v/c ratios which are apparently greater than 1.0. However, in reality, this simply means that if the traffic projection factors are correct, the number of lanes will have to be increased and/or other improvements made to reduce the v/c ratio to a desirable figure.

Other approximations used in these computations were K-factors (percent of ADT occurring in the peak hour) and peak hour factors (PHF -- ratio of total hourly volume to the highest 15 minute flow rate within the hour). A K-factor of 0.08 was used throughout, while a PHF of 0.85 was used for both urban and rural areas along the corridor. In reality, both of these factors vary by location along the corridor.

The level of service (LOS) corresponding to the computed v/c ratios for the traffic stream with and without trucks is printed out for each half-mile segment. For each segment with computed v/c ratio worse than 0.54 (corresponding to the maximum value for LOS B for 70 mph design), a plot is made of IMPROVEMENT IN V/C with trucks and without trucks. For example, at milepost 176.0 in Table 3, the computed v/c is 0.42 which is less than the threshold value. Therefore, no asterisk is plotted indicating improvement in v/c. On the other hand, at milepost 176.5, the computed v/c is 0.56. Without trucks the volume-to-capacity ratio is reduced to 0.34 for an improvement in v/c of 62 percent. This value is tabulated and plotted.

If the median width is less than 36 feet, an override feature in the program causes the message "MEDIAN TOO NARROW" to be printed under the heading IMPROVEMENT IN V/C instead of the asterisk plot. An example in

Table 3 is milepost 170.5. Yet another override occurs when capacity is exceeded (level of service F). An example is milepost 232.0. These plots of v/c improvement and messages give the designer a means to quickly evaluate a relatively long corridor.

Table 4 is a summary which indicates the length of corridor currently operating at each level of service with trucks and without trucks. It appears that only a small percentage of the full corridor length would benefit from an exclusive truck facility at current traffic volumes. Only 3.0 percent (7.5 miles) operates at LOS D or worse. Even with trucks removed (v/c auto in Table 4) the percentage with LOS D or worse is still 3.0 percent. There is an improvement, however, in that no sections operate at LOS E or F if exclusive truck lanes are added.

Of all the half-mile segments operating at LOS D or worse, only one has a median width of 36 feet or more. Therefore, the elevated cross-section would be required (see Figure 5). Future growth scenarios are investigated in a later section.

5.4.3 Level of Service Improvements

A verification of the computer output was made using the same input parameters in hand calculations as in the computer. A comparison was made at all ten manual traffic classification count locations.

5.4.3.1 Level of Service Determination by Computer

Traffic volume-to-capacity ratios were calculated by computer according to the HCM method (1). The end results are easily compared to calculations done by hand if all variables such as truck percentages, driver population factor, and truck weight-to-horsepower ratio are the same. The basic methodology used in the computer process follows, with a more detailed description in the Appendix.

Upon starting each run of the program, the passenger-car equivalent in Table 3-6 (Table numbers in this section correspond to HCM table numbers; these are included in the Appendix) for heavy trucks (300 lb/hp) is read into a four-subscript array, followed by a lane width factor from Table 3-2 in a second array. After data for a single half-mile segment has been read, the computer locates the appropriate table value during each loop of the model by calculating the correct subscripts based on number of lanes in a single direction, percent trucks, grade percent, grade length, and/or lateral obstruction distance.

Next, the trucks are subtracted from the peak hourly volume so as to give the number of remaining vehicles if the trucks are diverted to exclusive truck facilities. The proportion of trucks (P_T) is then determined; proportion of recreational vehicles and buses are not separately considered in this example.

If daily traffic counts have been input, the program calculates peak hourly volume, V, and peak hourly passenger car volume by multiplying the ADT and number of passenger cars by the K-factor which has been entered in the "RUNDATA" file. The adjustment factor for heavy trucks is then calculated; service flow rates are calculated for the traffic stream with

TABLE 4. CORRIDOR LEVEL OF SERVICE SUMMARY

LOS	With Trucks Miles	With Trucks %	Without Trucks Miles	Without Trucks %	Where Available Median > 36' and (LOS is "C" or worse) Miles	Where Available Median > 36' and (LOS is "C" or worse) %	Contiguous Segments Totaling 3 Miles Length (Miles)
A	159.0	64.4	196.0	79.4	--	--	--
B	64.5	26.1	43.0	17.4	--	--	--
C	16.0	6.9	0.5	0.2	13.5	5.5	3.0
D	4.0	1.6	7.5	3.0			
E	0.0	0.0	0.0	0.0	0.5	0.2	0.0
F	3.5	1.4	0.0	0.0			
	247.0	100.0	247.0	100.0			

and without trucks by dividing the service flow rate by the peak hour factor.

Each grade can be individually evaluated by the program, or a general terrain factor can be entered for each half-mile segment. If no grade is entered, the program uses the passenger car equivalents on extended general freeway segments given in Table 3-3 instead of the values in Table 3-6.

The improvement in level of service which can be expected from construction of truck lanes is evident in Table 3. The level of service for 70 mph design speed is found under the column heading "LOS70", with the first alpha character representing total traffic and the second representing the traffic stream with trucks removed. For example, at milepost 168.0. C:B indicates level of service C with trucks included in the traffic stream and an improvement to level of service B when trucks are removed.

Much of Table 3 shows LOS C or better (desirable) with trucks remaining in the main lanes. Under normal circumstances it would probably not be cost-effective to separate trucks under these conditions of traffic flow. On the other hand, if abnormal circumstances exist such as high accident rates involving trucks or a high anticipated growth rate (Future Traffic is in Section 5.5), construction of ETF's might still be desirable. For a LOS of D or worse and an effective median width of at least 36 feet, the construction of truck lanes begins to look attractive. Unfortunately, in almost all half-mile segments where LOS = D or worse, the median width is less than 36 feet. One option then becomes the elevated truck lane (see Figure 5).

5.4.3.2 Level of Service Calculations

Hand calculations of level of service for the manual count locations were done in order to check the computer calculations described in Section 5.4.3.1. As an example of the methodology used, the computations for the count location five miles south of New Braunfels are included in the Appendix. The method is the same as that found in the Highway Capacity Manual. (1)

Level of service criteria for basic freeway sections is given in Table 3-1 for 70 mph, 60 mph, and 50 mph design speeds. By knowing the appropriate design speed and the volume-to-capacity ratio, Table 3-1 can be used to find the corresponding LOS for the facility. The maximum service flow rate is given by the table; these values represent ideal conditions of lane width, lateral obstructions, and all passenger cars in the traffic stream. Adjustments are made by using appropriate table values from Tables 3-2, 3-10, 3-8, and 3-6. Lane widths, lateral obstructions, number of lanes, grade percent, and grade length are factors taken from construction drawings and/or aerial photographs.

A formula which relates v/c to service flow under ideal conditions with adjustments for number of lanes, lane widths/lateral obstructions, heavy vehicles, and the driver population is then used to determine the actual volume-to-capacity ratio. The service flow rate (SF) is equal to the actual hourly demand volume (from traffic counts) for the segment divided by the peak hour factor for the segment. The peak hour factor selected for the entire corridor was 0.85. In reality, this should be more closely determined for each urban area and for rural areas.

A comparison was made of the results obtained by the two methods of computing level of service. Data used for a comparison of one site contained herein were taken from the count location five miles south of New Braunfels. The hourly demand volume of 1,405 vph in the northbound lanes (highest directional volume) was used. The proportion of trucks in the traffic stream was 18 percent. Terrain was practically level so a passenger car equivalency factor of 2.0 was used. A peak hour factor of 0.85 was used. The design speed used was 70 mph so the "ideal" capacity was 2,000 passenger cars per hour per lane. The correction factors used for trucks, lane widths, and driver population were: 0.85, 0.99, and 0.90, respectively. The resulting v/c ratio was 0.55, which is in the level of service "C" range. The computer results are identical to the calculations by hand. For a more detailed description of these calculations, see the Appendix.

5.5 FUTURE YEAR RESULTS - INTERPRETATION OF COMPUTER OUTPUT

Traffic volume growth factors were determined for each county along the I-35 corridor (21). Within each county, the half-mile segment with the worst present v/c ratio was selected for evaluation. It was determined that traffic growth analyses for every half-mile segment along the corridor was neither necessary nor practical. Projections were made assuming an annual compounding of traffic volume within each county, using the determined growth rate factors. These rates are given in Table 5.

The output of this model is very similar to the output for the current year model. For each section of roadway analyzed by this model, the current roadway geometry is held constant. In other words, the number of lanes is not changed. Therefore, as the traffic volume increases, the v/c ratio increases to values possibly significantly higher than 1.0. Obviously, these values indicate the need for expanded roadway capacity. Other values held constant over the projection period are: percent trucks, driver population characteristics, and truck operating characteristics.

5.5.1 Effective Median Width

For the analysis of future scenarios, it was assumed that the median width does not change from its current value. Therefore, for the half-mile segment chosen to represent the worst case in each county, the printout column which indicates the effective width of the median (less than 36 ft., 36 to 52 ft., or over 52 ft.) remains the same throughout the projection period. There may be a difference under the heading IMPROVEMENT IN V/C, however, since the MEDIAN TOO NARROW message is superseded by LOS = F when then capacity is exceeded.

5.5.2 Volume-to-Capacity Ratio

Since the capacity is held constant for analysis purposes while the volume is increased by some growth factor, the v/c ratio can only increase. (No negative growth is anticipated in any of the counties involved.) Therefore, some of the volume-to-capacity ratios exceed the value of 1.0 with some future growth. From a practical standpoint, this simply identifies a time period before roadway expansion becomes necessary.

TABLE 5
COUNTY GROWTH RATE FACTORS

County	For 1/2 Mi. Beginning at MP	Growth Rate 1985 - 1989	Growth Rate 1990 - 2010
Bexar	168.0	2.17	2.50
Comal	185.5	4.36	4.31
Hays	205.5	1.83	2.96
Travis	233.5	3.24	3.58
Williamson	250.0	7.15	7.36
Bell	299.0	2.73	3.13
McClennon	336.5	1.57	1.98
Hill	369.0	1.40	2.44
Ellis	408.5	3.03	4.12
Dallas	413.5	2.00	2.52

The difference in time between a selected v/c threshold value (say 1.0) in the "V/C" column versus the time to the same threshold value under the "V/CA" column represents the additional life of the present roadway gained by building exclusive truck facilities. This difference depends upon the growth factor used -- a higher growth factor causes a reduction in this time difference. Two tables, Table 6 and Table 7 illustrate this point. In Table 6 for milepost 185.5, v/c = 1.0 in year 1997, while v/ca = 1.0 in year 2010, a difference of 13 years. The growth rate is approximately 4.3 percent. In Table 7, however, v/c = 1.0 in year 1991; v/ca = 1.0 in year 1997, a difference of six years. The growth rate in this case is over 7 percent. The difference in life of the two sections of roadway is 13 years versus 6 years due to the difference in the growth rates. Traffic growth for all counties for the 25 year time period is in the Appendix, Section 8.2.

5.5.3 Level of Service Improvements

5.5.3.1 Level of Service Determination by Computer

The level of service improvements can best be visualized by using Table 6 or 7. For each year from 1985 to the end of the projection period, the LOS with ETF's is more desirable than without them. This holds true until the v/ca reaches a value of 1.0. Normally, an improvement in the capacity of the roadway would occur by that time anyway.

5.5.3.2 Level of Service Calculations

The level of service calculations for future years were not validated by hand calculations because the comparison using existing traffic was deemed sufficient. The comparison of the two methods is included in the Appendix, Section 8.3.

Table 6. Anticipated Traffic Growth in Comal County

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 185.5 GROWTH FACTORS USED: 4.36% 1985 - 1989; 4.31% 1990 +

COMAL COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 185.5 & MP 186.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW: -36 36-52 52+		V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1313	144	11	4	1500	0	2	6	44	41	: . * . :	0.60	0.34	74	C:A	: . * I . :	0	
1986	1370	150	11	4	1500	0	2	6	44	41	: . * . :	0.62	0.36	74	C:B	: . * I . :	0	
1987	1430	157	11	4	1500	0	2	6	44	41	: . * . :	0.65	0.37	74	C:B	: . * I . :	0	
1988	1492	164	11	4	1500	0	2	6	44	41	: . * . :	0.68	0.39	74	C:B	: . * I . :	0	
1989	1557	171	11	4	1500	0	2	6	44	41	: . * . :	0.71	0.41	74	C:B	: . * I . :	0	
1990	1625	178	11	4	1500	0	2	6	44	41	: . * . :	0.74	0.43	74	C:B	: . * I . :	0	
1991	1695	186	11	4	1500	0	2	6	44	41	: . * . :	0.77	0.44	74	C:B	: . * I . :	0	
1992	1768	194	11	4	1500	0	2	6	44	41	: . * . :	0.81	0.46	74	D:B	: . * I . :	0	
1993	1844	202	11	4	1500	0	2	6	44	41	: . * . :	0.84	0.48	74	D:B	: . * I . :	0	
1994	1923	211	11	4	1500	0	2	6	44	41	: . * . :	0.88	0.50	74	D:B	: . * I . :	0	
1995	2006	220	11	4	1500	0	2	6	44	41	: . * . :	0.91	0.53	74	D:B	: . * I . :	0	
1996	2092	229	11	4	1500	0	2	6	44	41	: . * . :	0.95	0.55	74	E:C	: . * I . :	0	
1997	2182	239	11	4	1500	0	2	6	44	41	: . * . :	0.99	0.57	74	E:C	: . * I . :	0	
1998	2276	249	11	4	1500	0	2	6	44	41	: . * . :	1.04	0.60	74	F:C	: #### LOS = F #### :	0	
1999	2374	260	11	4	1500	0	2	6	44	41	: . * . :	1.08	0.62	74	F:C	: #### LOS = F #### :	0	
2000	2476	271	11	4	1500	0	2	6	44	41	: . * . :	1.13	0.65	74	F:C	: #### LOS = F #### :	0	
2001	2583	283	11	4	1500	0	2	6	44	41	: . * . :	1.18	0.68	74	F:C	: #### LOS = F #### :	0	
2002	2694	295	11	4	1500	0	2	6	44	41	: . * . :	1.23	0.71	74	F:C	: #### LOS = F #### :	0	
2003	2810	308	11	4	1500	0	2	6	44	41	: . * . :	1.28	0.74	74	F:C	: #### LOS = F #### :	0	
2004	2931	321	11	4	1500	0	2	6	44	41	: . * . :	1.34	0.77	74	F:C	: #### LOS = F #### :	0	
2005	3057	335	11	4	1500	0	2	6	44	41	: . * . :	1.39	0.80	74	F:D	: #### LOS = F #### :	0	
2006	3189	349	11	4	1500	0	2	6	44	41	: . * . :	1.45	0.84	74	F:D	: #### LOS = F #### :	0	
2007	3326	364	11	4	1500	0	2	6	44	41	: . * . :	1.52	0.87	74	F:D	: #### LOS = F #### :	0	
2008	3469	380	11	4	1500	0	2	6	44	41	: . * . :	1.58	0.91	74	F:D	: #### LOS = F #### :	0	
2009	3619	396	11	4	1500	0	2	6	44	41	: . * . :	1.65	0.95	74	F:E	: #### LOS = F #### :	0	
2010	3775	413	11	4	1500	0	2	6	44	41	: . * . :	1.72	0.99	74	F:E	: #### LOS = F #### :	0.	

Table 7. Anticipated Traffic Growth in Williamson County

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 250.0 GROWTH FACTORS USED: 7.15% 1985 - 1989; 7.36% 1990 +

WILLIAMSON COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 250.0 & MP 250.5

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW: -36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1680	134	8	2	5000	0	2	4	54	53 : . . * :	0.70	0.46	52	C:B	: * I . :	0	2MID
1986	1800	144	8	2	5000	0	2	4	54	53 : . . * :	0.71	0.49	43	C:B	: *. I . :	0	2MID
1987	1929	154	8	2	5000	0	2	4	54	53 : . . * :	0.80	0.53	52	D:B	: * I . :	0	2MID
1988	2067	165	8	2	5000	0	2	4	54	53 : . . * :	0.86	0.57	52	D:C	: * I . :	0	2MID
1989	2215	177	8	2	5000	0	2	4	54	53 : . . * :	0.92	0.61	52	D:C	: * I . :	0	2MID
1990	2373	190	8	2	5000	0	2	4	54	53 : . . * :	0.93	0.65	43	D:C	: *. I . :	0	2MID
1991	2548	204	8	2	5000	0	2	4	54	53 : . . * :	1.00	0.70	43	E:C	: *. I . :	0	2MID
1992	2736	219	8	2	5000	0	2	4	54	53 : . . * :	1.07	0.75	43	F:C	: #### LOS = F #### :	0	2MID
1993	2937	235	8	2	5000	0	2	4	54	53 : . . * :	1.15	0.80	43	F:D	: #### LOS = F #### :	0	2MID
1994	3153	252	8	2	5000	0	2	4	54	53 : . . * :	1.31	0.86	52	F:D	: #### LOS = F #### :	0	2MID
1995	3385	271	8	2	5000	0	2	4	54	53 : . . * :	1.33	0.93	43	F:D	: #### LOS = F #### :	0	2MID
1996	3634	291	8	2	5000	0	2	4	54	53 : . . * :	1.43	0.99	43	F:E	: #### LOS = F #### :	0	2MID
1997	3901	312	8	2	5000	0	2	4	54	53 : . . * :	1.62	1.07	52	F:F	: #### LOS = F #### :	0	2MID
1998	4188	335	8	2	5000	0	2	4	54	53 : . . * :	1.74	1.14	52	F:F	: #### LOS = F #### :	0	2MID
1999	4496	360	8	2	5000	0	2	4	54	53 : . . * :	1.76	1.23	43	F:F	: #### LOS = F #### :	0	2MID
2000	4827	386	8	2	5000	0	2	4	54	53 : . . * :	2.01	1.32	52	F:F	: #### LOS = F #### :	0	2MID
2001	5182	414	8	2	5000	0	2	4	54	53 : . . * :	2.16	1.42	52	F:F	: #### LOS = F #### :	0	2MID
2002	5563	444	8	2	5000	0	2	4	54	53 : . . * :	2.31	1.52	52	F:F	: #### LOS = F #### :	0	2MID
2003	5972	477	8	2	5000	0	2	4	54	53 : . . * :	2.48	1.63	52	F:F	: #### LOS = F #### :	0	2MID
2004	6412	512	8	2	5000	0	2	4	54	53 : . . * :	2.67	1.75	52	F:F	: #### LOS = F #### :	0	2MID
2005	6884	550	8	2	5000	0	2	4	54	53 : . . * :	2.86	1.88	52	F:F	: #### LOS = F #### :	0	2MID
2006	7391	590	8	2	5000	0	2	4	54	53 : . . * :	3.07	2.02	52	F:F	: #### LOS = F #### :	0	2MID
2007	7935	633	8	2	5000	0	2	4	54	53 : . . * :	3.30	2.17	52	F:F	: #### LOS = F #### :	0	2MID
2008	8519	680	8	2	5000	0	2	4	54	53 : . . * :	3.54	2.33	52	F:F	: #### LOS = F #### :	0	2MID
2009	9146	730	8	2	5000	0	2	4	54	53 : . . * :	3.80	2.50	52	F:F	: #### LOS = F #### :	0	2MID
2010	9819	784	8	2	5000	0	2	4	54	53 : . . * :	4.08	2.68	52	F:F	: #### LOS = F #### :	0	2MID

6.0 CONCLUSIONS AND RECOMMENDATIONS

This report describes the analysis procedure necessary for identifying candidate sections of roadway where exclusive truck facilities (ETF) are most feasible. A computer program was developed to analyze each half mile segment of a pre-selected corridor and printout results in an easily recognizable format. Two basic criteria are evaluated: effective median width and volume-to-capacity ratio - with and without trucks in the traffic stream. The computer program was further developed to incorporate the capability of evaluating scenarios of future traffic growth.

The process of comparing the v/c ratio with trucks and again without trucks readily gave a qualitative measure of improvement in traffic operating characteristics. For scenarios of future traffic, a comparison can be made of the length of time available with and without trucks before traffic conditions reach undesirable levels.

Analysis of the I-35 corridor between San Antonio and Dallas revealed that the addition of exclusive truck facilities to remove trucks from the main lanes of traffic would not be cost-effective for most of the study corridor if only existing traffic is considered. Approximately 90 percent of this section operates at LOS A or B; only three percent (7.5 miles) of the entire length of 247 miles operates at level of service D or worse. These congested segments of the freeway were all in or near urban areas where available median width for truck lanes is insufficent for desirable at-grade truck lane cross-sections. Therefore, the only option in many of these critical sections is the elevated truck lane (M-3 in Figure 5). Unfortunately, the high cost of this alternative may be prohibitive.

6.1 Recommendations for Implementation

The methodology used for determining candidate sections of roadway for truck lanes in the median area is equally appropriate for use in other corridors, and therefore can be immediately implemented elsewhere. In fact, it is already being used for evaluation of the I-10 corridor between Houston and Beaumont (Project 393). For that particular project, the program will be modified so that other areas besides just the median can also be considered (frontage roads, parallel alinement, etc.). The potential use of indices still exists in the program to provide additional program flexibility. The use of accident indices is an example. The program also has potential application in a number of other areas where the user desires information on quality of traffic flow for existing or future growth scenarios.

6.2 Recommendations for Future Research

Truck driver eye height should be further researched in order to arrive at definitive design values for sight distance requirements. In the specific context of exclusive truck facilities, this is an important factor if the taller longitudinal barriers are used immediately adjacent to the travel lane. Desirable sight distance might be difficult to maintain on horizontal curves. These barriers are designed such that a large truck can be redirected upon impact (14).

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8.0 APPENDIX

8.1 COMPUTER PROGRAM (MODELS 1, 2, 5, & 8)

DESCRIPTION OF THE
MOVING ANALYSIS PROGRAM TO EVALUATE THE GEOMETRIC
AND OPERATIONAL FEASIBILITY OF TRUCK LANES

INTRODUCTION

The increase in truck traffic on Texas highways led to the study of the feasibility of exclusive truck lane facilities in the median area of existing interstate highways. The initial phase established the geometric requirements for exclusive truck lanes along this corridor (16). The objective of the second phase was to develop a computer program to analyze specific highway segments so as to identify candidate sections that warrant the addition of truck lanes based on operational improvements.

PURPOSE OF PROGRAM

A major, time-consuming problem in determining the feasibility of truck lanes is that each segment of highway must be individually examined to determine the feasibility and benefits of truck lane construction. The interactions between segments must be further analyzed before the overall desirability of an exclusive truck lane facility can be evaluated for a given corridor. If present and/or projected traffic is well below the existing capacity of a highway, geometric feasibility need not be analyzed to conclude that construction of a truck lane would not be cost-effective. On the other hand, traffic congestion may indicate the desirability of truck lanes, but the physical impossibility of their construction may rule out this option. In another situation, the presence of a major interchange may prohibit the addition of truck lanes if construction costs simply exceed the anticipated benefits.

It was decided that a "moving analysis" computer program could most effectively evaluate each individual segment and print the results in an easily-interpreted format. Such a technique required an iterative, multi-step type of development to identify the pertinent variables, to develop the analysis model, and to present the results in a meaningful manner.

PROGRAM STRUCTURE

The structure of the program as it was finally developed can be more easily understood if the method of development is known. Beginning with a Basic program to simulate high speed trains which was re-programmed in Fortran 77 to run on a mainframe computer, the program evolved from determination of generalized feasibility indices to its present capability of calculating v/c ratios and levels of service, with optional growth in traffic. As improved versions of the program were implemented, the older subroutines and variables were NOT deleted, but were retained to provide possible foundations for future functions as well as to retain the original capabilities.

It was recognized that development of the analytical methodology would be a learning process: a model would be selected, programmed, and run, and the output would be reviewed to verify and calibrate the model. Once calibrated, the output would be used to evaluate a continuous section of highway. This approach led to the general models, analysis structure, and data required.

Program Development

The general analysis methodology selected was to use a Fortran // program on a mainframe computer to analyze the candidate corridor in half-mile segments, printing out a continuous strip of information for evaluation. Prior to development of the model, a series of meetings was held to determine the necessary input parameters and the desired analysis output, as well as the initial model to be used. Available data was examined, and needs were identified. The model was developed and programmed, and test runs were made on coded data. The resulting computer printouts were then analyzed to determine the correctness and utility of the output. These analyses resulted in improvements which were then programmed, and the process repeated.

The Fortran computer program was developed as a moving analysis program which sweeps through the data and analyzes each half-mile segment of the corridor. The basic methodology was adapted from a simulation program developed to examine the operation of high speed trains on various rights-of-way in Texas (19). The program was rewritten to examine geometric constraints, and later to perform volume/capacity computations. Adapting the methodology of an existing program (20) was found to greatly reduce development time. As revised, the program separates each function into a separate subroutine, each called in turn by the master control subroutine. This revision resulted in much greater flexibility, given that parts of the program and model need to reflect the changing developmental requirements.

Program Architecture

General architecture and operation of the revised program is shown in Figure A-1. The master program is quite short. It reads the first three lines of the "DATAFILE" and initializes the table arrays. Then, depending upon options selected by the initial lines of the data file, control is passed to one of the controlling MODEL subroutines, which takes over and selects the desired subroutines according to the options selected, looping until all segments have been evaluated. The MODEL subroutines may also call subroutines especially when growth is being evaluated. The end of the highway data being evaluated is marked by the milepost value of 999. When this is encountered, the selected controlling subroutine may call a concluding subroutine, and return control back to the main program. One option which may be selected is the capability of the program to write its results to a computer file for storage and/or analysis by another program such as a SAS statistical analysis program. (21) Although not currently programmed to do so, the program could be altered to synthesize multiple files, possibly using data output by other computer programs or taken from files on tape; such subroutines could be programmed and added.

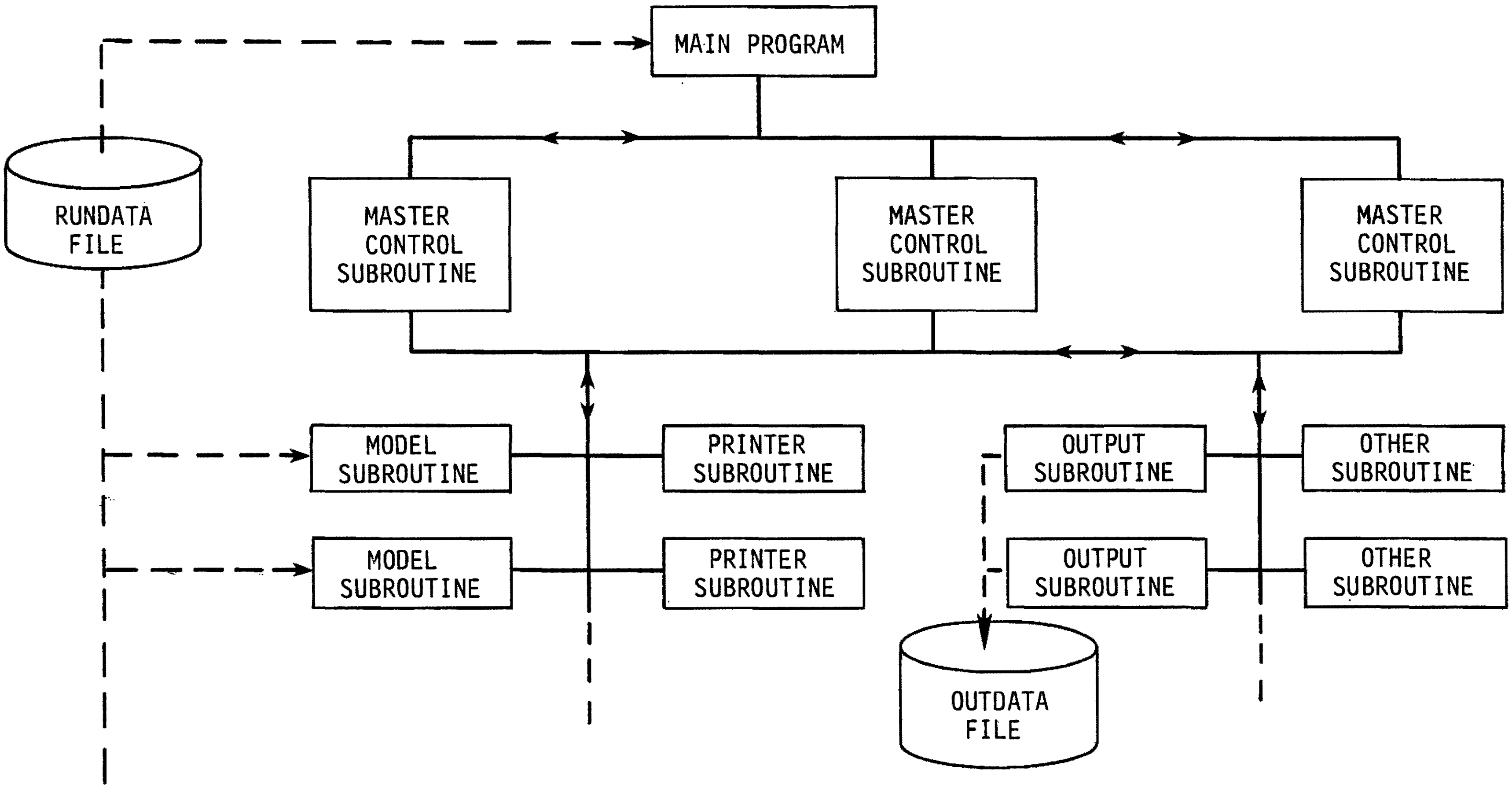

FIGURE A-1. COMPUTER PROGRAM OPERATION

This type of architecture, employing a short main program, controlling subroutines, and multiple operational subroutines, has a number of advantages over a series of programs with few or no subroutines. It results in a single program which is extremely flexible, capable of many different types of analyses depending upon the options selected at the beginning of the "RUNDATA" file. Developmental changes are easily made, with only a few subroutines involved with any changes. Old options can be retained for comparison purposes through the addition of new subroutines, and it is not necessary to maintain a large library of many separate analysis programs for each desired function.

One disadvantage with this type of architecture is the large size of the program, which contains many more subroutines than employed in any single run. This not only results in a long program, but it makes it necessary to either store a compiled version of the Fortran program which cannot be easily edited or reprogrammed, or to re-compile all portions of the program each time it is run, which can increase operational costs. The developmental advantages and flexibility of the program more than offset these disadvantages, however.

A number of extra variables, such as MP2 (for possible future smoothing) and COMNT3 (for additional comments), were programmed in. These were never used in the program, but were left for possible future use.

Data

Data is read from a separate file named "RUNDATA", which is begun with an options line to tell the program which model(s) to use and the desired output, followed by a heading line; the formatted highway and traffic data followed these first two lines. The format is described in the explanation of the main program.

The entire length of Interstate 35 from San Antonio to Dallas, a distance of approximately 250 miles, was selected for analysis, and coded into "RUNDATA". An explanation of the strip map developed for this program can be found in Section 4.3. Information gathered for the strip map was supplemented and updated by aerial photographs taken specifically for this project.

Current roadway and traffic information was then entered into the computer by one-half mile segments for the entire length of the corridor, coded into the "DATAFILE" by highway milepost. Following data entry, the two initial lines containing options and heading were entered, and the file saved. As models were changed, it was necessary to change the formats to include desired inputs in an 80-column, single line format. Input formats are described with the appropriate MASTER and MODEL subroutines.

Development of Models

There were three main evolutionary steps in the development of the analysis models. First, determination of feasibility indices was investigated (MODEL 1 and MODEL 8). Second, v/c ratios and effective median widths were calculated for present traffic levels (MODEL 2). **MODEL 2 was ultimately**

selected for evaluation of existing traffic conditions. Third, traffic growth was calculated for selected segments of highway (MODEL 5). Note that the models are not numbered consecutively, reflecting other models considered during the development process, but never completed; these model fragments were removed from the final program.

MODEL 1

As a first trial model, it was decided to generate three indices: one for geometric feasibility, one for traffic level, and a combined index. These indices were printed out for each half-mile segment, along with a visual profile of the combined index. The geometric index was determined by analyzing available median width, presence of overpasses or bridges, and severity of grades, using a simple summing process of individually estimated input indices (which could be weighted by a multiplicative factor) added to an index calculated from grade percent and length. The traffic index reflected truck congestion; this was determined from ADT, daily truck count, and number of lanes. The combined index was determined by simply adding the other two indices together. The results were printed out numerically and also as a simple graph or "profile" for ease of visual analysis.

At first, it was planned to create a moving average to reflect the interactions of adjacent half-mile segments on the segment currently under analysis. If this weighted average, or smoothing, were specified, the combined index of the current half-mile segment of the route would be given 40% weight; indices of the two immediately adjacent half-mile segments beyond would be given 10% weight each. After analysis of the initial unsmooth output, it was decided that smoothing would conceal rather than enhance the interactions; as a result, this feature was not programmed.

Analysis of the indices suggested that these were not the most desirable output. While a need for a better model was acknowledged early in the design process, it became apparent that a satisfactory, justifiable method of combining the indices could not be found. Multiple runs (MODEL 8) plotting each index in turn were no help. A new basis for the analysis model was needed.

MODEL 2

This model was ultimately chosen for evaluation of existing traffic conditions. A flowchart of its operation is shown in Figure A-2. Traffic volume-to-capacity (v/c ratios), calculated according to the Highway Capacity Manual (HCM) (1), proved to be more meaningful than the concept of using indices. (Interpretation of the end results could also be done using traditional level-of-service comparisons.) For each half-mile segment, the enhanced program calculates the v/c ratios with and without trucks on the segment, using the procedures outlined in the HCM for freeway segments.

Upon starting each run of the program, the passenger-car equivalent in Table 3-6 for heavy trucks (300 LB/HP) is read into a four-subscript array, followed by lane width factors from Table 3-2 in a second array. (Note: Table numbers correspond to those found in the HCM. These are included in the Appendix, Section 8.3.) After data for a single half-mile

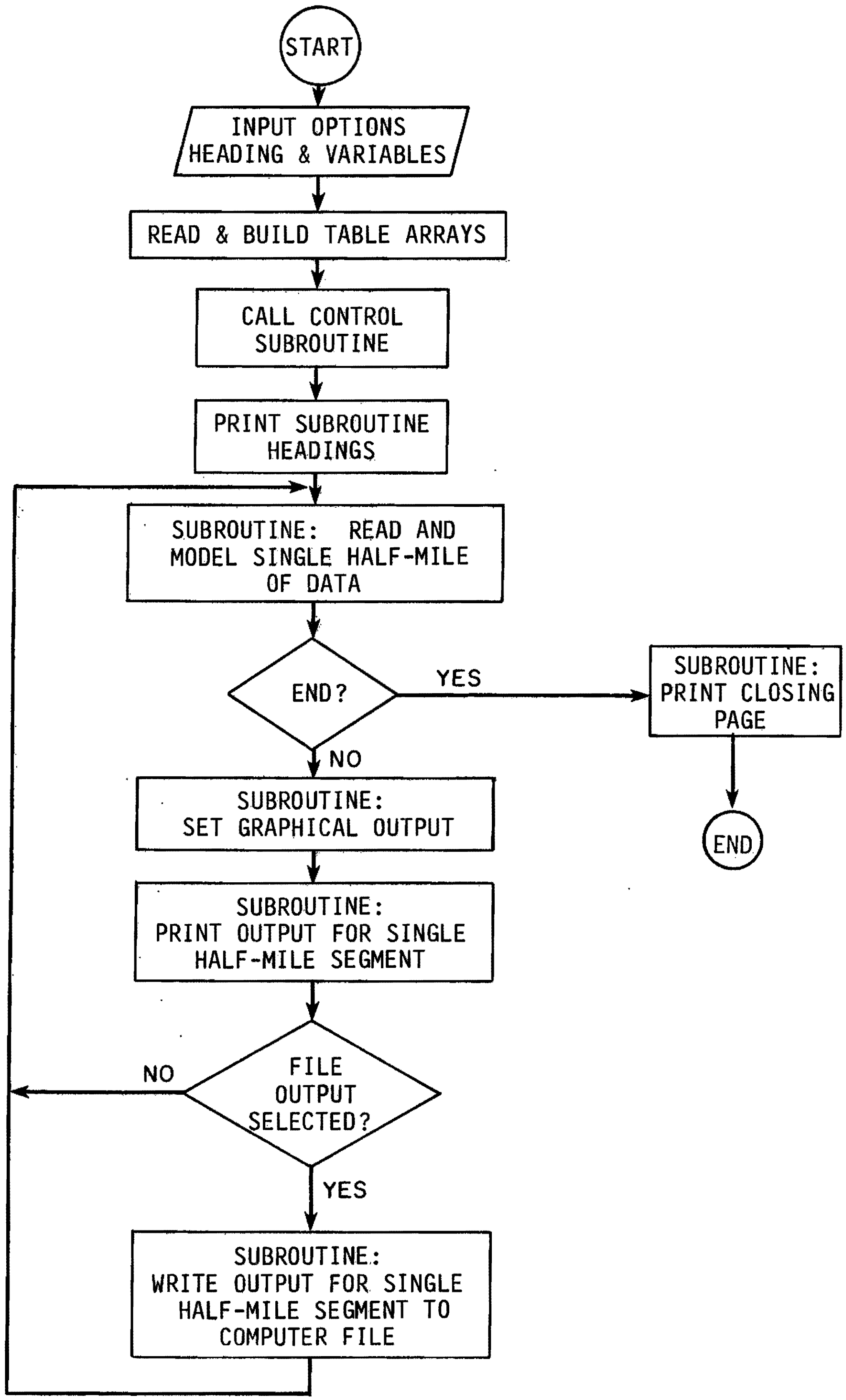

FIGURE A-2. PROGRAM FLOWCHART (REVISED MODEL 2)

segment has been read, the computer locates the appropriate table value during each loop of the model by calculating the correct subscripts based on number of lanes in a single direction, percent trucks, grade percent, grade length, and/or lateral obstruction distance. The arrays are then entered at the proper locations to obtain the relevant values of E_T, passenger car equivalents, and/or adjustment factors. Next, the trucks are subtracted from the ADT (or peak hourly volume as selected by the operator) to give the number of other vehicles if the trucks were diverted to exclusive truck lanes. The proportion of trucks (P_T) is then determined; proportion of recreational vehicles and busses are not separately considered in this program. An alternative is to enter the decimal percent of trucks, rather than the actual count, and let the computer calculate the number of trucks. These two forms of input may be intermixed in a single run.

If daily traffic counts have been input, the program calculates peak hourly volume, V, and peak hourly passenger car volume by multiplying the ADT and number of passenger cars by the K-factor which has been entered in the "RUNDATA" file (where K = the ratio of peak hour traffic volume to ADT).

The adjustment factor for heavy trucks is then calculated using the following formula (taken from formula 3-4 in the HCM):

$$f_{HV} = 1 \ / \ [1 + P_T \ (E_T - 1)].$$

Service flow rate SF is calculated for present traffic with and without trucks by dividing the respective peak hourly volumes by PHF, the peak hour factor input in "RUNDATA": SF = V / PHF. The v/c ratios are determined using the rearranged formula 3-3 from HCM.

$$v/c = SF \ / \ [c_j \times N \times f_w \times f_{HV} \times f_p]$$

where:

- v/c = ratio of volume to capacity
- SF = Service flow rate, calculated as above
- c_j = capacity under ideal conditions (2000 passenger cars per hour per lane was used)
- N = number of freeway lanes in one direction
- f_w = factor to adjust for restricted lane widths and lateral clearances (to be read from Table 3-2 of Circular 281 or input in "RUNDATA")
- f_{HV} = factor to adjust for heavy trucks, calculated as above
- f_p = factor to adjust for the effect of driver population (input from "RUNDATA. Rush hour value of 1.0 was used.)

The percent v/c improvement is calculated by dividing the difference between the v/c ratio with and without trucks by the v/c ratio without trucks, and multiplying the quotient by 100%. This percent improvement in v/c is then plotted horizontally for visual analysis.

Each grade can be individually evaluated by the program, or a general terrain factor can be entered for each half-mile segment. If there is no grade data entered, the program uses the passenger car equivalents on extended general freeway segments given in Table 3-3 of the HCM instead of the values in Table 3-6. In the first revision, a geometric index was again determined, now based only on effective median width available for exclusive truck lanes (width between mainlanes, less shoulders, median barrier, and obstructions). The range of effective median widths was also plotted. The computer output was compared with selected hand-calculated v/c ratios; these gave identical results when an E_T value of 2.0 was used for level terrain instead of the default 1.7 to reflect the use of Table 3-9 instead of Formula 3-4.

With the v/c ratio portion of the model calibrated, other output variables of the model were examined. The geometric index, now taking on only the three values of -10, +4, or +8, was deemed to be more confusing than enlightening; the visual presentation of available median width was considered adequate. Thus, this index was eliminated.

Another weakness of the original version of the second model was that in many segments the percent improvement in the v/c ratio suggested a strong desirability for truck lanes, but the v/c ratio with trucks was less than 0.54, (LOS "B" or better for 70 mph design speed). The model was revised to calculate and print the level of service (A through F) with and without trucks for each half-mile segment, and to use flags printed in the profile column to provide for immediate visual appraisal of such conditions. The graphical portion of the printout was revised to plot the percent improvement in v/c ratios only when trucklanes were feasible. If the v/c ratio with trucks was less than 0.54, the v/c improvement plot for that half-mile segment was replaced by a series of dashes to flag the fact that no improvement was needed. (This value of v/c can be changed by the user as necessary.) During traffic projections, it was possible to calculate a (meaningless) v/c ratio of greater than one, indicating that capacity of the highway segment had been exceeded; this was also flagged with the message, "LOS = F". Finally, those locations where median width was inadequate for truck lane construction were flagged with a printed message, "MEDIAN TOO NARROW."

MODEL 5

The revised version of MODEL 2 was deemed satisfactory, but it was decided that use of this model to print a separate output for each year to reflect growth would be impractical. As growth factors were available by county (18), a single half-mile segment per county (worst v/c ratio) was projected. MODEL 2 was revised to read growth factors for each line of input data, and to apply these growth factors to the data for the years from 1985 through 2010. This new model, MODEL 5, prints a page of output for each line of input data reflecting traffic growth, along with appropriate headings. Otherwise, the calculations are the same as for MODEL 2.

The revision would cause the program to calculate a page of output for each half-mile segment in a corridor. Thus, only the worse-case segments in each county were run using growth factors.

PROGRAM AND SUBROUTINES

The complete program consists of a single main program which initializes each run by reading table values from the Highway Capacity Manual, reading the first lines of the data file, and calling the appropriate MSTR subroutine. Each model selected from the data file has its own MSTR subroutine which then calls the appropriate model, output, and options subroutines as necessary to run the model using the options selected. To simplify tracing of variables through the program, the same variable names are used throughout each subroutine. The following sections describe the main program and each subroutine which was in the program as of 8/30/85. It should be noted that MODEL 2 will be further developed in Project 393.

MAIN PROGRAM

The main program starts and initializes the variables and arrays for each run, then passes control to the appropriate MSTR (master) subroutine. Arrays are dimensioned, following which the first line of the input file "RUNDATA" is read:

The first line of "RUNDATA" must contain four indices. The first is "SMOOTH"; this had originally been intended to select the option to smooth adjacent segment outputs by using moving averages, but was never implemented. (It was decided that smoothing would obscure, rather than enhance the output.) Consequently, SMOOTH should be entered as 00, format I2. The second index of the first line of "RUNDATA" is LOOP, which also was not used in the final program. It is advised to enter 01 (which was the input code for a single loop), format I2. The third index is MODEL, format I2, which selects the model to be used in the run. At the present time, there are four models which can be selected as described below: 01, 02, 05, and 08. The fourth index is OUT, format I2, which selects the desired output: If OUT is 00, there is printer output with no WYLBUR file output; 01 outputs an abbreviated set of data to the file "OUTDATA", while 02 outputs an extended set of data to "OUTDATA". (Program documentation indicates 02 causes two-line output; this is true for Models 1 and 8, but not for models 2 and 5.) This feature was programmed to allow the data to be used by a different program, such as a SAS statistical analysis program. In summary, the first line of the "RUNDATA" file must be in 4I4 format: SMOOTH (not used, enter 00), LOOP (not used, enter 01), MODEL (select the desired model for the run), and OUT (type of computer file output desired, none, short, or long).

The program then reads the second line of "RUNDATA" which is the 24-character heading which is to be echo-printed at the top of each printed page of output.

The remainder of the "RUNDATA" file must correspond to the format of the model selected. If MODEL1 or MODEL8 are selected, individual lines of data for each highway segment follow. If MODEL2 or MODEL5 are selected, a third options line is entered into "RUNDATA". The first index of this third line is K (ratio of peak hourly traffic to ADT, always a decimal value less than 1.00), format F5.2. The second index is the desired PHF to be used, format F5.2. The third index of the third line of "RUNDATA" is the desired default width factor FWD: entering 0.00 causes the program to determine FWD from Highway Capacity Manual Table 3-2; otherwise the default value input is read into all cells of the FWD table. The fourth index in the FP value to be used in calculation of the v/c ratios, format F5.2. The fifth value in this line is the desired value of c_j (single lane capacity), format I4. The final index is VOLFLG, a flag which tells the program whether traffic volume input is Average Daily Traffic (00 if input is ADT), or Peak Hourly Volume (01 if input is PHV), format I2. In summary, if MODEL2 or MODEL5 is selected, the third line of "RUNDATA" contains 6 indices: k, PHF, default FWD (00 causes the program to determine FWD), FP, c_j, and VOLFLG (00 for ADT input, 01 for PHV); format 4F5.2, I4, I2.

The main program then calls the MSTR (master) subroutine selected, passing all further control to this subroutine until the end of the program. A partial list of input variables used throughout the program is given in comments in the main program. Not all variables are used in each model.

Subroutine MSTR1 (Master 1)

This is the main control subroutine for model 1, which sweeps through the highway data a single time, calculating geometric, traffic, and combined indices, and printing a profile of the combined index. It is a very short subroutine, which assembles the program by calling subroutine HEAD1 to initialize the printout, and then loops through subroutines MODEL1 (testing for END = 1, which is the end-of-file marker generated by milepost 999), TABB3 (to create the combined index profile for a single line segment), OUT1 or OUT2 (if file output is selected), and LINE1 to print a single line of output. MSTR1 loops through these subroutines for each half-mile segment of highway until the end-of-file flag END is equal to one, at which time subroutine SUMM1 is called to advance a page and print an ending message. Control is then returned to the main program and the run is concluded.

Subroutine MSTR2 (Master 2)

This is the main control subroutine for model 2, which sweeps through the highway data a single time, calculating v/c ratios with and without trucks and the percent improvement obtained by removing the truck traffic, along with the levels of service with and without truck traffic on the highway segment, and then printing a profile of the percent improvement in v/c ratios. It is a short subroutine, which begins by reading the FWD width factors from Highway Capacity Manual Table 3-2 into the FWTABL array (if FWD is equal to zero, or else it enters into each cell of the FWTABL array the default FWD which was input in the third line of the "RUNDATA" file). It then assembles the program by calling subroutine HEAD2 to initialize the printout, and then loops through subroutines MODEL2 (testing for END = 1, which is the end-of-file marker generated by milepost 999), TABB4 (to create percent v/c improvement profile for a single line segment), OUT3 or OUT4 (if file output is selected), and LINE2 to print a single line of output. MSTR2 loops through these subroutines for each half-mile segment of highway until the end-of-file flag END is equal to one, at which time subroutine SUMM2 is called to advance a page and print an ending message. Control is then returned to the main program and the run is concluded.

Subroutine MSTR5 (Master 5)

This is the main control subroutine for model 5, which reads and applies traffic growth factors to each line of highway data, calculating v/c ratios with and without trucks and the percent improvement obtained by removing the truck traffic, along with the levels of service with and without truck traffic on the highway segment. MODEL5 differs from the other models in that it prints a single page for each segment with a separate heading, calculating the traffic growth from the year 1985 to the year 2010, printing a single line for each year. It prints a profile of the percent improvement in v/c ratios for each year for a single half-mile segment of highway. As this model prints a single page of output for each segment in "RUNDATA", it should NOT be used to analyze each half-mile segment of a highway, as it will generate many pages of output. Instead, the recommended procedure is to calculate growth factors only on selected segments along the route.

MSTR5 is a short subroutine, which begins by reading the FWD width factors from HCM Table 3-2 into the FWTABL array (if FWD is equal to zero, or else it enters into each cell of the FWTABL array the default FWD which was input in the third line of the "RUNDATA" file). It loops through subroutines MODEL5, testing for END = 1 (the end-of-file marker generated by milepost 999), indicating that the end of the input data file has been reached. Unlike MSTR2, MSTR5 does not assemble the other subroutines of the program; this is done by subroutine MODEL5, which calls HEAD5, TABB4 (to create the percent v/c improvement profile for a single line segment), OUT3 or OUT4 (if file output is selected), and LINE5 to print a single line of output. MODEL5 (not MSTR5) loops through these subroutines for each year, printing a complete page for each half-mile segment of highway. MSTR5 causes MODEL5 to repeat this process for each highway segment until the end-of-file flag END is equal to one, at which time subroutine SUMM2 is called to advance a page and print an ending message. Control is then returned to the main program and the run is concluded.

Subroutine MSTR8 (Master 8)

This is the main control subroutine for model 8, which is almost identical to model 1, except that it sweeps through the highway data three times, calculating geometric, traffic, and combined indices, and printing a profile first of the geometric index, then repeats the printout but printing the traffic index, and then loops through again to print the combined index. (Note that the route data in "RUNDATA" must be copied three times.) It is a very short subroutine, which assembles the program by calling subroutine HEAD1 to initialize the printout, sets LFLAG1 to first 1, then 2, and then 3 (once for each loop through the data), and then loops through subroutines MODEL1 (testing for END = 1, which is the end-of-file marker generated by milepost 999); TABB1, TABB2, or TABB3, depending on the value of LFLAG1 (to create the appropriate index profile for a single line segment); OUT1 or OUT2 (if file output is selected); and LINE1 to print a single line of output. MSTR1 loops through these subroutines for each half-mile segment of highway until the end-of-file flag END is equal to one, and then increments LFLAG1 by one to repeat the loop for all three indices. Subroutine SUMM1 is called after each loop to advance a page and print an ending message for that loop. When all three indices have been printed for the highway segment, control is returned to the main program and the run is concluded.

Subroutine MODEL1

Subroutine MODEL1 is used for both model 1 (a single sweep through the highway data, plotting a single combined index profile) and model 8 (a triple loop through the highway data, plotting first a geometric index profile, then a traffic index profile, and finally a combined index profile). This subroutine reads a single line of data for a single half-mile segment of highway, and determines a geometric index, a traffic index, and a combined index. Each 80-column line of data, one for each half-mile segment of the highway, is read from the WYLBUR file named "RUNDATA", and must contain the following formatted information:

Milepost (F5.1), Traffic volume (I6), Truck volume (I6), Truck index (I3 - not used at this time but must be entered), Median width between shoulders (I4), Percent grade (I2), Length of grade (I6 - total, not just within the half-mile segment), Number of lanes in a single direction (I2), Total width of both inside shoulders (I3), Shoulder pavement type index (I1 - not used at this time but must be entered), Pavement condition score (I3 - not used at this time but must be entered), Mainlane pavement type index (I1 - not used at this time but must be entered), Level of service (I2 - A = 1, B = 2, present time), Overpass, Bridge, and Other obstruction indices (3I3 - each index ranges from zero: no obstruction to minus ten: impassible obstruction, becoming more negative as severity increases), and Comment (A20).

Input format is F5.1, 2I6, I3, I4, I2, I6, I2, I3, I1, I3, I1, I2, 3I3, A20.

If milepost is 999 or greater, MODEL1 sets the flag END equal to one, and returns. Otherwise, the indices are calculated and returned as follows: The geometric index is determined from obstructions, grades, and adjusted median width. The worst of the three obstruction indices is selected. If any are minus ten, the segment is considered impassible, and the flag NOLANE is set to one. Adjusted total median width is calculated by adding median width to total shoulder width. If the sum is less than 36 feet, there is not adequate room for truck lanes and shoulders, and the flag NOLANE is set to one. If the total is 60 feet or greater, six is added to the geometric index determined by obstructions. The grade contribution to the geometric index is plus three if grade length times grade decimal percent is greater than 3000, and plus eight (3 + 5) if the product is greater than 6000, to reflect the increased need for a trucklane in cases of severe grades. This sum becomes the geometric index, but with the range limited to minus ten to plus ten. If the flag NOLANE has been set to one, the geometric index is reset to minus ten.

The traffic index is initialized by dividing the number of trucks by the number of lanes, subtracting 1500, and dividing by 110 (the formula is simply empirical and was never calibrated). Level of service is then used to adjust this - the traffic index is reset to minus twelve for LOS A or B, to recognize the lack of desirability of trucklanes if traffic is light. If LOS is E or F, a value of plus four is added to the traffic index. The range is limited to minus ten to plus ten.

The combined index is simply the sum of the geometric index and the traffic index, limited to a range of minus ten to plus ten.

The values read from the "RUNDATA" file are then returned along with the indices which were calculated.

Subroutine MODEL2

Subroutine MODEL2 is used with model 2, and provides a single sweep through the highway data. It calculates the v/c ratios for each half-mile segment both with and without trucks, and plots the percent improvement in the v/c ratio to be obtained by removing the truck traffic. Truck traffic can be input directly, or a decimal percent (less than 1.00) can be input, in which case the subroutine calculates the truck traffic. Depending on the value of traffic volume flag VOLFLG, traffic volumes are read directly as peak hourly volumes (VOLFLG = one), or volumes are calculated by multiplying the volumes assumed to be ADT by K (VOLFLG = zero). VOLFLG can be switched within the data by a dummy milepost: milepost 980 sets VOLFLG to zero, while milepost 981 resets VOLFLG to one.

This subroutine reads a single line of data for a single half-mile segment of highway. Each 80-column line of data, one for each half-mile segment of the highway, is read from the WYLBUR file named "RUNDATA", and must contain the following formatted information:

Milepost (F5.1), Traffic volume (I5), Truck volume or percent trucks (F8.2 - as described above), Truck index (I2 - not used at this time but must be entered), Median width between shoulders (I4), Percent grade (I2), Length of grade (I6 - total, not just within the half-mile segment), Number of lanes in a single direction (I2), Total width of both inside shoulders (I3), Default terrain factor as listed in the Highway Capacity Manual (I1 - 1 = level terrain, 2 = rolling, and 3 = mountainous; if a zero is entered, individual grades are considered to calculate passenger car equivalents), Number of feet from the pavement to the nearest lateral obstruction (I3), Mainlane pavement type index (I1 - not used at this time but must be entered), Level of service (I2 - A = 1, B = 2, ..., F = 6; use LOS = 0 if unknown - computer calculates LOS according to HCM, Overpass (I3 - integer number of feet width of overpass piers in the median), Bridge and Other obstruction indices (2I3 - not used at the present time but must be entered), and Comment (A20).

Input format is F5.1, I5, F8.2, I2, I4, I2, I6, I2, I3, I1, I3, I1, I2, 3I3, and A20.

If milepost is 999 or greater, MODEL2 sets the flag END equal to one, and returns. Otherwise, MODEL2 calculates the v/c ratios with and without trucks according to HCM as described above and determines the percent improvement in the v/c ratio. Total median width is determined by adding the median width to the inside shoulder width, and subtracting the width of any overpass piers, then subtracting three feet for a center median barrier. If this remainder is less than 36 feet, the flag NOLANE is set to one, and a geometric index is set to minus ten. If the total is between 36 and 52 feet, the geometric index is set to 4. If the total is 52 feet wide or greater, the geometric index is set to eight. (But note that the geometric index is not printed in the output at this time). The subroutine returns these values which have been calculated along with the data read from the "RUNDATA" file.

Subroutine MODEL5

Subroutine MODEL5 is used with model 5, and applies growth factors to the highway data. It calculates the v/c ratios for increasing traffic computed for exponential growth over the time period from 1985 through 2010, both with and without trucks, and plots the percent improvement in the v/c ratio to be obtained by removing the truck traffic. This is done for each half-mile segment, one segment at a time. Truck traffic can be input directly, or a decimal percent (less than 1.00) can be input, in which case the subroutine calculates the truck traffic. Depending on the value of traffic volume flag VOLFLG, traffic volumes are read directly as peak hourly volumes (VOLFLG = one), or volumes are calculated by multiplying the ADT by K (VOLFLG = zero). VOLFLG can be switched within the data by a dummy milepost: milepost 980 sets VOLFLG to zero, while milepost 981 resets VOLFLG to one.

This subroutine reads a single line of data for a single half-mile segment of highway, and then applies the growth factors for each year between 1985 and 2010 before the next line of highway data is read. Each 80-column line of data, one for each half-mile segment of the highway, is read from the WYLBUR file named "RUNDATA", and must contain the following formatted information:

Milepost (F5.1), Traffic volume (I5), Truck volume or percent trucks (F8.2 - as described above), Truck index (I2 - not used at this time but must be entered), Median width between shoulders (I4), Percent grade (I2), Length of grade (I6 - total, not just within the half-mile segment), Number of lanes in a single direction (I2), Total width of both inside shoulders (I3), Default terrain factor as listed in the Highway Capacity Manual (I1 - 1 = level terrain, 2 = rolling, and 3 = mountainous; if a zero is entered, individual grades are considered to calculate passenger car equivalents), Number of feet from the pavement to the nearest lateral obstruction (I3), Mainlane pavement type index (I1 - not used at this time but must be entered), Traffic growth factor per year from 1985 through 1989 (F6.2), Traffic growth factor per year from 1990 through 2010 (F6.2), Overpass pier width (I3 - integer number of feet width of overpass piers in the median), Other obstruction index (I3 - not used at the present time but must be entered), and Comment (A20).

Input format is F5.1, I5, F8.2, I2, I4, I2, I6, I2, I3, I1, I3, I1, 2F6.2, 2I3, and A20.

If milepost is 999 or greater, MODEL5 sets the flag END equal to one, and returns. Otherwise, MODEL5 calls subroutine HEAD5 to start a new page of printout for the highway segment data which has been read. The subroutine now begins to loop through the following procedure, increasing the year by one and the traffic according to the appropriate growth factor: For each year, MODEL5 calculates the v/c ratios with and without trucks for a single year according to TRB Circular 281 as described above and determines the percent improvement in the v/c ratio. Total median width is determined by adding the median width to the shoulder width, and subtracting the width of any overpass piers, then subtracting three feet for a center median barrier. If this total is less than 36 feet, the flag NOLANE is set to one, and a geometric index is set to minus ten. If the total is between 36 and 52 feet, the geometric index is set to 4. If the total is 52 feet wide or greater, the geometric index is set to eight. (But note that the geometric index is not printed in the output at this time). The subroutine calls subroutine TABB4 to set the v/c improvement profile; it then calls subroutine OUT5 or OUT6 if file output was specified. After it calls subroutine LINE5 to print out the calculated values and the data read from the "RUNDATA" file for a single year, it calculates the next year's traffic and loops back to calculate the new v/c values. When the year 2010 has been printed, control returns to MSTR5.

Subroutine HEAD1

Subroutine HEAD1 causes the printer to start a new page, prints the heading HEAD input in the second line of the "RUNDATA" file, and prints out the column headings for the output of subroutine LINE1. This heading is used for MODEL1 and MODEL8.

Subroutine HEAD2

Subroutine HEAD2 causes the printer to start a new page, prints the heading HEAD input in the second line of the "RUNDATA" file, and prints out the column headings for the output of subroutine LINE2. This heading is used for MODEL2.

Subroutine HEAD5

Subroutine HEAD5 is called by the subroutine MODEL5. The subroutine reads the segment heading HEADII which is input following each line of highway data. It then causes the printer to start a new page for each highway segment, and prints the heading HEAD (which was input in the second line of the "RUNDATA" file) and HEADII at the top of the page. HEAD5 next prints out the column headings for the output of subroutine LINE5, and returns control to MODEL5.

Subroutine TABB1

Subroutine TABB1 assigns the 26-character string TABB to print the geometric index profile. The character string contains the necessary punctuation to create the profile on the printer, and the location of the indicator (*) is determined from the value of the geometric index IGEOM by a series of IF tests. The appropriate character string TABB is then returned to be printed.

Subroutine TABB2

Subroutine TABB2 assigns the 26-character string TABB to print the traffic index profile. The character string contains the necessary punctuation to create the profile on the printer, and the location of the indicator (*) is determined from the value of the traffic index ITRUK by a series of IF tests. The appropriate character string TABB is then returned to be printed.

Subroutine TABB3

Subroutine TABB3 assigns the 26-character string TABB to print the combined index profile. The character string contains the necessary punctuation to create the profile on the printer, and the location of the indicator (*) is determined from the value of the combined index INDEX by a series of IF tests. The appropriate character string TABB is then returned to be printed.

Subroutine TABB4

Subroutine TABB4 assigns the 26-character string TABB to print the percent v/c improvement profile. The character string contains the necessary punctuation to create the profile on the printer, and the location of the indicator (*) is determined from the value of the percent v/c improvement variable VCIMPR by a series of IF tests. The appropriate character string TABB is then returned to be printed.

Subroutine LINE1

Subroutine LINE1 causes the printer to print a single line of output in a 132-column format. This subroutine is used with model 1 and model 8, and matches the heading produced by HEAD1. Values are printed for each half-mile segment of highway.

The initial output values are echo-printed from the input: Milepost; Traffic volume; Truck traffic volume; Truck type index; Median width; Percent grade; Grade length; Number of lanes in one direction; Shoulder width; Shoulder pavement index; Pavement condition score; Mainlane pavement index; Level of service (1 = LOS A,..., 6 = LOS F); Indices for overpasses, bridges, and other obstructions. These are followed by the calculated values of the geometric, traffic, and combined indices, and the appropriate index profile. Finally, 20 columns of the line comment are echo printed, to complete the line.

Control is then returned.

Subroutine LINE2

Subroutine LINE2 causes the printer to print a single line of output in a 132-column format. This subroutine is used with model 2, and matches the heading produced by HEAD2. Prior to printing a line of data, LINE2 determines the percent trucks, level of service (A, B, C, D, E, or F) from the v/c ratios according to a 70-mph design speed as presented in TRB Circular 281, using a series of IF-tests. Next, the character string for the total median width profile is assigned, based on the limiting values for total median width of 36 feet and 52 feet. Finally, the character strings for the v/c improvement profile (TABB) are replaced with appropriate flags to be printed if the LOS is A or B (trucklanes are not needed), if the LOS is F (Immediate action is necessary), or if the total median width is less than 36 feet (too narrow). Values printed for each half-mile segment of highway, in order, are:
Milepost; Hourly traffic volume; Hourly truck traffic volume; Percent

trucks; Percent grade; Grade length; Terrain index (1 = flat, 2 = rolling, 3 = mountainous, and zero means the computer used grades to determine the truck passenger car equivalents); Number of lanes in one direction; Distance to lateral obstructions; Median width; Total median width available for truck lanes; Total median width profile; v/c ratio with trucks; v/c ratio without trucks; Percent v/c improvement; Levels of service with and without trucks; Profile of percent v/c improvement (or the appropriate flags determined as above); Obstruction index (echo printed); and 20 columns of the line comment (echo printed).

Control is then returned.

Subroutine LINE5

Subroutine LINE5 causes the printer to print a single line of output in a 132-column format. This subroutine is used with model 5, and matches the heading produced by HEAD5. Prior to printing a line of data, LINE5 determines the percent trucks, level of service (A, B, C, D, E, or F) from the v/c ratios according to a 70-mph design speed as presented in TRB Circular 281, using a series of IF-tests. Next, the character string for the total median width profile is assigned, based on the limiting values for total median width of 36 feet and 52 feet. Finally, the character strings for the v/c improvement profile (TABB) are replaced with appropriate flags to be printed if the LOS is A or B (trucklanes are not needed), if the LOS is F (Immediate action is necessary), or if the total median width is less than 36 feet (too narrow). Values printed for each half-mile segment of highway, in order, are:

Year; Hourly traffic volume; Hourly truck traffic volume; Percent trucks; Percent grade; Grade length; Terrain index (1 = flat, 2 = rolling, 3 = mountainous, and zero means the computer used grades to determine the truck passenger car equivalents); Number of lanes in one direction; Distance to lateral obstructions; Median width; Total median width available for truck lanes; Total median width profile; v/c ratio with trucks; v/c ratio without trucks; Percent v/c improvement; Levels of service with and without trucks; Profile of percent v/c improvement (or the appropriate flags determined as above); Obstruction index (echo printed); and 20 columns of the line comment (echo printed).

Control is then returned.

Subroutine OUT1

Subroutine OUT1 is used to write a single line of data to a WYLBUR file named OUTDATA. Called by MSTR1 or MSTR8 if short file output has been selected (the fourth index of the first line of the RUNDATA file = 1), this subroutine writes a single line of data to the output file. Five values are output: milepost, obstruction index, geometric index, traffic index, and the combined index. The format is (1X, F5.1, 4I4).

Control is then returned.

Subroutine OUT2

Subroutine OUT2 is used to write program output data to a WYLBUR file named OUTDATA. Called by MSTR1 or MSTR8 if long file output has been selected (the fourth index of the first line of the RUNDATA file = 2), this subroutine writes two lines of data to the output file. Note that this feature was never used during development; this subroutine may need further debugging to operate correctly. Twenty-two values are written to file.

The initial values are echo-printed from the input: Milepost; Traffic volume; Truck traffic volume; Truck type index; Median width; Percent grade; Grade length; Number of lanes in one direction; Shoulder width; Shoulder pavement index; Pavement condition score; Mainlane pavement index; Level of service (1 = LOS A,..., 6 = LOS F); Indices for overpasses, bridges, and other obstructions. These are followed by the calculated values of the geometric, traffic, and combined indices, and the appropriate index profile. Finally, 20 columns of the line comment are echo printed, to complete the line. The output format is (1X, F5.1, 2I6, I2, I4, I3, I6, I2, 4I3, I4, 3I3) on the first line. The second line format is (4I6, A26, A20).

Control is then returned.

Subroutine OUT3

Subroutine OUT3 is used to write a single line of data to a WYLBUR file named OUTDATA. Called by MSTR2 if short file output has been selected (the fourth index of the first line of the RUNDATA file = 1), this subroutine writes a single line of data to the output file. Four values are output: milepost, v/c ratio without trucks, v/c ratio with trucks, and the percent v/c improvement. The format is (1X, 3F5.2, F5.1).

Control is then returned.

Subroutine OUT4

Subroutine OUT4 is used to write program output data to a WYLBUR file named OUTDATA. Called by MSTR2 if long file output has been selected (the fourth index of the first line of the RUNDATA file = 2), this subroutine writes a SINGLE line of data to the output file (Note: not a double line of data as in OUT2). As this feature was never used during development, this subroutine may need further debugging to operate correctly. Twenty-two values are output:

Milepost; Hourly traffic volume; Hourly truck traffic volume; Truck index; Median width; Percent grade; Grade length; Number of lanes in one direction; Shoulder width; Terrain index (1 = flat, 2 = rolling, 3 = mountainous, and zero means the computer used individual grades to determine the truck passenger car equivalents); Distance to lateral obstructions; Pavement index; Level of service as input (not as calculated); Overpass, bridge, and other indices; Geometric index; v/c ratio without trucks; v/c ratio with trucks; Percent v/c improvement; Profile of percent v/c improvement; and 20 columns of the line comment (echo printed). Format is (1X, F5.1, 2I6, I2, I4, I3, I6, I2, 4I3, I4, 4I3, 3F6.2, A26, A20).

Subroutine OUT5

Subroutine OUT5 is used to write program output data to a WYLBUR file named OUTDATA. Called by MODEL5 if either short or long file output has been selected (the fourth index of the first line of the RUNDATA file = 1 or 2; there is no differentiation), this subroutine writes a SINGLE line of data to the output file (Note: not a double line of data as in OUT2). As this feature was never used during development, this subroutine may need further debugging to operate correctly. Nineteen values are output:

Milepost; Year; Hourly traffic volume; Hourly truck traffic volume; Truck index; Median width; Percent grade; Grade length; Number of lanes in one direction; Shoulder width; Terrain index (1 = flat, 2 = rolling, 3 = mountainous, and zero means the computer used individual grades to determine the truck passenger car equivalents); Distance to lateral obstructions; Overpass index; Other index; v/c ratio without trucks; v/c ratio with trucks; Percent v/c improvement; Growth factor to 1990; and the growth factor for 1990 and later. Format is (F5.1, I5, 2I6, I2, I3, I3, I6, I2, I3, I2, 3I3, 2F5.2, 3F6.2).

Control is then returned to MODEL5.

Subroutine SUMM1

Subroutine SUMM1 is called when all data has been read from the RUNDATA input file and processed. It prints the message "END OF FILE" and provides a page feed, printing the message, "END OF RUN FOR (heading read from RUNDATA)". This subroutine does not presently print a summary table; this could be programmed at a later time.

Control is then returned. SUMM1 normally ends the program.

Subroutine SUMM2

Subroutine SUMM2 is called when all data has been read from the RUNDATA input file and processed. It prints the message "END OF FILE" and provides a page feed, printing the message, "END OF ANALYSIS RUN FOR (heading read from RUNDATA)". This subroutine does not presently print a summary table; this could be programmed at a later time.

Control is then returned. SUMM2 normally ends the program.

CONCLUSIONS

The developmental process described here worked quite well. A rather sophisticated computer program and analysis methodology was developed in a relatively short seven-month period by adapting an existing computer program. The combination of numerical and graphical output was found to greatly speed up program development and debugging.

```
XXXXXXXXXXX   XXXXXXX    XXXXXXXXX  XXXXXXXXX                      XXXXXXXXXXX  XXXXXXXXX    XXXXXXXXX    XXXXXXXXX
XXXXXXXXXXX  XXXXXXXXX  XXXXXXXXXXX XXXXXXXXXX                     XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX
XX          XXX     XXX XX       XX XX       XX                    XX          XX       XX XX       XX XX       XX
XX          XX       XX         XXX XX       XX                    XX          XX       XX XX       XX XX       XX
XXXXXXXXXX  XX       XX       XXXX  XX       XX                    XXXXXXXXXX   XXXXXXXXX   XXXXXXXXX  XXXXXXXXXXX
XXXXXXXXXXX XX       XX       XXXX  XX       XX                    XXXXXXXXXXX  XXXXXXXXX   XXXXXXXXX   XXXXXXXXXX
         XX XX       XX         XXX XX       XX                             XX XX       XX XX       XX          XX
XX       XX XXX     XXX XX       XX XX       XX                    XX       XX XX       XX XX       XX          XX
XXXXXXXXXXX  XXXXXXXXX  XXXXXXXXXXX XXXXXXXXXX                     XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX
 XXXXXXXXX    XXXXXXX    XXXXXXXXX  XXXXXXXXX                       XXXXXXXXX   XXXXXXXXX   XXXXXXXXX   XXXXXXXXX


XXXXXXXXXX XXXXXXXXXX  XX       XX  XXXXXXXXX  XX       XX  XX          XX       XX
XXXXXXXXXX XXXXXXXXXXX XX       XX XXXXXXXXXXX XX      XX   XX          XXX      XX
    XX     XX       XX XX       XX XX       XX XX    XX     XX          XXXX     XX
    XX     XX       XX XX       XX XX          XX  XX       XX          XX XX    XX
    XX     XXXXXXXXXXX XX       XX XX          XXXXXX       XX          XX  XX   XX
    XX     XXXXXXXXXX  XX       XX XX          XX    XX     XX          XX   XX  XX
    XX     XX   XX     XX       XX XX          XX     XX    XX          XX    XX XX
    XX     XX    XX    XX       XX XX       XX XX      XX   XX          XX     XXXX
    XX     XX     XX   XXXXXXXXXXX XXXXXXXXXXX XX       XX  XXXXXXXXXXX XX      XXX
    XX     XX      XX   XXXXXXXXX   XXXXXXXXX  XX        XX XXXXXXXXXXX XX       XX
```

```
********  JES3 JOB SUMMARY  *********        *****  WRITER CHARACTERISTICS  ******       ************************************
*                                   *        *                                  *       *                                  *
*       1,700 CARDS READ (INTRDR)   *        *  DEVICE= XEROX1    TRAIN= PN     *       *      TEXAS A&M UNIVERSITY        *
*                                   *        *                                  *       *    COMPUTING SERVICES CENTER     *
*       2,507 LINES SPOOLED         *        *  FORMS=  1100      FCB=   8      *       *                                  *
*                                   *        *                                  *       *  AMDAHL 5850/470V8  MVS/SP/JES3  *
*           0 CARDS SPOOLED         *        *  SYSOUT= A         JDE=   JFMT1  *       *                                  *
*                                   *        *                                  *       *   13.20.02        28 AUG 85.240  *
*                                   *        *                                  *       *                                  *
*************************************        ************************************       ************************************
```

```
XXXXXXXXXX  XXXXXXXXXXX XXXXXXXXXX  XXXXXXXXXXX XXXXXXXXXX    XXXXXXXXX  XXXXXXXXXXX XX       XX
XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXX  XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX XXXXXXXXXXX XXX      XX
XX       XX XX               XX     XX          XX       XX XX       XX XX          XXXX     XX
XX       XX XX               XX     XX          XX       XX XX          XX          XX XX    XX
XXXXXXXXXXX XXXXXXX          XX     XXXXXXX     XXXXXXXXXXX XXXXXXXXXX  XXXXXXX     XX  XX   XX
XXXXXXXXXX  XXXXXXX          XX     XXXXXXX     XXXXXXXXXX   XXXXXXXXXX XXXXXXX     XX   XX  XX
XX          XX               XX     XX          XX    XX             XX XX          XX    XX XX
XX          XX               XX     XX          XX     XX   XX       XX XX          XX     XXXX
XX          XXXXXXXXXXX      XX     XXXXXXXXXXX XX      XX  XXXXXXXXXXX XXXXXXXXXXX XX      XXX
XX          XXXXXXXXXXX      XX     XXXXXXXXXXX XX       XX  XXXXXXXXX  XXXXXXXXXXX XX       XX
```

```
//TRUCKLN JOB (W348,503D,S30,5,TL),'PETERSEN'
```

```
IAT6140 JOB ORIGIN FROM GROUP=XEROX    , DSP=WJP, DEVICE=WYLRDR  , 000
TAMISOO JOB 5889       ENDING INPUT SERVICE     01.15.49 PM    28 AUG 85.240
TAMISOO ORG=XEROX    PRTY=5 SHIFT=1
13:15:51 IAT5110 JOB 5889 (TRUCKLN ) USES     D LIB004
13:15:51 IAT5110 JOB 5889 (TRUCKLN ) USES     D LIB001
13:15:51 IAT5110 JOB 5889 (TRUCKLN ) USES     D LIB002
13:15:51 IAT5110 JOB 5889 (TRUCKLN ) USES     D USER44
13:15:51 IAT5110 JOB 5889 (TRUCKLN ) USES     D USER47
13:15:51 IAT5200 JOB 5889 (TRUCKLN ) IN SETUP ON MAIN=A
13:15:51 IAT5210 STEPLIB  USING D LIB004 ON A4E
13:15:51 IAT5210 SYSLIB   USING D LIB001 ON 55C
13:15:51 IAT5210 SYSLIB   USING D LIB002 ON A4C
13:15:51 IAT5210 FT01F001 USING D USER44 ON A63
13:15:51 IAT5210 FT02F001 USING D USER47 ON 553
13:15:51 IAT2000 JOB 5889 TRUCKLN  SELECTED A        GRP=NRMGROUP
13:15:52  IEF403I TRUCKLN - STARTED - TIME=13.15.52
13:16:58 IAT5110 JOB 5889 (TRUCKLN ) USES     D WORK2A
13:16:58  IEF404I TRUCKLN - ENDED - TIME=13.16.58
13:16:59 IAT5400 JOB 5889 (TRUCKLN ) IN BREAKDOWN
```

```
//TRUCKLN JOB (W348,503D,S30,5,TL),'PETERSEN'
//*MAIN        USER=W348TL,ORG=XEROX
//*TAMU        HOLDOUT
//*PASSWORD************************************************************
//*TAMU PRTY=5
// EXEC FORTVCLG,FVREGN=1024K,GOREGN=512K,PARM=NOTRMFLG
//FORT.SYSIN DD *
//GO.SYSIN DD * DATA
//GO.FT01F001 DD DSN=USR.W348.TL.RUNDATA,DISP=SHR
//GO.FT02F001 DD DSN=USR.W348.TL.OUTDATA,DISP=OLD
    1     //TRUCKLN JOB (W348,503D,S30,5,TL),'PETERSEN'
    2     // EXEC FORTVCLG,FVREGN=1024K,GOREGN=512K,PARM=NOTRMFLG
    3     XXFORTVCLG PROC FVPGM=FORTVS,FVREGN=1200K,FVPDECK=NODECK,               +00001000
          XX             FVPOLST=NOLIST,FVPOPT=0,FVTERM='SYSOUT=A',GOREGN=100K,   +00002000
          XX             FVLNSPC='3200,(25,6)',                                   +00003000
          XX             GOF5DD='DDNAME=SYSIN',GOF6DD='SYSOUT=A',                 +00004000
          XX             GOF7DD='SYSOUT=B'                                         00005000
          ***                                                                      00006000
          ***            PARAMETER  DEFAULT-VALUE      USAGE                       00007000
          ***                                                                      00008000
          ***              FVPGM    FORTVS             COMPILER NAME               00009000
          ***              FVREGN   1200K              FORT-STEP REGION            00010000
          ***              FVPDECK  NODECK             COMPILER DECK OPTION        00011000
          ***              FVPOLST  NOLIST             COMPILER LIST OPTION        00012000
          ***              FVPOPT   0                  COMPILER OPTIMIZATION       00013000
          ***              FVTERM   SYSOUT=A           FORT.SYSTERM OPERAND        00014000
          ***              FVLNSPC  3200,(25,6)        FORT.SYSLIN SPACE           00015000
          ***              GOREGN   100K               GO-STEP REGION              00016000
          ***              GOF5DD   DDNAME=SYSIN       GO.FT05F001 OPERAND         00017000
          ***              GOF6DD   SYSOUT=A           GO.FT06F001 OPERAND         00018000
          ***              GOF7DD   SYSOUT=B           GO.FT07F001 OPERAND         00019000
          ***                                                                      00020000
    4     XXFORT    EXEC PGM=&FVPGM,REGION=&FVREGN,COND=(4,LT),                   +00021000
          XX             PARM='&FVPDECK,&FVPOLST,OPT(&FVPOPT),GOSTMT'              00022000
    5     XXSTEPLIB      DD   DSN=USR.X069.SG.FORTVS,DISP=SHR                      00023000
    6     XXSYSPRINT     DD SYSOUT=A,DCB=BLKSIZE=3429                              00024000
    7     XXSYSTERM      DD &FVTERM                                                00025000
    8     XXSYSPUNCH     DD SYSOUT=B,DCB=BLKSIZE=3200                              00026000
    9     XXSYSLIN       DD DSN=&&LOADSET,DISP=(MOD,PASS),UNIT=SYSDA,             +00027000
          XX             SPACE=(&FVLNSPC),DCB=BLKSIZE=3200                         00028000
   10     //FORT.SYSIN DD *,DCB=BLKSIZE=80
   11     XXLKED    EXEC PGM=IEWL,REGION=200K,COND=(4,LT),                        +00029000
          XX             PARM='LET,LIST,MAP,XREF'                                  00030000
   12     XXSYSPRINT     DD SYSOUT=A                                               00031000
   13     XXSYSLIB    DD  DSN=USR.X069.SG.FORTLIBV,DISP=SHR                        00032000
   14     XX          DD  DSN=SYS1.DPCLIB,DISP=SHR                                 00033000
   15     XX          DD  DSN=SYS1.SSPLIB,DISP=SHR                                 00034000
   16     XX          DD  DSN=SYSDPC.PLOTLIB,DISP=SHR                              00035000
   17     XX          DD  DSN=SYSDPC.IMSLS.LOAD,DISP=SHR                           00036000
   18     XX          DD  DSN=SYSDPC.IMSLS.LOAD,DISP=SHR                           00037000
   19     XXSYSUT1       DD UNIT=SYSDA,SPACE=(1024,(200,20))                       00038000
   20     XXSYSLMOD      DD DSN=&&GOSET(MAIN),DISP=(,PASS),UNIT=SYSDA,            +00039000
          XX             SPACE=(TRK,(10,10,1),RLSE)                                00040000
   21     XXSYSLIN       DD DSN=&&LOADSET,DISP=(OLD,DELETE)                        00041000
   22     XX             DD DDNAME=SYSIN                                           00042000
   23     XXGO      EXEC PGM=*.LKED.SYSLMOD,REGION=&GOREGN,COND=(4,LT)             00043000
   24     XXSTEPLIB DD   DSN=USR.X069.SG.FORTLIBV,DISP=SHR                         00044000
   25     XXFT05F001     DD &GOF5DD                                                00045000
   26     XXFT06F001     DD &GOF6DD                                                00046000
   27     XXFT07F001     DD &GOF7DD                                                00047000
   28     //GO.SYSIN DD *,DCB=BLKSIZE=80
```

```
//GO.FT01F001 DD DSN=USR.W348.TL.RUNDATA,DISP=SHR
//GO.FT02F001 DD DSN=USR.W348.TL.OUTDATA,DISP=OLD
```

```
    4      IEF653I SUBSTITUTION JCL - PGM=FORTVS,REGION=1024K,COND=(4,LT),
    4      IEF653I SUBSTITUTION JCL - PARM='NODECK,NOLIST,OPT(0),GOSTMT'
    7      IEF653I SUBSTITUTION JCL - SYSOUT=A
    9      IEF653I SUBSTITUTION JCL - SPACE=(3200,(25,6)),DCB=BLKSIZE=3200
   23      IEF653I SUBSTITUTION JCL - PGM=*.LKED.SYSLMOD,REGION=512K,COND=(4,LT)
   25      IEF653I SUBSTITUTION JCL - DDNAME=SYSIN
   26      IEF653I SUBSTITUTION JCL - SYSOUT=A
   27      IEF653I SUBSTITUTION JCL - SYSOUT=B
   23      IEF686I DDNAME REFERRED TO ON DDNAME KEYWORD IN PRIOR STEP WAS NOT RESOLVEI
IEF236I ALLOC. FOR TRUCKLN FORT
IEF237I A4E  ALLOCATED TO STEPLIB
IEF237I A76  ALLOCATED TO SYS01512
IEF237I JES3 ALLOCATED TO SYSPRINT
IEF237I JES3 ALLOCATED TO SYSTERM
IEF237I JES3 ALLOCATED TO SYSPUNCH
IEF237I 18A  ALLOCATED TO SYSLIN
IEF237I JES3 ALLOCATED TO SYSIN
IEF142I TRUCKLN FORT - STEP WAS EXECUTED - COND CODE 0000     <--------------------------------------------------N O T E
IEF285I   USR.X069.SG.FORTVS                          KEPT
IEF285I   VOL SER NOS= LIB004.
IEF285I   SYSCTLG.VUSER4S                             KEPT
IEF285I   VOL SER NOS= USER4S.
IEF285I   FORT.SYSPRINT                               SYSOUT
IEF285I   FORT.SYSTERM                                SYSOUT
IEF285I   FORT.SYSPUNCH                               SYSOUT
IEF285I   SYS85240.T131550.RA000.TRUCKLN.LOADSET      PASSED
IEF285I   VOL SER NOS= WORK1A.
IEF285I   JESI0001                                    SYSIN
*****************************************************************************************************************
*                                                                                                               *
*   CALC CPU   NORMAL TIME   EXEC TIME    TCB TIME    SRB TIME  REGION SIZE  REGION USED  PAGING COUNT  DISK EXCPS  *
*    6.40 SEC    2.66 SEC    1.23 SEC    1.18 SEC    .05 SEC     1024K         976K           5            59   *
*                                                                                                               *
*  EXCP-UNIT   EXCP-UNIT   EXCP-UNIT   EXCP-UNIT   EXCP-UNIT   EXCP-UNIT   EXCP-UNIT                            *
*     1-A4E       0-D76       0-JES       0-JES       0-JES      59-18A       0-JES                             *
*                                                                                                               *
*****************************************************************************************************************
IEF236I ALLOC. FOR TRUCKLN LKED
IEF237I JES3 ALLOCATED TO SYSPRINT
IEF237I A4E  ALLOCATED TO SYSLIB
IEF237I 55C  ALLOCATED TO
IEF237I 55C  ALLOCATED TO
IEF237I A4C  ALLOCATED TO
IEF237I 544  ALLOCATED TO
IEF237I 544  ALLOCATED TO
IEF237I 55C  ALLOCATED TO SYS01516
IEF237I A76  ALLOCATED TO SYS01514
IEF237I 88A  ALLOCATED TO SYSUT1
IEF237I 88A  ALLOCATED TO SYSLMOD
IEF237I 18A  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO
IEF142I TRUCKLN LKED - STEP WAS EXECUTED - COND CODE 0000     <--------------------------------------------------N O T E
IEF285I   LKED.SYSPRINT                               SYSOUT
IEF285I   USR.X069.SG.FORTLIBV                        KEPT
IEF285I   VOL SER NOS= LIB004.
IEF285I   SYS1.DPCLIB                                 KEPT
IEF285I   VOL SER NOS= LIB001.
IEF285I   SYS1.SSPLIB                                 KEPT
IEF285I   VOL SER NOS= LIB001.
```

```
IEF285I   SYSDPC.PLOTLIB                              KEPT
IEF285I   VOL SER NOS= LIB002.
IEF285I   SYSDPC.IMSLS.LOAD                           KEPT
IEF285I   VOL SER NOS= LIB003.
IEF285I   SYSDPC.IMSLS.LOAD                           KEPT
IEF285I   VOL SER NOS= LIB003.
IEF285I   SYSCTLG.VLIB001                             KEPT
IEF285I   VOL SER NOS= LIB001.
IEF285I   SYSCTLG.VUSER4S                             KEPT
IEF285I   VOL SER NOS= USER4S.
IEF285I   SYS85240.T131550.RA000.TRUCKLN.R0000005     DELETED
IEF285I   VOL SER NOS= WORK2A.
IEF285I   SYS85240.T131550.RA000.TRUCKLN.GOSET        PASSED
IEF285I   VOL SER NOS= WORK2A.
IEF285I   SYS85240.T131550.RA000.TRUCKLN.LOADSET      DELETED
IEF285I   VOL SER NOS= WORK1A.
************************************************************************************************************
*                                                                                                          *
*   CALC CPU   NORMAL TIME   EXEC TIME    TCB TIME    SRB TIME  REGION SIZE  REGION USED  PAGING COUNT  DISK EXCPS   *
*    5.69 SEC     1.06 SEC     .49 SEC     .41 SEC     .08 SEC      200K         124K           2          616   *
*                                                                                                          *
*  EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT   *
*      0-JES      207-A4E        2-55C        0-55C        1-D4C        2-744        0-744        0-55C        0-D76   *
*                                                                                                          *
*  EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT                                                        *
*    172-88A      172-88A       60-18A        0-JES                                                        *
*                                                                                                          *
************************************************************************************************************
IEF236I ALLOC. FOR TRUCKLN GO
IEF237I 88A  ALLOCATED TO PGM=*.DD
IEF237I A4E  ALLOCATED TO STEPLIB
IEF237I A76  ALLOCATED TO SYS01518
IEF237I JES3 ALLOCATED TO FT05F001
IEF237I JES3 ALLOCATED TO FT06F001
IEF237I JES3 ALLOCATED TO FT07F001
IEF237I A63  ALLOCATED TO FT01F001
IEF237I 553  ALLOCATED TO FT02F001
IEF142I TRUCKLN GO - STEP WAS EXECUTED - COND CODE 0000     <-----------------------------------------------------N O T E
IEF285I   SYS85240.T131550.RA000.TRUCKLN.GOSET        KEPT
IEF285I   VOL SER NOS= WORK2A.
IEF285I   USR.X069.SG.FORTLIBV                        KEPT
IEF285I   VOL SER NOS= LIB004.
IEF285I   SYSCTLG.VUSER4S                             KEPT
IEF285I   VOL SER NOS= USER4S.
IEF285I   JESI0002                                    SYSIN
IEF285I   GO.FT06F001                                 SYSOUT
IEF285I   GO.FT07F001                                 SYSOUT
IEF285I   USR.W348.TL.RUNDATA                         KEPT
IEF285I   VOL SER NOS= USER44.
IEF285I   USR.W348.TL.OUTDATA                         KEPT
IEF285I   VOL SER NOS= USER47.
************************************************************************************************************
*                                                                                                          *
*   CALC CPU   NORMAL TIME   EXEC TIME    TCB TIME    SRB TIME  REGION SIZE  REGION USED   DISK EXCPS    EXCP-UNIT   *
*    3.60 SEC     1.12 SEC     .52 SEC     .51 SEC     .01 SEC      512K         168K            8        1-88A   *
*                                                                                                          *
*  EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT    EXCP-UNIT                 *
*      0-D4E        0-D76        0-JES        0-JES        0-JES        8-D63        0-553                 *
*                                                                                                          *
************************************************************************************************************
IEF237I 88A  ALLOCATED TO SYS00001
```

```
IEF285I   SYS85240.T131657.RA000.TRUCKLN.R0000001       KEPT
IEF285I   VOL SER NOS= WORK2A.
IEF285I   SYS85240.T131550.RA000.TRUCKLN.GOSET          DELETED
IEF285I   VOL SER NOS= WORK2A.
```

```
REQUESTED OPTIONS (EXECUTE): NOTRMFLG

OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C*****************************************************************
                  C*                                                               *
                  C*              TTI TRUCK LANE ANALYSIS PROGRAM                  *
                  C*                                                               *
                  C*              FORTRAN 77 VERSION OF 08/20/85                   *
                  C*                                                               *
                  C*                       PROJECT 2331                            *
                  C*                                                               *
                  C*****************************************************************
                  C
                  C          AUTHOR:           HARRY C. PETERSEN
                  C                            TEXAS TRANSPORTATION INSTITUTE
                  C                            TEXAS A&M UNIVERSITY SYSTEM
                  C                            COLLEGE STATION, TEXAS  77843
                  C          PHONE:            (409) 845 - 9881
                  C
                  C*****************************************************************
                  C
                  C  THIS PROGRAM OPERATES A SERIES OF SUBROUTINES TO EVALUATE THE
                  C  FEASIBILITY OF CONSTRUCTING EXCLUSIVE TRUCK LANES.  THE PROGRAM
                  C  WILL READ THE DATA FROM A WYLBUR FILE NAMED "RUNDATA" WHICH IS
                  C  PREPARED ACCORDING TO THE FORMAT STATEMENT NUMBER 100 IN THE
                  C APPROPRIATE INDEX SUBROUTINE. THIS MAIN PROGRAM CALLS THE DESIRED
                  C MODEL SUBROUTINE AND SETS THE OPTIONS ACCORDING TO THE FIRST
                  C LINE IN "RUNDATA". THE MODEL SUBROUTINE OPERATES THE PROGRAM BY
                  C CALLING AND LOOPING THE PROPER INDIVIDUAL SUBROUTINES, ALLOWING
                  C FLEXIBILITY OF ANALYSIS.
                  C
                  C ****************************************************************
                  C
                  C INITIALIZE PROGRAM VARIABLES AND ARRAY.
                  C
ISN       1             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       2             CHARACTER*26 TABB
ISN       3             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,PCTABL(2,7,5,4),
                       * LS,TS,GPS,GLS,OUT,CJ,VOLFLG
ISN       4             REAL MP1, MP2, MP3, K
ISN       5             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                       * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
ISN       6             INDEX = 0
ISN       7             ITRUK = 0
ISN       8             IGEOM = 0
ISN       9             END = 0
ISN      10             MP1 = 0.0
ISN      11             MP2 = 0.0
ISN      12             MP3 = 0.0
```

```
               *....*...1.........2.........3.........4.........5.........6.........7.*.......8

               C
               C ****************************************************************
               C
               C
               C THE FIRST LINE OF "RUNDATA" MUST CONTAIN FOUR INDICES. THE FIRST
               C IS "SMOOTH" AND MUST BE 00. THE SECOND IS LOOP, WHICH LOOPS
               C THE PROGRAM. USE 1 FOR SINGLE RUN, OR 8 FOR TRIPLE RUN. THE NEXT
               C IS MODEL (WHICH MODEL IS TO BE RUN). THE LAST IS OUT. IF OUT
               C IS ZERO, THERE IS NO FILE OUTPUT; 1 OUTPUTS INDICES ONLY TO THE
               C FILE "OUTDATA", WHILE 2 OUTPUTS ALL DATA ON TWO LINES. THE SECOND
               C LINE OF "RUNDATA" IS THE DESIRED 24-CHARACTER HEAD TO BE ECHO-
               C PRINTED DURING OUTPUT. THE REMAINDER OF THE "RUNDATA" FILE MUST
               C CORRESPOND TO THE INPUT FORMAT OF THE SELECTED INDEX SUBROUTINE.
               C
               C ****************************************************************
               C
 ISN     13          READ(01,25) SMOOTH, LOOP, MODEL, OUT
 ISN     14       25 FORMAT(4I2)
 ISN     15          DO 40 I = 1,5
 ISN     16          DO 30 J = 1,15
 ISN     17          A(I,J) = 0
 ISN     18       30 CONTINUE
 ISN     19       40 CONTINUE
 ISN     20          IF (SMOOTH.EQ.0) A(3,1) = 1
 ISN     22          IF (SMOOTH.EQ.0) A(5,1) = 1
               C
               C ****************************************************************
               C READ PASSENGER CAR EQUIVALENT TABLE INTO PCTABL ARRAY.
               C
 ISN     24          DO 401 I = 1,2
 ISN     25          DO 401 J = 1,7
 ISN     26          DO 401 K = 1,5
 ISN     27          DO 401 L = 1,4
 ISN     28          READ (05,410) PCTABL(I,J,K,L)
 ISN     29      410 FORMAT (I2)
 ISN     30      401 CONTINUE
               C ****************************************************************
               C
               C TEST: WRITE OUT PCTABL ARRAY
               C
               C
               C     DO 420 LS=1,2
               C     DO 420 GPS=1,7
               C     DO 420 GLS=1,5
               C     WRITE(06,421) LS,GPS,GLS,PCTABL(LS,GPS,GLS,1),
               C    * PCTABL(LS,GPS,GLS,2),PCTABL(LS,GPS,GLS,3),PCTABL(LS,GPS,GLS,4)
               C 421 FORMAT(1X,7I3)
 ISN     31      420 CONTINUE
               C
               C
               C****************************************************************
               C
               C THE FOLLOWING INPUT VARIABLES ARE USED:
               C     VOL    = ONE WAY VEHICLE COUNT PER DAY OR HOUR, UNADJUSTED.
               C     NTRUCK = NUMBER OF TRUCKS PER DAY, ONE WAY
               C     ITRUCK = INDEX OF PREDOMINANT TRUCK TYPE; NOT USED YET
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C              (ENTER ZERO FOR DEFAULT).
                C      MEDWID = MEDIAN WIDTH IN FEET
                C      GRADEP = MAXIMUM GRADE, PERCENT
                C      GRADEL = MAXIMUM GRADE LENGTH IN FEET
                C      NLANES = NUMBER OF LANES IN SINGLE PEAK DIRECTION.
                C      SHOWID = TOTAL WIDTH OF BOTH INSIDE SHOULDERS.
                C      PVTIX  = PAVEMENT TYPE INDEX AS FOLLOWS (NOT USED NOW):
                C              1 = CONCRETE
                C              2 = ASPHALT
                C              3 = OVERLAY
                C              4 = SEALCOAT
                C      ITERR  = TERRAIN INDEX: 1=FLAT, 2=ROLLING, 3=MOUNTAINOUS.
                C      LATOBS = DISTANCE FROM INSIDE LANE TO A LATERAL OBSTRUCTION.
                C      LOS    = LEVEL OF SERVICE INDEX AS FOLLOWS:
                C               1 = LOS A
                C               2 = LOS B
                C               3 = LOS C
                C               4 = LOS D
                C               5 = LOS E
                C               6 = LOS F
                C               0 CAUSES COMPUTER TO DEFAULT TO LOS C.
                C      OPASS  = INDEX OR WIDTH OF WORST OVERPASS IN HALF-MILE SEGMENT.
                C      BRIDGE = INDEX OF WORST BRIDGE IN HALF-MILE SEGMENT.
                C      OTHER  = INDEX OF WORST OTHER FEATURE IN HALF-MILE SEGMENT.
                C               A COMMENT SHOULD BE INSERTED TO IDENTIFY FEATURE.
                C      COMNT* = 24-CHARACTER COMMENT ABOUT SEGMENT.
                C
                C*****************************************************************
ISN     32            READ (01,12) HEAD
ISN     33         12 FORMAT (A20)
ISN     34            IF(MODEL.EQ.2) READ(01,08) K, PHF, FWD, FP, CJ, VOLFLG
ISN     36            IF(MODEL.EQ.5) READ(01,08) K, PHF, FWD, FP, CJ, VOLFLG
ISN     38          8 FORMAT(4F5.2,I4,I2)
ISN     39            READ (05,10) TABB
ISN     40         10 FORMAT (A26)
                C     WRITE (06,444) HEAD
                C 444 FORMAT (1X,A26)
                C 444 FORMAT (1X,A26)
                C     GOTO 108
ISN     41            IF (MODEL.EQ.1) CALL MSTR1 (HEAD,TABB,LOOP,MODEL,OUT)
ISN     43            IF (MODEL.EQ.2) CALL MSTR2 (HEAD,TABB,LOOP,MODEL,OUT,
                     * VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FWD,FP,CJ,VOLFLG,IFLAGG)
ISN     45            IF (MODEL.EQ.5) CALL MSTR5 (HEAD,TABB,LOOP,MODEL,OUT,
                     * VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FWD,FP,CJ,VOLFLG,IFLAGG)
ISN     47            IF (MODEL.EQ.8) CALL MSTR8 (HEAD,TABB,LOOP,MODEL,OUT)
ISN     49            END

*STATISTICS*   SOURCE STATEMENTS = 41, PROGRAM SIZE = 4828 BYTES, PROGRAM NAME = MAIN    PAGE:    1.

*STATISTICS*   NO DIAGNOSTICS GENERATED.

**MAIN** END OF COMPILATION 1 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                     OPT(O) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)       CHARLEN(500)     SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C ***************************************************************
                C
                C ***************************************************************
ISN       1           SUBROUTINE MSTR1 (HEAD,TABB,LOOP,MODEL,OUT)
                C
                C CONTROL SUBROUTINE MSTR1 CALLS THE FOLLOWING SUBROUTINES:
                C MODEL1, TABB3, LINE1 (AND OUT1 OR OUT2 IF FILE OUTPUT IS SELEC-
                C TED) IN A LOOP UNTIL ALL DATA IS USED. IT OUTPUTS A COMBINED
                C INDEX IN A SINGLE PASS THROUGH THE DATA.
                C
                C ***************************************************************
                C
ISN       2           CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3           CHARACTER*26 TABB
ISN       4           INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, SINDEX, PVTSCR, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,
                    * LS,TS,GPS,GLS,OUT
ISN       5           REAL MP1, MP2, MP3
ISN       6           COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                    * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
ISN       7           END = 0
ISN       8           CALL HEAD1 (HEAD, TABB)
ISN       9       107 CONTINUE
ISN      10           CALL MODEL1 (SINDEX, PVTSCR)
ISN      11           CALL TABB3 (TABB)
ISN      12           IF (END.EQ.1) GOTO 116
ISN      13           IF (OUT.EQ.1) CALL OUT1 (TABB)
ISN      15           IF (OUT.GE.2) CALL OUT2 (TABB, SINDEX, PVTSCR)
ISN      17           CALL LINE1 (TABB, SINDEX, PVTSCR)
ISN      18       116 CONTINUE
ISN      19           IF (END.EQ.0) GOTO 107
ISN      20           CALL SUMM1 (HEAD)
ISN      21       108 CONTINUE
ISN      22           END

*STATISTICS*   SOURCE STATEMENTS = 20, PROGRAM SIZE = 1864 BYTES, PROGRAM NAME = MSTR1    PAGE:     4.

*STATISTICS*   NO DIAGNOSTICS GENERATED.

**MSTR1** END OF COMPILATION 2 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C ************************************************************
                C
                C ************************************************************
ISN      1            SUBROUTINE MSTR2 (HEAD,TABB,LOOP,MODEL,OUT,
                     * VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FWD,FP,CJ,VOLFLG,IFLAGG)
                C
                C CONTROL SUBROUTINE MSTR2 CALLS THE FOLLOWING SUBROUTINES:
                C MODEL2, TABB4, LINE2 (AND OUT3 OR OUT4 IF FILE OUTPUT IS SELEC-
                C TED) IN A LOOP UNTIL ALL DATA IS USED. IT OUTPUTS V/C, V/C
                C WITHOUT TRUCKS, AND V/C IMPROVEMENT IN A SINGLE PASS THROUGH
                C THE DATA.
                C ************************************************************
                C
ISN      2            CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3            CHARACTER*26 TABB
ISN      4            INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,
                     * LS,TS,GPS,GLS,OUT,CJ,VOLFLG
ISN      5            REAL MP1, MP2, MP3, K, FWTABL(7,2)
ISN      6            COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
ISN      7            FW = 0
                C ************************************************************
                C
                C  READ FWTABL: VALUES OF FW BASED ON LANES, LATOBS (12' LANES)
                C
                C ************************************************************
ISN      8            DO 102 I = 1,7
ISN      9            READ(05,100)FWTABL(I,1), FWTABL(I,2)
ISN     10        100 FORMAT(2F5.2)
                C     WRITE(6,103)FWTABL(I,1), FWTABL(I,2)
                C 103 FORMAT(1X,2F6.2)
ISN     11        102 CONTINUE
ISN     12            IF(FWD.EQ.0.0)GOTO 106
ISN     13        104 DO 105 I = 1,7
ISN     14            FWTABL(I,1) = FWD
ISN     15            FWTABL(I,2) = FWD
ISN     16        105 CONTINUE
ISN     17        106 CONTINUE
                C
                C
ISN     18            END = 0
ISN     19            CALL HEAD2 (HEAD, TABB)
ISN     20        107 CONTINUE
ISN     21            CALL MODEL2 (VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FW,FP,CJ,VOLFLG,
                     * IFLAGG,FWTABL)
ISN     22            CALL TABB4 (TABB,VCIMPR)
ISN     23            IF (END.EQ.1) GOTO 116
ISN     24            IF (OUT.EQ.1) CALL OUT3 (TABB, VCAUTO, VCTRUK, VCIMPR)
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

ISN       26          IF (OUT.GE.2) CALL OUT4 (TABB, VCAUTO, VCTRUK, VCIMPR)
ISN       28          CALL LINE2 (TABB,VCAUTO,VCTRUK,VCIMPR,IFLAGG)
ISN       29     116  CONTINUE
ISN       30          IF (END.EQ.O) GOTO 107
ISN       31          CALL SUMM2 (HEAD)
ISN       32     108  CONTINUE
ISN       33          END

*STATISTICS*   SOURCE STATEMENTS = 31, PROGRAM SIZE = 2898 BYTES, PROGRAM NAME = MSTR2    PAGE:    5.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**MSTR2** END OF COMPILATION 3 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                       OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                 *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                 C
                 C ***************************************************************
                 C
                 C ***************************************************************
ISN       1            SUBROUTINE MSTR5 (HEAD,TABB,LOOP,MODEL,OUT,
                      * VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FWD,FP,CJ,VOLFLG,IFLAGG)
                 C
                 C CONTROL SUBROUTINE MSTR5 CALLS THE FOLLOWING SUBROUTINES:
                 C MODEL5 (WHICH CALLS TABB4, LINE5 & OUT5 IF FILE OUTPUT IS SELEC-
                 C TED) IN A LOOP UNTIL ALL DATA IS USED. IT OUTPUTS V/C, V/C
                 C WITHOUT TRUCKS, AND V/C IMPROVEMENT FOR 1985 THROUGH 2010 IN A
                 C SINGLE PASS THROUGH THE DATA, USING GROWTH FACTORS.
                 C ***************************************************************
                 C
ISN       2            CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3            CHARACTER*26 TABB
ISN       4            INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,
                      * LS,TS,GPS,GLS,OUT,CJ,VOLFLG
ISN       5            REAL MP1, MP2, MP3, K, FWTABL(7,2)
ISN       6            COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                      * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
ISN       7            FW = 0
                 C ***************************************************************
                 C
                 C  READ FWTABL: VALUES OF FW BASED ON LANES, LATOBS (12' LANES)
                 C
                 C ***************************************************************
ISN       8            DO 102 I = 1,7
ISN       9            READ(05,100)FWTABL(I,1), FWTABL(I,2)
ISN      10       100  FORMAT(2F5.2)
                 C      WRITE(6,103)FWTABL(I,1), FWTABL(I,2)
                 C 103  FORMAT(1X,2F6.2)
ISN      11       102  CONTINUE
ISN      12            IF(FWD.EQ.0.0)GOTO 106
ISN      13       104  DO 105 I = 1,7
ISN      14            FWTABL(I,1) = FWD
ISN      15            FWTABL(I,2) = FWD
ISN      16       105  CONTINUE
ISN      17       106  CONTINUE
                 C
                 C
ISN      18            END = 0
ISN      19       107  CONTINUE
ISN      20            CALL HEAD5 (HEAD, TABB)
ISN      21            CALL MODEL5 (VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FW,FP,CJ,VOLFLG,
                      * IFLAGG,FWTABL,OUT)
                 C
ISN      22            IF (END.EQ.1) GOTO 116
                 C      IF (OUT.EQ.1) CALL OUT5 (TABB, VCAUTO, VCTRUK, VCIMPR)
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C      IF (OUT.GE.2) CALL OUT4 (TABB, VCAUTO, VCTRUK, VCIMPR)
                C      CALL LINE2 (TABB,VCAUTO,VCTRUK,VCIMPR,IFLAGG)
ISN      23       116  CONTINUE
ISN      24            IF (END.EQ.O) GOTO 107
ISN      25            CALL SUMM2 (HEAD)
ISN      26       108  CONTINUE
ISN      27            END

*STATISTICS*   SOURCE STATEMENTS = 27, PROGRAM SIZE = 2466 BYTES, PROGRAM NAME = MSTR5    PAGE:    7.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**MSTR5** END OF COMPILATION 4 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG    SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS    FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                     *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                     C
                     C ***************************************************************
                     C
                     C ***************************************************************
ISN        1               SUBROUTINE MSTR8 (HEAD,TABB,LOOP,MODEL,OUT)
                     C
                     C CONTROL SUBROUTINE MSTR8 CALLS THE FOLLOWING SUBROUTINES:
                     C MODEL1, TABB1,2,&3, LINE1 (& OUT1 OR OUT2 IF FILE OUTPUT IS SEL-
                     C ECTED) IN NESTED LOOPS UNTIL ALL DATA IS USED. IT OUTPUTS INDICES
                     C  USING DATA DUPLICATED THREE TIMES IN "RUNDATA".
                     C
                     C ***************************************************************
                     C
ISN        2               CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN        3               CHARACTER*26 TABB
ISN        4               INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                         * SHOWID, SINDEX, PVTSCR, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                         * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,
                         * LS,TS,GPS,GLS,OUT
ISN        5               REAL MP1, MP2, MP3
ISN        6               COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                         * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                         * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                         * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
ISN        7               DO 108 LFLAG1 = 1,3
ISN        8               END = 0
ISN        9               CALL HEAD1 (HEAD, TABB)
ISN       10               IF (LFLAG1.EQ.1) WRITE (6,111)
ISN       12               IF (LFLAG1.EQ.2) WRITE (6,112)
ISN       14               IF (LFLAG1.EQ.3) WRITE (6,113)
ISN       16          111  FORMAT(85X,'GEOMETRIC INDEX')
ISN       17          112  FORMAT(85X,'TRUCK INDEX')
ISN       18          113  FORMAT(85X,'COMBINED INDEX')
ISN       19          107  CONTINUE
ISN       20               CALL MODEL1 (SINDEX, PVTSCR)
ISN       21               IF (LFLAG1.EQ.1) CALL TABB1 (TABB)
ISN       23               IF (LFLAG1.EQ.2) CALL TABB2 (TABB)
ISN       25               IF (LFLAG1.EQ.3) CALL TABB3 (TABB)
ISN       27               IF (END.EQ.1) GOTO 116
ISN       28               IF (OUT.EQ.1) CALL OUT1 (TABB)
ISN       30               IF (OUT.GE.2) CALL OUT2 (TABB, SINDEX, PVTSCR)
ISN       32               CALL LINE1 (TABB, SINDEX, PVTSCR)
ISN       33          116  CONTINUE
ISN       34               IF (END.EQ.0) GOTO 107
ISN       35               CALL SUMM1 (HEAD)
ISN       36          108  CONTINUE
ISN       37               END

*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 2514 BYTES, PROGRAM NAME = MSTR8    PAGE:    9.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**MSTR8** END OF COMPILATION 5 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(O) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C ************************************************************
                C
                C
                C************************************************************
ISN        1           SUBROUTINE HEAD1 (HEAD,TABB)
ISN        2           CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN        3           CHARACTER*26 TABB
ISN        4           INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN        5           REAL MP1, MP2, MP3
ISN        6           COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
ISN        7           WRITE (06,01) HEAD
ISN        8       01  FORMAT ('1',45X,'TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT',
                     * /,/,10X,'ANALYSIS OF ', A20, /,/)
ISN        9           IF(SMOOTH.EQ.0) WRITE(06,02)
ISN       11       02  FORMAT(90X,'INDEX IS NOT SMOOTHED',/,' MP    VOL  TRUCKS/I ',
                     * 'MEDW %GRADEL # SHW/I  PS/I LOS OP BR OT IGEOM ITRUK INDEX: -10',
                     * '   -5    0    5   10   COMMENTS',/,120('-'))
                C
ISN       12           RETURN
ISN       13           END

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1420 BYTES, PROGRAM NAME = HEAD1    PAGE:    10.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**HEAD1** END OF COMPILATION 6 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)       CHARLEN(500)      SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C***************************************************************
ISN        1             SUBROUTINE HEAD2 (HEAD,TABB)
ISN        2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN        3             CHARACTER*26 TABB
ISN        4             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN        5             REAL MP1, MP2, MP3
ISN        6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                       * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
ISN        7             WRITE (06,01) HEAD
ISN        8          01 FORMAT ('1',45X,'TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT',
                       * /,/,10X,'ANALYSIS OF ', A20, /,/)
ISN        9             WRITE(06,02)
ISN       10          02 FORMAT(87X,' IMPROVEMENT IN V/C  ',/,'  MP    PHV  TRUCKS %T %',
                       * 'GRADEL T  N LAT MEDW TW: -36 36-52 52+   V/C V/CA %V/C LOS70',
                       * '  0%   50% 100% 150% 200% OBS COMMENTS',/,132('-'))
                  C   .
ISN       11             RETURN
ISN       12             END

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = HEAD2    PAGE:   11.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**HEAD2** END OF COMPILATION 7 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                     OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)       CHARLEN(500)      SDUMP

               *....*...1.........2.........3.........4.........5.........6.........7.*.......8

               C
               C***************************************************************
ISN       1            SUBROUTINE HEAD5 (HEAD,TABB)
ISN       2            CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3            CHARACTER*26 TABB
ISN       4            INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5            REAL MP1, MP2, MP3
ISN       6            COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                    * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
ISN       7            WRITE (06,01) HEAD, MP1
ISN       8         01 FORMAT ('1',45X,'TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT',
                    * /,/,10X,'ANALYSIS OF ', A20, ' AT MILEPOST ', F5.1, /,/)
ISN       9            WRITE(06,02)
ISN      10         02 FORMAT(87X,' IMPROVEMENT IN V/C  ',/,'  YEAR  PHV  TRUCKS %T %',
                    * 'GRADEL T  N LAT MEDW TW: -36 36-52 52+   V/C V/CA %V/C LOS70',
                    * '  0%   50% 100% 150% 200% OBS COMMENTS',/,132('-'))
               C
ISN      11            RETURN
ISN      12            END

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1406 BYTES, PROGRAM NAME = HEAD5    PAGE:    12.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**HEAD5** END OF COMPILATION 8 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                     OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                   *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                   C
                   C **************************************************************
ISN      1                SUBROUTINE MODEL1 (SINDEX, PVTSCR)
ISN      2                CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3                CHARACTER*26 TABB
ISN      4                INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, SINDEX, PVTSCR, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN      5                REAL MP1, MP2, MP3
ISN      6                COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                        * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                   C **************************************************************
                   C
                   C  BEGIN ANALYSIS LOOP FOR A SINGLE HALF-MILE SEGMENT.
                   C
                   C **************************************************************
                   C
ISN      7           50   READ (01,100) MP1,VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADEL,
                        * NLANES,SHOWID,SINDEX,PVTSCR,PVTIX,LOS,OPASS,BRIDGE,OTHER,
                        * COMNT1
ISN      8          100   FORMAT (F5.1,2I6,I3,I4,I2,I6,I2,I3,I1,I3,I1,I2,3I3,A20)
ISN      9                IF (MP1.GE.999.0) END = 1
ISN     11                IF (END.EQ.1) RETURN
                   C
                   C **************************************************************
                   C
                   C CALCULATE GEOMETRIC, TRAFFIC, AND COMBINED INDICES.
                   C
                   C **************************************************************
                   C
ISN     13                NOLANE = 0
ISN     14                ITRUK = ((NTRUCK/NLANES)-1500)/110
ISN     15                IF (LOS.EQ.0) LOS = 3
                   C IF LOS=0, THE COMPUTER SIMPLY DEFAULTS TO LOS = 3.
                   C
ISN     17                IF (LOS.LE.2) ITRUK = -12
ISN     19                IF (LOS.GE.4) ITRUK = ITRUK + 4
                   C
ISN     21                OINDEX = OPASS
ISN     22                IF (BRIDGE.LE.OINDEX) OINDEX = BRIDGE
ISN     24                IF (OTHER.LE.OINDEX) OINDEX = OTHER
ISN     26                IF (OINDEX.EQ.-10) NOLANE = 1
ISN     28                TWIDTH = MEDWID + SHOWID
ISN     29                IF (TWIDTH.LT.36) INDEX = -10
ISN     31                IF (TWIDTH.LT.36) NOLANE = 1
ISN     33                IGEOM = 4 + OINDEX
ISN     34                IF (TWIDTH.GE.60) IGEOM = 6 + OINDEX
ISN     36                IGRADE = GRADEL*GRADEP/100
ISN     37                IF (IGRADE.GE.3000) IGEOM = 3 + IGEOM
ISN     39                IF (IGRADE.GE.6000) IGEOM = 5 + IGEOM
ISN     41                IF (NOLANE.EQ.1) IGEOM = -10
```

```
LEVEL 1.3.1 (FEB 1984)           VS FORTRAN          DATE: AUG 28, 1985    TIME: 13:15:56      NAME: MODEL1  PAGE:    14

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C COMBINE ITRUK (TRUCK TRAFFIC INDEX) WITH IGEOM (GEOMETRIC
                C INDEX) TO OBTAIN (OVERALL) INDEX FOR A SINGLE HALF MILE.
                C
ISN      43             INDEX = ITRUK + IGEOM
ISN      44             IF (NOLANE.EQ.1) INDEX = -10
                C
                C SET LIMITS FOR INDEX AT +- 10
                C
                C
ISN      46             IF (ITRUK.LE.-10) ITRUK = -10
ISN      48             IF (ITRUK.GE.10) ITRUK = 10
ISN      50             IF (IGEOM.LE.-10) IGEOM = -10
ISN      52             IF (IGEOM.GE.10) IGEOM = 10
ISN      54             IF (INDEX.LE.-10) INDEX = -10
ISN      56             IF (INDEX.GE.10) INDEX = 10
ISN      58             RETURN
ISN      59             END

*STATISTICS*   SOURCE STATEMENTS = 38, PROGRAM SIZE = 3430 BYTES, PROGRAM NAME = MODEL1    PAGE:   13.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**MODEL1** END OF COMPILATION 9 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE    TERM    OBJECT FIXED  NOTEST NOTRMFLG    SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)       CHARLEN(500)      SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C
                  C*************************************************************
                  C
                  C *************************************************************
ISN       1             SUBROUTINE MODEL2 (VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FW,FP,
                       * CJ,VOLFLG,IFLAGG,FWTABL)
ISN       2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3             CHARACTER*26 TABB
ISN       4             INTEGER VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADP,GRADEL,NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,PCTABL(2,7,5,4),GPS,GLS,
                       * LS,TS,CJ,VOLFLG
ISN       5             REAL MP1, MP2, MP3, K, FWTABL(7,2)
ISN       6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                       * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
                  C *************************************************************
                  C
                  C  BEGIN ANALYSIS LOOP FOR A SINGLE HALF-MILE SEGMENT.
                  C
                  C *************************************************************
                  C
ISN       7        50   READ (01,100) MP1,VOL,TRUCKS,ITRUCK,MEDWID,GRADEP,GRADEL,
                       * NLANES,SHOWID,ITERR,LATOBS,PVTIX,LOS,OPASS,BRIDGE,OTHER,
                       * COMNT1
ISN       8       100   FORMAT (F5.1,I5,F8.2,I2,I4,I2,I6,I2,I3,I1,I3,I1,I2,3I3,A20)
ISN       9             IF (MP1.GE.999.0) END = 1
ISN      11             IF (END.EQ.1) RETURN
ISN      13             IF(TRUCKS.LE.1.0) NTRUCK = IFIX((TRUCKS*VOL) + 0.5)
ISN      15             IF(TRUCKS.GT.1.0) NTRUCK = IFIX(TRUCKS + 0.5)
                  C
                  C
ISN      17             GRADP = GRADEP
ISN      18             IF (GRADP.GE.0) GOTO 52
ISN      19        51   GRADP = GRADEP*(-1)
ISN      20        52   CONTINUE
                  C
                  C
                  C *************************************************************
                  C
                  C CALCULATE V/C WITH & W/O TRUCKS, % IMPROVEMENT, & EVALUATION.
                  C
                  C PEAK HOURLY VOLUME IS ASSUMED TO BE K TIMES DAILY VOLUME.
                  C UNLESS VOLFLG = 1; THEN PHV IS SIMPLY READ AS "VOL" VARIABLE.
                  C NOTE: IF ITERR = 0, THE MODEL WILL CALCULATE PASSENGER CAR
                  C       EQUIVALENTS PER TRB CIRCULAR 281, JUNE, 1984. OTHERWISE,
                  C       USE 1 FOR FLAT, 2 FOR ROLLING, OR 3 FOR MOUNTAINOUS
                  C       TERRAIN. FLAT PCE = 1.7, ROLLING PCE = 4.0, AND MOUNTAIN-
                  C       OUS PCE = 8.0 FOR V/C CALCULATIONS WITH TRUCKS.
                  C
                  C *************************************************************
```

```
                    *....*...1.........2.........3.........4.........5.........6.........7.*.......8
                    C
ISN      21              NOLANE = 0
ISN      22              LS = 1
ISN      23              IF(NLANES.GE.3) LS = 2
ISN      25              NPC = VOL - NTRUCK
ISN      26              IFLAGG = 0
ISN      27              IF(GRADEL.EQ.0) GOTO 102
ISN      28          101 IF (ITERR.EQ.0) GOTO 105
ISN      29          102 ET = 1.7
ISN      30              IF (ITERR.EQ.2) ET = 4.0
ISN      32              IF (ITERR.EQ.3) ET = 8.0
ISN      34              GOTO 107
ISN      35          105 CONTINUE
ISN      36              GPS = IFIX(GRADP + 1.99)
ISN      37              IF (GPS.GE.7) GPS = 7
ISN      39              GLS = IFIX((GRADEL/1320.0) + 0.999)
ISN      40              IF (GLS.GE.5) GLS = 5
ISN      42              IF (GLS.LE.1) GLS = 1
ISN      44              TS = IFIX((100*NTRUCK/VOL)/2+0.99)
ISN      45              IF (TS.LE.1) TS = 1
ISN      47              IF (TS.GE.4) TS = 4
ISN      49              ET = PCTABL(LS,GPS,GLS,TS)
ISN      50          107 CONTINUE
                    C
                    C ***********************************************************
                    C
                    C IF VOLFLG=0, FIND PEAK HOURLY VOLUME BY MULTIPLYING VOL, NPC,
                    C & NTRUCK BY K. IF VOLFLG=1, PHV IS READ AS THE VARIABLE "VOL".
                    C
                    C ***********************************************************
                    C
ISN      51              IF(VOLFLG.EQ.1) GOTO 110
ISN      52          109 NPC = IFIX((NPC * K) + 0.5)
ISN      53              VOL = IFIX((VOL * K) + 0.5)
ISN      54              NTRUCK = IFIX((NTRUCK * K) + 0.5)
ISN      55          110 CONTINUE
ISN      56              V = VOL
ISN      57              PT = NTRUCK/(VOL * 1.0)
ISN      58              IF(TRUCKS.LE.1.0) PT = TRUCKS
ISN      60              FHV = 1.0/(1.0 + PT * (ET - 1.0))
ISN      61              SF = V/PHF
ISN      62              SFA = NPC/PHF
                    C
ISN      63              LAT = LATOBS
ISN      64              IF(LAT.LE.6) GOTO 120
ISN      65          119 LAT = 6
ISN      66          120 LATS = 7 - LAT
ISN      67              FW = FWTABL(LATS,LS)
ISN      68              VCAUTO = SFA/(CJ*NLANES*FW*FP)
ISN      69              VCTRUK = SF/(CJ*NLANES*FW*FHV*FP)
ISN      70              VCIMPR = ((VCTRUK - VCAUTO)/VCAUTO) * 100
ISN      71              TWIDTH = SHOWID + MEDWID - (OPASS + 3)
                    C
ISN      72              IF (TWIDTH.LT.36) NOLANE = 1
ISN      74              IGEOM = 4
ISN      75              IF (TWIDTH.GE.52) IGEOM = 8
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

ISN       77          IF (NOLANE.EQ.1) IGEOM = -10
                C
                C     WRITE (6,457) LS,GPS,GLS,TS,PCTABL(LS,GPS,GLS,TS)
                C457  FORMAT (1X,5I10)
                C
                C
                C ************************************************************
                C
                C                        SET WARNING FLAG
                C
                C ************************************************************
                C
ISN       79          IVC = IFIX((VCTRUK * 100) + 0.5)
ISN       80          IF(IVC.LT.54) IFLAGG = 1
ISN       82          IF(NOLANE.EQ.1) IFLAGG = 3
ISN       84          IF(IVC.GT.100) IFLAGG = 2
                C
ISN       86          RETURN
ISN       87          END

*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5830 BYTES, PROGRAM NAME = MODEL2    PAGE:    15

*STATISTICS*   NO DIAGNOSTICS GENERATED.

**MODEL2** END OF COMPILATION 10 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                 *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                 C
                 C
                 C***************************************************************
                 C
                 C ***************************************************************
ISN      1             SUBROUTINE MODEL5 (VCAUTO,VCTRUK,VCIMPR,PCTABL,K,PHF,FW,FP,
                     * CJ,VOLFLG,IFLAGG,FWTABL,OUT)
ISN      2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3             CHARACTER*26 TABB
ISN      4             INTEGER VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADP,GRADEL,NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,PCTABL(2,7,5,4),GPS,GLS,
                     * LS,TS,CJ,VOLFLG,OUT
ISN      5             REAL MP1, MP2, MP3, K, FWTABL(7,2)
ISN      6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE,MP1,MP2,MP3,COMNT1,COMNT2,COMNT3
                 C ***************************************************************
                 C
                 C  BEGIN ANALYSIS LOOP FOR A SINGLE HALF-MILE SEGMENT.
                 C
                 C ***************************************************************
                 C
ISN      7         50  READ (01,100) MP1,VOL,TRUCKS,ITRUCK,MEDWID,GRADEP,GRADEL,
                     * NLANES,SHOWID,ITERR,LATOBS,PVTIX,GF1,GF2,OPASS,OTHER,
                     * COMNT1
ISN      8        100  FORMAT (F5.1,I5,F8.2,I2,I4,I2,I6,I2,I3,I1,I3,I1,2F6.2,2I3,A20)
ISN      9             IF (MP1.GE.999.0) END = 1
ISN     11             IF (END.EQ.1) RETURN
ISN     13             IF(TRUCKS.LE.1.0) NTRUCK = IFIX((TRUCKS*VOL) + 0.5)
ISN     15             IF(TRUCKS.GT.1.0) NTRUCK = IFIX(TRUCKS + 0.5)
                 C
                 C
ISN     17             GRADP = GRADEP
ISN     18             IF (GRADP.GE.0) GOTO 52
ISN     19         51  GRADP = GRADEP*(-1)
ISN     20         52  CONTINUE
                 C
                 C
                 C ***************************************************************
                 C
                 C CALCULATE V/C WITH & W/O TRUCKS, % IMPROVEMENT, & EVALUATION.
                 C
                 C PEAK HOURLY VOLUME IS ASSUMED TO BE K TIMES DAILY VOLUME.
                 C UNLESS VOLFLG = 1; THEN PHV IS SIMPLY READ AS "VOL" VARIABLE.
                 C NOTE: IF ITERR = 0, THE MODEL WILL CALCULATE PASSENGER CAR
                 C       EQUIVALENTS PER TRB CIRCULAR 281, JUNE, 1984. OTHERWISE,
                 C       USE 1 FOR FLAT, 2 FOR ROLLING, OR 3 FOR MOUNTAINOUS
                 C       TERRAIN. FLAT PCE = 1.7, ROLLING PCE = 4.0, AND MOUNTAIN-
                 C       OUS PCE = 8.0 FOR V/C CALCULATIONS WITH TRUCKS.
                 C
                 C ***************************************************************
```

```
                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
ISN      21              NOLANE = 0
ISN      22              LS = 1
ISN      23              IF(NLANES.GE.3) LS = 2
ISN      25              NPC = VOL - NTRUCK
ISN      26              IFLAGG = 0
ISN      27              IF(GRADEL.EQ.0) GOTO 102
ISN      28          101 IF (ITERR.EQ.0) GOTO 105
ISN      29          102 ET = 1.7
ISN      30              IF (ITERR.EQ.2) ET = 4.0
ISN      32              IF (ITERR.EQ.3) ET = 8.0
ISN      34              GOTO 107
ISN      35          105 CONTINUE
ISN      36              GPS = IFIX(GRADP + 1.99)
ISN      37              IF (GPS.GE.7) GPS = 7
ISN      39              GLS = IFIX((GRADEL/1320.0) + 0.999)
ISN      40              IF (GLS.GE.5) GLS = 5
ISN      42              IF (GLS.LE.1) GLS = 1
ISN      44              TS = IFIX((100*NTRUCK/VOL)/2+0.99)
ISN      45              IF (TS.LE.1) TS = 1
ISN      47              IF (TS.GE.4) TS = 4
ISN      49              ET = PCTABL(LS,GPS,GLS,TS)
ISN      50          107 CONTINUE
                  C
                  C ***************************************************************
                  C
                  C IF VOLFLG=0, FIND PEAK HOURLY VOLUME BY MULTIPLYING VOL, NPC,
                  C & NTRUCK BY K. IF VOLFLG=1, PHV IS READ AS THE VARIABLE "VOL".
                  C
                  C ***************************************************************
                  C
ISN      51              IF(VOLFLG.EQ.1) GOTO 110
ISN      52          109 NPC = IFIX((NPC * K) + 0.5)
ISN      53              VOL = IFIX((VOL * K) + 0.5)
ISN      54              NTRUCK = IFIX((NTRUCK * K) + 0.5)
ISN      55          110 CONTINUE
ISN      56              V = VOL
ISN      57              PT = NTRUCK/(VOL * 1.0)
ISN      58              IF(TRUCKS.LE.1.0) PT = TRUCKS
ISN      60              FHV = 1.0/(1.0 + PT * (ET - 1.0))
ISN      61              SF = V/PHF
ISN      62              SFA = NPC/PHF
                  C
ISN      63              LAT = LATOBS
ISN      64              IF(LAT.LE.6) GOTO 120
ISN      65          119 LAT = 6
ISN      66          120 LATS = 7 - LAT
ISN      67              FW = FWTABL(LATS,LS)
ISN      68              VCAUTO = SFA/(CJ*NLANES*FW*FP)
ISN      69              VCTRUK = SF/(CJ*NLANES*FW*FHV*FP)
ISN      70              VCIMPR = ((VCTRUK - VCAUTO)/VCAUTO) * 100
ISN      71              TWIDTH = SHOWID + MEDWID - (OPASS + 3)
                  C
ISN      72              IF (TWIDTH.LT.36) NOLANE = 1
ISN      74              IGEOM = 4
ISN      75              IF (TWIDTH.GE.52) IGEOM = 8
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

ISN       77            IF (NOLANE.EQ.1) IGEOM = -10
                C
                C       WRITE (6,457) LS,GPS,GLS,TS,PCTABL(LS,GPS,GLS,TS)
                C457    FORMAT (1X,5I10)
                C
                C
                C ***************************************************************
                C
                C                            SET WARNING FLAG
                C
                C ***************************************************************
                C
ISN       79            IVC = IFIX((VCTRUK * 100) + 0.5)
ISN       80            IF(IVC.LT.54) IFLAGG = 1
ISN       82            IF(NOLANE.EQ.1) IFLAGG = 3
ISN       84            IF(IVC.GT.100) IFLAGG = 2
                C
ISN       86            RETURN
ISN       87            END

*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5882 BYTES, PROGRAM NAME = MODEL5    PAGE:   22.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**MODEL5** END OF COMPILATION 13 ******
```

```
LEVEL 1.3.1 (FEB 1984)            VS FORTRAN          DATE: AUG 28, 1985    TIME: 13:15:57                PAGE:   25

OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C
                C*****************************************************************
                C
                C
                C
                C ***************************************************************
ISN       1           SUBROUTINE TABB1 (TABB)
ISN       2           CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3           CHARACTER*26 TABB
ISN       4           INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5           REAL MP1, MP2, MP3
ISN       6           COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                C
                C ASSIGN THE PROPER PROFILE PRINT STRING TO "TABB", DEPENDING ON
                C THE VALUE OF "IGEOM".
                C
ISN       7           IF (IGEOM.EQ.(-10)) TABB = '    *    .    I    .    : '
ISN       9           IF (IGEOM.EQ.(-9)) TABB  = '    :*   .    I    .    : '
ISN      11           IF (IGEOM.EQ.(-8)) TABB  = '    : *  .    I    .    : '
ISN      13           IF (IGEOM.EQ.(-7)) TABB  = '    :  * .    I    .    : '
ISN      15           IF (IGEOM.EQ.(-6)) TABB  = '    :   *.    I    .    : '
ISN      17           IF (IGEOM.EQ.(-5)) TABB  = '    :    *    I    .    : '
ISN      19           IF (IGEOM.EQ.(-4)) TABB  = '    :    .*   I    .    : '
ISN      21           IF (IGEOM.EQ.(-3)) TABB  = '    :    . *  I    .    : '
ISN      23           IF (IGEOM.EQ.(-2)) TABB  = '    :    .  * I    .    : '
ISN      25           IF (IGEOM.EQ.(-1)) TABB  = '    :    .   *I    .    : '
ISN      27           IF (IGEOM.EQ.(0)) TABB   = '    :    .    *    .    : '
ISN      29           IF (IGEOM.EQ.(1)) TABB   = '    :    .    I*   .    : '
ISN      31           IF (IGEOM.EQ.(2)) TABB   = '    :    .    I *  .    : '
ISN      33           IF (IGEOM.EQ.(3)) TABB   = '    :    .    I  * .    : '
ISN      35           IF (IGEOM.EQ.(4)) TABB   = '    :    .    I   *.    : '
ISN      37           IF (IGEOM.EQ.(5)) TABB   = '    :    .    I    *    : '
ISN      39           IF (IGEOM.EQ.(6)) TABB   = '    :    .    I    .*   : '
ISN      41           IF (IGEOM.EQ.(7)) TABB   = '    :    .    I    . *  : '
ISN      43           IF (IGEOM.EQ.(8)) TABB   = '    :    .    I    .  * : '
ISN      45           IF (IGEOM.EQ.(9)) TABB   = '    :    .    I    .   *: '
ISN      47           IF (IGEOM.EQ.(10)) TABB  = '    :    .    I    .    * '
                C
ISN      49           RETURN
ISN      50           END

*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB1    PAGE:   25.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**TABB1** END OF COMPILATION 14 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS    FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C ****************************************************************
ISN       1           SUBROUTINE TABB2 (TABB)
ISN       2           CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3           CHARACTER*26 TABB
ISN       4           INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5           REAL MP1, MP2, MP3
ISN       6           COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                    * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                C
                C ASSIGN THE PROPER PROFILE PRINT STRING TO "TABB", DEPENDING ON
                C THE VALUE OF "ITRUK".
                C
ISN       7           IF (ITRUK.EQ.(-10)) TABB = '    *    .    I    .    : '
ISN       9           IF (ITRUK.EQ.(-9)) TABB  = '    :*   .    I    .    : '
ISN      11           IF (ITRUK.EQ.(-8)) TABB  = '    : *  .    I    .    : '
ISN      13           IF (ITRUK.EQ.(-7)) TABB  = '    :  * .    I    .    : '
ISN      15           IF (ITRUK.EQ.(-6)) TABB  = '    :   *.    I    .    : '
ISN      17           IF (ITRUK.EQ.(-5)) TABB  = '    :    *    I    .    : '
ISN      19           IF (ITRUK.EQ.(-4)) TABB  = '    :    .*   I    .    : '
ISN      21           IF (ITRUK.EQ.(-3)) TABB  = '    :    . *  I    .    : '
ISN      23           IF (ITRUK.EQ.(-2)) TABB  = '    :    .  * I    .    : '
ISN      25           IF (ITRUK.EQ.(-1)) TABB  = '    :    .   *I    .    : '
ISN      27           IF (ITRUK.EQ.(0)) TABB   = '    :    .    *    .    : '
ISN      29           IF (ITRUK.EQ.(1)) TABB   = '    :    .    I*   .    : '
ISN      31           IF (ITRUK.EQ.(2)) TABB   = '    :    .    I *  .    : '
ISN      33           IF (ITRUK.EQ.(3)) TABB   = '    :    .    I  * .    : '
ISN      35           IF (ITRUK.EQ.(4)) TABB   = '    :    .    I   *.    : '
ISN      37           IF (ITRUK.EQ.(5)) TABB   = '    :    .    I    *    : '
ISN      39           IF (ITRUK.EQ.(6)) TABB   = '    :    .    I    .*   : '
ISN      41           IF (ITRUK.EQ.(7)) TABB   = '    :    .    I    . *  : '
ISN      43           IF (ITRUK.EQ.(8)) TABB   = '    :    .    I    .  * : '
ISN      45           IF (ITRUK.EQ.(9)) TABB   = '    :    .    I    .   *: '
ISN      47           IF (ITRUK.EQ.(10)) TABB  = '    :    .    I    .    * '
                C
ISN      49           RETURN
ISN      50           END

*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB2    PAGE:   26.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**TABB2** END OF COMPILATION 15 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM    OBJECT FIXED   NOTEST NOTRMFLG    SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

               *....*...1.........2.........3.........4.........5.........6.........7.*.......8

               C
               C ***************************************************************
ISN      1            SUBROUTINE TABB3 (TABB)
ISN      2            CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3            CHARACTER*26 TABB
ISN      4            INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN      5            REAL MP1, MP2, MP3
ISN      6            COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                    * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
               C
               C ASSIGN THE PROPER PROFILE PRINT STRING TO "TABB", DEPENDING ON
               C THE VALUE OF "INDEX".
               C
ISN      7            IF (INDEX.EQ.(-10)) TABB = '    *    .    I    .    : '
ISN      9            IF (INDEX.EQ.(-9)) TABB  = '    :*   .    I    .    : '
ISN     11            IF (INDEX.EQ.(-8)) TABB  = '    : *  .    I    .    : '
ISN     13            IF (INDEX.EQ.(-7)) TABB  = '    :  * .    I    .    : '
ISN     15            IF (INDEX.EQ.(-6)) TABB  = '    :   *.    I    .    : '
ISN     17            IF (INDEX.EQ.(-5)) TABB  = '    :    *    I    .    : '
ISN     19            IF (INDEX.EQ.(-4)) TABB  = '    :    .*   I    .    : '
ISN     21            IF (INDEX.EQ.(-3)) TABB  = '    :    . *  I    .    : '
ISN     23            IF (INDEX.EQ.(-2)) TABB  = '    :    .  * I    .    : '
ISN     25            IF (INDEX.EQ.(-1)) TABB  = '    :    .   *I    .    : '
ISN     27            IF (INDEX.EQ.(0)) TABB   = '    :    .    *    .    : '
ISN     29            IF (INDEX.EQ.(1)) TABB   = '    :    .    I*   .    : '
ISN     31            IF (INDEX.EQ.(2)) TABB   = '    :    .    I *  .    : '
ISN     33            IF (INDEX.EQ.(3)) TABB   = '    :    .    I  * .    : '
ISN     35            IF (INDEX.EQ.(4)) TABB   = '    :    .    I   *.    : '
ISN     37            IF (INDEX.EQ.(5)) TABB   = '    :    .    I    *    : '
ISN     39            IF (INDEX.EQ.(6)) TABB   = '    :    .    I    .*   : '
ISN     41            IF (INDEX.EQ.(7)) TABB   = '    :    .    I    . *  : '
ISN     43            IF (INDEX.EQ.(8)) TABB   = '    :    .    I    .  * : '
ISN     45            IF (INDEX.EQ.(9)) TABB   = '    :    .    I    .   *: '
ISN     47            IF (INDEX.EQ.(10)) TABB  = '    :    .    I    .    * '
               C
ISN     49            RETURN
ISN     50            END

*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB3    PAGE:   27.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**TABB3** END OF COMPILATION 16 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                       OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C ***************************************************************
ISN       1             SUBROUTINE TABB4 (TABB,VCIMPR)
ISN       2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3             CHARACTER*26 TABB
ISN       4             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5             REAL MP1, MP2, MP3
ISN       6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                      * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                  C
                  C ASSIGN THE PROPER PROFILE PRINT STRING TO "TABB", DEPENDING ON
                  C THE VALUE OF "VCIMPR".
                  C
ISN       7                                     TABB  = ' -**:    .    I    .    : '
ISN       8             IF (VCIMPR.GE.000.0) TABB  = '    *    .    I    .    : '
ISN      10             IF (VCIMPR.GE.010.0) TABB  = '    :*   .    I    .    : '
ISN      12             IF (VCIMPR.GE.020.0) TABB  = '    : *  .    I    .    : '
ISN      14             IF (VCIMPR.GE.030.0) TABB  = '    :  * .    I    .    : '
ISN      16             IF (VCIMPR.GE.040.0) TABB  = '    :   *.    I    .    : '
ISN      18             IF (VCIMPR.GE.050.0) TABB  = '    :    *    I    .    : '
ISN      20             IF (VCIMPR.GE.060.0) TABB  = '    :    .*   I    .    : '
ISN      22             IF (VCIMPR.GE.070.0) TABB  = '    :    . *  I    .    : '
ISN      24             IF (VCIMPR.GE.080.0) TABB  = '    :    .  * I    .    : '
ISN      26             IF (VCIMPR.GE.090.0) TABB  = '    :    .   *I    .    : '
ISN      28             IF (VCIMPR.GE.100.0) TABB  = '    :    .    *    .    : '
ISN      30             IF (VCIMPR.GE.110.0) TABB  = '    :    .    I*   .    : '
ISN      32             IF (VCIMPR.GE.120.0) TABB  = '    :    .    I *  .    : '
ISN      34             IF (VCIMPR.GE.130.0) TABB  = '    :    .    I  * .    : '
ISN      36             IF (VCIMPR.GE.140.0) TABB  = '    :    .    I   *.    : '
ISN      38             IF (VCIMPR.GE.150.0) TABB  = '    :    .    I    *    : '
ISN      40             IF (VCIMPR.GE.160.0) TABB  = '    :    .    I    .*   : '
ISN      42             IF (VCIMPR.GE.170.0) TABB  = '    :    .    I    . *  : '
ISN      44             IF (VCIMPR.GE.180.0) TABB  = '    :    .    I    .  * : '
ISN      46             IF (VCIMPR.GE.190.0) TABB  = '    :    .    I    .   *: '
ISN      48             IF (VCIMPR.GE.200.0) TABB  = '    :    .    I    .    * '
                  C
ISN      50             RETURN
ISN      51             END

*STATISTICS*    SOURCE STATEMENTS = 30, PROGRAM SIZE = 4040 BYTES, PROGRAM NAME = TABB4    PAGE:    28.

*STATISTICS*     NO DIAGNOSTICS GENERATED.

**TABB4** END OF COMPILATION 17 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                     OPT(O) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                     *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                     C
                     C *****************************************************************
ISN        1               SUBROUTINE LINE1 (TABB, SINDEX, PVTSCR)
ISN        2               CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN        3               CHARACTER*26 TABB
ISN        4               INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                         * SHOWID, SINDEX, PVTSCR, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                         * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN        5               REAL MP1, MP2, MP3
ISN        6               COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                         * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                         * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                         * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                     C*****************************************************************
                     C
                     C PRINT OUT RESULTS FOR A SINGLE HALF-MILE SEGMENT.
                     C
ISN        7               WRITE (06,1000) MP1,VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADEL,
                         * NLANES,SHOWID,SINDEX,PVTSCR,PVTIX,LOS,OPASS,BRIDGE,OTHER,
                         * IGEOM,ITRUK, INDEX, TABB, COMNT1
ISN        8          1000 FORMAT (1X,F5.1,2I6,I2,I4,I3,I6,I2,4I3,I4,3I3,3I6,A26,A20)
ISN        9               RETURN
ISN       10               END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1366 BYTES, PROGRAM NAME = LINE1    PAGE:   29.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**LINE1** END OF COMPILATION 18 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                    *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                    C
                    C ***************************************************************
ISN      1                SUBROUTINE LINE2 (TABB,VCAUTO,VCTRUK,VCIMPR,IFLAGG)
ISN      2                CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3                CHARACTER*26 TABB
ISN      4                CHARACTER*1 LOSALL
ISN      5                CHARACTER*1 LOSCAR
ISN      6                CHARACTER*17 WTAB
ISN      7                INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH, PCT
ISN      8                REAL MP1, MP2, MP3
ISN      9                COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                        * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                    C
ISN     10                IVC = IFIX(VCIMPR + 0.5)
                    C
                    C***************************************************************
                    C
                    C DETERMINE % TRUCKS AND LOS WITH & WITHOUT TRUCKS
                    C
                    C ***************************************************************
                    C
ISN     11                PCT = IFIX(((NTRUCK*100.0)/VOL) + 0.5)
ISN     12                LOSALL = 'A'
ISN     13                IF(VCTRUK.GT.0.355) LOSALL = 'B'
ISN     15                IF(VCTRUK.GT.0.545) LOSALL = 'C'
ISN     17                IF(VCTRUK.GT.0.775) LOSALL = 'D'
ISN     19                IF(VCTRUK.GT.0.935) LOSALL = 'E'
ISN     21                IF(VCTRUK.GT.1.005) LOSALL = 'F'
                    C
ISN     23                LOSCAR = 'A'
ISN     24                IF(VCAUTO.GT.0.355) LOSCAR = 'B'
ISN     26                IF(VCAUTO.GT.0.545) LOSCAR = 'C'
ISN     28                IF(VCAUTO.GT.0.775) LOSCAR = 'D'
ISN     30                IF(VCAUTO.GT.0.935) LOSCAR = 'E'
ISN     32                IF(VCAUTO.GT.1.005) LOSCAR = 'F'
                    C
                    C ***************************************************************
                    C
                    C  SET VALUE FOR WTAB (TOTAL MEDIAN WIDTH TAB)
                    C
                    C ***************************************************************
                    C
ISN     34                WTAB = '  : * .   .   :  '
ISN     35                IF(TWIDTH.GE.36) WTAB = '  :   . * .   :  '
ISN     37                IF(TWIDTH.GT.52) WTAB = '  :   .   . * :  '
                    C
                    C ***************************************************************
                    C
                    C SET PRINT FLAGS WHERE TRUCK LANES ARE INFEASIBLE OR NOT WARRANTED.
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C ***************************************************************
                C
ISN     39            IF(IFLAGG.EQ.1) TABB = '    :- - . - -I- - . - -: '
ISN     41            IF(IFLAGG.EQ.2) TABB = '    : #### LOS = F #### : '
ISN     43            IF(IFLAGG.EQ.3) TABB = '    : MEDIAN TOO NARROW : '
                C
                C ***************************************************************
                C
                C
                C PRINT OUT RESULTS FOR A SINGLE HALF-MILE SEGMENT.
                C
                C ***************************************************************
ISN     45            WRITE (06,1000) MP1,VOL,NTRUCK,PCT,GRADEP,GRADEL,ITERR,NLANES,
                    * LATOBS,MEDWID,TWIDTH,WTAB,VCTRUK,VCAUTO,IVC,LOSALL,LOSCAR,
                    * TABB,OTHER,COMNT1
ISN     46       1000 FORMAT (1X,F5.1,2I6,I4,I3,I5,I2,I3,3I4,A17,F4.2,1X,F4.2,I4,
                    * 2X,A1,':',A1,A26,I3,1X,A20)
ISN     47            RETURN
ISN     48            END

*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3708 BYTES, PROGRAM NAME = LINE2    PAGE:   30.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**LINE2** END OF COMPILATION 19 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)       CHARLEN(500)      SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C
                C *************************************************************
ISN      1             SUBROUTINE LINE5 (TABB,VCAUTO,VCTRUK,VCIMPR,IFLAGG,YEAR)
ISN      2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3             CHARACTER*26 TABB
ISN      4             CHARACTER*1 LOSALL
ISN      5             CHARACTER*1 LOSCAR
ISN      6             CHARACTER*17 WTAB
ISN      7             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH, PCT,YEAR
ISN      8             REAL MP1, MP2, MP3
ISN      9             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                C
ISN     10             IVC = IFIX(VCIMPR + 0.5)
                C
                C*************************************************************
                C
                C DETERMINE % TRUCKS AND LOS WITH & WITHOUT TRUCKS
                C
                C *************************************************************
                C
ISN     11             PCT = IFIX(((NTRUCK*100.0)/VOL) + 0.5)
ISN     12             LOSALL = 'A'
ISN     13             IF(VCTRUK.GT.0.355) LOSALL = 'B'
ISN     15             IF(VCTRUK.GT.0.545) LOSALL = 'C'
ISN     17             IF(VCTRUK.GT.0.775) LOSALL = 'D'
ISN     19             IF(VCTRUK.GT.0.935) LOSALL = 'E'
ISN     21             IF(VCTRUK.GT.1.005) LOSALL = 'F'
                C
ISN     23             LOSCAR = 'A'
ISN     24             IF(VCAUTO.GT.0.355) LOSCAR = 'B'
ISN     26             IF(VCAUTO.GT.0.545) LOSCAR = 'C'
ISN     28             IF(VCAUTO.GT.0.775) LOSCAR = 'D'
ISN     30             IF(VCAUTO.GT.0.935) LOSCAR = 'E'
ISN     32             IF(VCAUTO.GT.1.005) LOSCAR = 'F'
                C
                C *************************************************************
                C
                C  SET VALUE FOR WTAB (TOTAL MEDIAN WIDTH TAB)
                C
                C *************************************************************
                C
ISN     34             WTAB = '  : * .    .    :  '
ISN     35             IF(TWIDTH.GE.36) WTAB = '   :    . * .    :  '
ISN     37             IF(TWIDTH.GT.52) WTAB = '   :    .    . * :  '
                C
                C *************************************************************
                C
```

```
                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C SET PRINT FLAGS WHERE TRUCK LANES ARE INFEASIBLE OR NOT WARRANTED.
                C
                C ***************************************************************
                C
ISN       39          IF(IFLAGG.EQ.1) TABB = '    :- - . - -I- - . - -: '
ISN       41          IF(IFLAGG.EQ.2) TABB = '    : #### LOS = F #### : '
ISN       43          IF(IFLAGG.EQ.3) TABB = '    : MEDIAN TOO NARROW : '
                C
                C ***************************************************************
                C
                C
                C PRINT OUT RESULTS FOR A SINGLE YEAR
                C
                C ***************************************************************
ISN       45          WRITE (06,1000) YEAR,VOL,NTRUCK,PCT,GRADEP,GRADEL,ITERR,NLANES,
                     * LATOBS,MEDWID,TWIDTH,WTAB,VCTRUK,VCAUTO,IVC,LOSALL,LOSCAR,
                     * TABB,OTHER,COMNT1
ISN       46     1000  FORMAT (1X,I5,2I6,I4,I3,I5,I2,I3,3I4,A17,F4.2,1X,F4.2,I4,
                     * 2X,A1,':',A1,A26,I3,1X,A20)
ISN       47          RETURN
ISN       48          END

*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3736 BYTES, PROGRAM NAME = LINE5    PAGE:   32.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**LINE5** END OF COMPILATION 20 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  ) LINECOUNT(60)      CHARLEN(500)     SDUMP

                *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                C
                C *************************************************************
ISN       1             SUBROUTINE OUT1 (TABB)
ISN       2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3             CHARACTER*26 TABB
ISN       4             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5             REAL MP1, MP2, MP3
ISN       6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                     * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                     * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                     * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                C*************************************************************
                C
                C WRITE INDICES FOR A SINGLE HALF-MILE SEGMENT TO "OUTDATA" FILE.
                C
ISN       7             WRITE (02,1000) MP1, OINDEX, IGEOM, ITRUCK, INDEX
                C
                C
ISN       8       1000  FORMAT (1X,F5.1,4I4)
ISN       9             RETURN
ISN      10             END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1106 BYTES, PROGRAM NAME = OUT1    PAGE:   34.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT1** END OF COMPILATION 21 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C ***************************************************************
ISN       1              SUBROUTINE OUT2 (TABB, SINDEX, PVTSCR)
ISN       2              CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3              CHARACTER*26 TABB
ISN       4              INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX,TWIDTH,IGRADE,A(5,15),END,SMOOTH,SINDEX,PVTSCR
ISN       5              REAL MP1, MP2, MP3
ISN       6              COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                       * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                       * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                       * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                  C****************************************************************
                  C
                  C WRITE RESULTS FOR A SINGLE HALF-MILE SEGMENT TO "OUTDATA" FILE.
                  C
ISN       7              WRITE (02,1000) MP1,VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADEL,
                       * NLANES,SHOWID,SINDEX,PVTSCR,PVTIX,LOS,OPASS,BRIDGE,OTHER,IGEOM,
                       * OINDEX, ITRUK, INDEX, TABB, COMNT1
ISN       8        1000  FORMAT (1X,F5.1,2I6,I2,I4,I3,I6,I2,4I3,I4,3I3,/,4I6,A26,A20)
ISN       9              RETURN
ISN      10              END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = OUT2    PAGE:   35.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT2** END OF COMPILATION 22 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(O) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C ***************************************************************
ISN       1             SUBROUTINE OUT3 (TABB, VCAUTO, VCTRUK, VCIMPR)
ISN       2             CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3             CHARACTER*26 TABB
ISN       4             INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5             REAL MP1, MP2, MP3
ISN       6             COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                      * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                  C***************************************************************
                  C
                  C WRITE V/C'S FOR A SINGLE HALF-MILE SEGMENT TO "OUTDATA" FILE.
                  C
ISN       7             WRITE (02,1000) MP1, VCAUTO,VCTRUK,VCIMPR
                  C
                  C
ISN       8        1000 FORMAT (1X,3F5.2,F5.1)
ISN       9             RETURN
ISN      10             END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1182 BYTES, PROGRAM NAME = OUT3    PAGE:   36.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT3** END OF COMPILATION 23 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                  *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                  C
                  C ***************************************************************
ISN      1              SUBROUTINE OUT4 (TABB, VCAUTO, VCTRUK, VCIMPR)
ISN      2              CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN      3              CHARACTER*26 TABB
ISN      4              INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN      5              REAL MP1, MP2, MP3
ISN      6              COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                      * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                      * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                      * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                  C***************************************************************
                  C
                  C WRITE RESULTS FOR A SINGLE HALF-MILE SEGMENT TO "OUTDATA" FILE.
                  C
ISN      7              WRITE (02,1000) MP1,VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADEL,
                      * NLANES,SHOWID,ITERR,LATOBS,PVTIX,LOS,OPASS,BRIDGE,OTHER,IGEOM,
                      * OINDEX, ITRUK, INDEX, TABB, COMNT1
ISN      8        1000  FORMAT (1X,F5.1,2I6,I2,I4,I3,I6,I2,4I3,I4,3I3,4I6,A26,A20)
ISN      9              RETURN
ISN     10              END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1338 BYTES, PROGRAM NAME = OUT4    PAGE:   37.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT4** END OF COMPILATION 24 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)      SDUMP

                    *....*...1.........2.........3.........4.........5.........6.........7.*.......8

                    C
                    C ***************************************************************
ISN        1              SUBROUTINE OUT5 (TABB, VCAUTO, VCTRUK, VCIMPR, YEAR)
ISN        2              CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN        3              CHARACTER*26 TABB
ISN        4              INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH, YEAR
ISN        5              REAL MP1, MP2, MP3
ISN        6              COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                        * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                        * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                        * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
                    C***************************************************************
                    C
                    C WRITE RESULTS FOR A SINGLE YEAR TO "OUTDATA" FILE.
                    C
ISN        7              WRITE (02,1000) MP1,YEAR,VOL,NTRUCK,ITRUCK,MEDWID,GRADEP,GRADEL,
                        * NLANES,SHOWID,ITERR,LATOBS,PVTIX,LOS,OPASS,BRIDGE,OTHER,IGEOM,
                        * OINDEX, ITRUK, INDEX, TABB, COMNT1
ISN        8         1000 FORMAT (1X,F5.1,3I6,I2,I4,I3,I6,I2,4I3,I4,3I3,4I6,A26,A20)
ISN        9              RETURN
ISN       10              END

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1382 BYTES, PROGRAM NAME = OUT5    PAGE:   38.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT5** END OF COMPILATION 25 ******
```

```
LEVEL 1.3.1 (FEB 1984)            VS FORTRAN          DATE: AUG 28, 1985    TIME: 13:15:59                     PAGE:   39

OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG    SRCFLG NOSYM
                      OPT(0) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

               *....*...1.........2.........3.........4.........5.........6.........7.*.......8

               C
               C
               C ***************************************************************
ISN       1           SUBROUTINE SUMM1 (HEAD)
ISN       2           CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3           CHARACTER*26 TABB
ISN       4           INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5           REAL MP1, MP2, MP3
ISN       6           COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                    * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                    * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                    * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
ISN       7     1500  WRITE (6,1550)
ISN       8     1550 FORMAT (1X,/,' END OF FILE')
ISN       9           WRITE (06,1600) HEAD
ISN      10     1600  FORMAT('1',10X,'A SUMMARY SHEET FOR ', A20, ' WILL BE ',
                    * 'PRINTED ON THIS PAGE AT A LATER TIME.')
ISN      11           RETURN
ISN      12           END

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1242 BYTES, PROGRAM NAME = SUMM1    PAGE:   39.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**SUMM1** END OF COMPILATION 26 ******
```

```
OPTIONS IN EFFECT:  NOLIST NOMAP NOXREF   GOSTMT NODECK   SOURCE   TERM   OBJECT FIXED  NOTEST NOTRMFLG   SRCFLG NOSYM
                      OPT(O) LANGLVL(77) NOFIPS   FLAG(I)  NAME(MAIN  )  LINECOUNT(60)      CHARLEN(500)     SDUMP

               *....*...1.........2.........3.........4.........5.........6.........7.*.......8

               C
               C ****************************************************************
ISN       1          SUBROUTINE SUMM2 (HEAD)
ISN       2          CHARACTER*20 HEAD, COMNT1, COMNT2, COMNT3
ISN       3          CHARACTER*26 TABB
ISN       4          INTEGER VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                   * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                   * OINDEX, TWIDTH, IGRADE, A(5,15), END, SMOOTH
ISN       5          REAL MP1, MP2, MP3
ISN       6          COMMON VOL, NTRUCK, ITRUCK, MEDWID, GRADEP, GRADEL, NLANES,
                   * SHOWID, ITERR, LATOBS, PVTIX, LOS, OPASS, BRIDGE, OTHER,
                   * OINDEX, TWIDTH, IGRADE, A, END, SMOOTH, IGEOM, INDEX, ITRUK,
                   * NOLANE, MP1, MP2, MP3,COMNT1,COMNT2,COMNT3
ISN       7     1500  WRITE (6,1550)
ISN       8     1550 FORMAT (1X,/,' END OF FILE')
ISN       9          WRITE (06,1600) HEAD
ISN      10     1600  FORMAT('1',10X,'END OF ANALYSIS RUN FOR ', A20)
               C
ISN      11          RETURN
ISN      12          END

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1194 BYTES, PROGRAM NAME = SUMM2    PAGE:   40.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**SUMM2** END OF COMPILATION 27 ******
```

```
SUMMARY OF MESSAGES AND STATISTICS FOR ALL COMPILATIONS

*STATISTICS*   SOURCE STATEMENTS = 41, PROGRAM SIZE = 4828 BYTES, PROGRAM NAME = MAIN    PAGE:    1.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MAIN** END OF COMPILATION 1 ******
*STATISTICS*   SOURCE STATEMENTS = 20, PROGRAM SIZE = 1864 BYTES, PROGRAM NAME = MSTR1    PAGE:    4.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR1** END OF COMPILATION 2 ******
*STATISTICS*   SOURCE STATEMENTS = 31, PROGRAM SIZE = 2898 BYTES, PROGRAM NAME = MSTR2    PAGE:    5.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR2** END OF COMPILATION 3 ******
*STATISTICS*   SOURCE STATEMENTS = 27, PROGRAM SIZE = 2466 BYTES, PROGRAM NAME = MSTR5    PAGE:    7.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR5** END OF COMPILATION 4 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 2514 BYTES, PROGRAM NAME = MSTR8    PAGE:    9.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR8** END OF COMPILATION 5 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1420 BYTES, PROGRAM NAME = HEAD1    PAGE:   10.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD1** END OF COMPILATION 6 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = HEAD2    PAGE:   11.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD2** END OF COMPILATION 7 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1406 BYTES, PROGRAM NAME = HEAD5    PAGE:   12.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD5** END OF COMPILATION 8 ******
*STATISTICS*   SOURCE STATEMENTS = 38, PROGRAM SIZE = 3430 BYTES, PROGRAM NAME = MODEL1    PAGE:   13.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL1** END OF COMPILATION 9 ******
*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5830 BYTES, PROGRAM NAME = MODEL2    PAGE:   15.
```

```
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL2** END OF COMPILATION 10 ******
*STATISTICS*   SOURCE STATEMENTS = 36, PROGRAM SIZE = 3194 BYTES, PROGRAM NAME = MODEL3    PAGE:   18.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL3** END OF COMPILATION 11 ******
*STATISTICS*   SOURCE STATEMENTS = 36, PROGRAM SIZE = 3194 BYTES, PROGRAM NAME = MODEL4    PAGE:   20.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL4** END OF COMPILATION 12 ******
*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5882 BYTES, PROGRAM NAME = MODEL5    PAGE:   22.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL5** END OF COMPILATION 13 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB1    PAGE:   25.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB1** END OF COMPILATION 14 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB2    PAGE:   26.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB2** END OF COMPILATION 15 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB3    PAGE:   27.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB3** END OF COMPILATION 16 ******
*STATISTICS*   SOURCE STATEMENTS = 30, PROGRAM SIZE = 4040 BYTES, PROGRAM NAME = TABB4    PAGE:   28.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB4** END OF COMPILATION 17 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1366 BYTES, PROGRAM NAME = LINE1    PAGE:   29.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE1** END OF COMPILATION 18 ******
*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3708 BYTES, PROGRAM NAME = LINE2    PAGE:   30.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE2** END OF COMPILATION 19 ******
```

```
*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3736 BYTES, PROGRAM NAME = LINE5    PAGE:   32.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE5** END OF COMPILATION 20 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1106 BYTES, PROGRAM NAME = OUT1    PAGE:   34.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**OUT1** END OF COMPILATION 21 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = OUT2    PAGE:   35.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**OUT2** END OF COMPILATION 22 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1182 BYTES, PROGRAM NAME = OUT3    PAGE:   36.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**OUT3** END OF COMPILATION 23 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1338 BYTES, PROGRAM NAME = OUT4    PAGE:   37.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**OUT4** END OF COMPILATION 24 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1382 BYTES, PROGRAM NAME = OUT5    PAGE:   38.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**OUT5** END OF COMPILATION 25 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1242 BYTES, PROGRAM NAME = SUMM1    PAGE:   39.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**SUMM1** END OF COMPILATION 26 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1194 BYTES, PROGRAM NAME = SUMM2    PAGE:   40.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**SUMM2** END OF COMPILATION 27 ******
******* SUMMARY STATISTICS ******* 0 DIAGNOSTICS GENERATED. HIGHEST SEVERITY CODE IS 0.
```

```
VS FORTRAN COMPILER ENTERED.  13:15:55
*STATISTICS*   SOURCE STATEMENTS = 41, PROGRAM SIZE = 4828 BYTES, PROGRAM NAME = MAIN    PAGE:    1.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MAIN** END OF COMPILATION 1 ******
*STATISTICS*   SOURCE STATEMENTS = 20, PROGRAM SIZE = 1864 BYTES, PROGRAM NAME = MSTR1    PAGE:    4.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR1** END OF COMPILATION 2 ******
*STATISTICS*   SOURCE STATEMENTS = 31, PROGRAM SIZE = 2898 BYTES, PROGRAM NAME = MSTR2    PAGE:    5.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR2** END OF COMPILATION 3 ******
*STATISTICS*   SOURCE STATEMENTS = 27, PROGRAM SIZE = 2466 BYTES, PROGRAM NAME = MSTR5    PAGE:    7.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR5** END OF COMPILATION 4 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 2514 BYTES, PROGRAM NAME = MSTR8    PAGE:    9.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MSTR8** END OF COMPILATION 5 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1420 BYTES, PROGRAM NAME = HEAD1    PAGE:   10.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD1** END OF COMPILATION 6 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = HEAD2    PAGE:   11.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD2** END OF COMPILATION 7 ******
*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1406 BYTES, PROGRAM NAME = HEAD5    PAGE:   12.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**HEAD5** END OF COMPILATION 8 ******
*STATISTICS*   SOURCE STATEMENTS = 38, PROGRAM SIZE = 3430 BYTES, PROGRAM NAME = MODEL1    PAGE:   13.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL1** END OF COMPILATION 9 ******
*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5830 BYTES, PROGRAM NAME = MODEL2    PAGE:   15.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
```

```
**MODEL2** END OF COMPILATION 10 ******
*STATISTICS*   SOURCE STATEMENTS = 36, PROGRAM SIZE = 3194 BYTES, PROGRAM NAME = MODEL3    PAGE:   18.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL3** END OF COMPILATION 11 ******
*STATISTICS*   SOURCE STATEMENTS = 36, PROGRAM SIZE = 3194 BYTES, PROGRAM NAME = MODEL4    PAGE:   20.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL4** END OF COMPILATION 12 ******
*STATISTICS*   SOURCE STATEMENTS = 68, PROGRAM SIZE = 5882 BYTES, PROGRAM NAME = MODEL5    PAGE:   22.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**MODEL5** END OF COMPILATION 13 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB1    PAGE:   25.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB1** END OF COMPILATION 14 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB2    PAGE:   26.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB2** END OF COMPILATION 15 ******
*STATISTICS*   SOURCE STATEMENTS = 29, PROGRAM SIZE = 3906 BYTES, PROGRAM NAME = TABB3    PAGE:   27.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB3** END OF COMPILATION 16 ******
*STATISTICS*   SOURCE STATEMENTS = 30, PROGRAM SIZE = 4040 BYTES, PROGRAM NAME = TABB4    PAGE:   28.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**TABB4** END OF COMPILATION 17 ******
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1366 BYTES, PROGRAM NAME = LINE1    PAGE:   29.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE1** END OF COMPILATION 18 ******
*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3708 BYTES, PROGRAM NAME = LINE2    PAGE:   30.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE2** END OF COMPILATION 19 ******
*STATISTICS*   SOURCE STATEMENTS = 33, PROGRAM SIZE = 3736 BYTES, PROGRAM NAME = LINE5    PAGE:   32.
*STATISTICS*    NO DIAGNOSTICS GENERATED.
**LINE5** END OF COMPILATION 20 ******
```

```
*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1106 BYTES, PROGRAM NAME = OUT1    PAGE:   34.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT1** END OF COMPILATION 21 ******

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1374 BYTES, PROGRAM NAME = OUT2    PAGE:   35.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT2** END OF COMPILATION 22 ******

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1182 BYTES, PROGRAM NAME = OUT3    PAGE:   36.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT3** END OF COMPILATION 23 ******

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1338 BYTES, PROGRAM NAME = OUT4    PAGE:   37.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT4** END OF COMPILATION 24 ******

*STATISTICS*   SOURCE STATEMENTS = 10, PROGRAM SIZE = 1382 BYTES, PROGRAM NAME = OUT5    PAGE:   38.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**OUT5** END OF COMPILATION 25 ******

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1242 BYTES, PROGRAM NAME = SUMM1    PAGE:   39.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**SUMM1** END OF COMPILATION 26 ******

*STATISTICS*   SOURCE STATEMENTS = 12, PROGRAM SIZE = 1194 BYTES, PROGRAM NAME = SUMM2    PAGE:   40.

*STATISTICS*    NO DIAGNOSTICS GENERATED.

**SUMM2** END OF COMPILATION 27 ******
VS FORTRAN COMPILER EXITED.   13:15:59
```

```
 F64-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED   NONE
          DEFAULT OPTION(S) USED -  SIZE=(120832,24576)
****MAIN      DOES NOT EXIST BUT HAS BEEN ADDED TO DATA SET
AUTHORIZATION CODE IS         0.
```

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF FULL ADT DATA: I-35

MP	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
168.0	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	O	
168.5	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	O	
169.0	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	O	
169.5	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	O	
170.0	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	O	
170.5	2080	229	11	0	0	0	2	6	24	21	: * . . :	0.66	0.54	21	C:B	: MEDIAN TOO NARROW :	O	
171.0	2080	229	11	0	0	0	2	6	24	29	: * . . :	0.66	0.54	21	C:B	: MEDIAN TOO NARROW :	O	
171.5	1280	141	11	0	0	0	2	6	24	23	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	2MID
172.0	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	
172.5	1280	141	11	0	0	0	2	6	24	23	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	2MID
173.0	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	
173.5	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	
174.0	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	RIVER
174.5	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	RIVER
175.0	1280	141	11	0	0	0	2	6	24	29	: * . . :	0.41	0.33	21	B:A	: MEDIAN TOO NARROW :	O	
175.5	1313	144	11	0	0	0	2	6	24	29	: * . . :	0.42	0.34	21	B:A	: MEDIAN TOO NARROW :	O	
176.0	1313	144	11	0	0	0	2	6	44	49	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
176.5	1313	144	11	-3	1500	0	2	6	44	49	: . * . :	0.56	0.34	62	C:A	: .* I . :	O	
177.0	1313	144	11	0	0	0	2	6	44	43	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	2MID
177.5	1313	144	11	0	0	0	2	6	44	49	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
178.0	1313	144	11	-3	1500	0	2	6	44	43	: . * . :	0.56	0.34	62	C:A	: .* I . :	O	2MID
178.5	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
179.0	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
179.5	1313	144	11	-3	1600	0	2	6	48	53	: . . * :	0.56	0.34	62	C:A	: .* I . :	O	
180.0	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
180.5	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
181.0	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
181.5	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
182.0	1313	144	11	0	0	0	2	6	48	53	: . . * :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
182.5	1313	144	11	-3	1600	0	2	6	48	53	: . . * :	0.56	0.34	62	C:A	: .* I . :	O	
183.0	1313	144	11	0	0	0	2	6	44	49	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
183.5	1313	144	11	0	0	0	2	6	44	43	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	2MID
184.0	1313	144	11	0	0	0	2	6	44	49	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
184.5	1313	144	11	0	0	0	2	6	44	49	: . * . :	0.42	0.34	21	B:A	:- - . - -I- - . - -:	O	
185.0	1313	144	11	0	0	0	2	6	44	35	: * . . :	0.42	0.34	21	B:A	: MEDIAN TOO NARROW :	O	17%;6MI S N BRANFEL;
185.5	1313	144	11	4	1500	0	2	6	44	41	: . * . :	0.60	0.34	74	C:A	: . * I . :	O	
186.0	411	45	11	0	0	0	2	6	44	41	: . * . :	0.13	0.11	21	A:A	:- - . - -I- - . - -:	O	19%;RA 5MI S N BRAN;
186.5	411	45	11	0	0	0	2	6	44	41	: . * . :	0.13	0.11	21	A:A	:- - . - -I- - . - -:	O	
187.0	429	47	11	-2	2500	0	2	6	44	41	: . * . :	0.17	0.11	49	A:A	:- - . - -I- - . - -:	O	20%;30MI N SAN ANTO;
187.5	429	47	11	0	0	0	2	6	44	41	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
188.0	429	47	11	0	0	0	2	6	44	41	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
188.5	429	47	11	0	0	0	2	6	44	41	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
189.0	429	47	11	0	0	0	2	6	48	45	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
189.5	429	47	11	0	0	0	2	6	48	45	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
190.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
190.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
191.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
191.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
192.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
192.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
193.0	429	47	11	-4	1200	0	2	6	48	47	: . * . :	0.17	0.11	49	A:A	:- - . - -I- - . - -:	O	2 SETS OF 2 PIERS

193.5	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
194.0	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
194.5	429	47	11	4	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
195.0	429	47	11	5	1000	0	2	6	48	53	: . . * :	0.18	0.11	62	A:A	:- - . - -I- - . - -:	O	
195.5	429	47	11	-3	2300	0	2	6	48	47	: . * . :	0.18	0.11	62	A:A	:- - . - -I- - . - -:	O	2MID
196.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
196.5	429	47	11	0	0	0	2	6	48	47	: . * . :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	4 SETS OF 2 PIERS
197.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	RIVER
197.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
198.0	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
198.5	429	47	11	0	0	0	2	6	48	53	: . . * :	0.14	0.11	21	A:A	:- - . - -I- - . - -:	O	
199.0	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	17%;5MI S SN MR;INCD
199.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
200.0	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	2MID
200.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
201.0	423	42	10	1	4100	0	2	6	48	47	: . * . :	0.15	0.11	34	A:A	:- - . - -I- - . - -:	O	2MID
201.5	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
202.0	423	42	10	0	0	0	2	6	48	53	: . . * :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	
202.5	423	42	10	0	0	0	2	6	48	47	: . * . :	0.13	0.11	19	A:A	:- - . - -I- - . - -:	O	2MID
203.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
203.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
204.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
204.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	SAN MARCOS RIVER
205.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
205.5	1414	141	10	3	1500	0	2	6	48	53	: . . * :	0.58	0.37	56	C:B	: * I . :	O	
206.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	R/R
206.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
207.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
207.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
208.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	BLANCO RIVER
208.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
209.0	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
209.5	1414	141	10	0	0	0	2	6	48	53	: . . * :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	16%;5MI N SAN MARCOS
210.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
210.5	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	15%;20MI S AUS;2MID;
211.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
211.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
212.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
212.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
213.0	533	53	10	3	2000	0	2	6	48	53	: . . * :	0.22	0.14	55	A:A	:- - . - -I- - . - -:	O	
213.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
214.0	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
214.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
215.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
215.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
216.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	S FORK PLUM CREEK
216.5	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
217.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	PLUM CREEK
217.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
218.0	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
218.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
219.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
219.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
220.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
220.5	533	53	10	-1	4800	0	2	6	48	53	: . . * :	0.19	0.14	33	A:A	:- - . - -I- - . - -:	O	
221.0	533	53	10	0	0	0	2	6	48	47	: . * . :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	2MID
221.5	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
222.0	533	53	10	4	1700	0	2	6	48	53	: . . * :	0.24	0.14	67	A:A	:- - . - -I- - . - -:	O	
222.5	533	53	10	1	4700	0	2	6	48	53	: . . * :	0.19	0.14	33	A:A	:- - . - -I- - . - -:	O	
223.0	533	53	10	0	0	0	2	6	48	53	: . . * :	0.17	0.14	19	A:A	:- - . - -I- - . - -:	O	
223.5	1200	96	8	-4	1800	0	2	6	48	47	: . * . :	0.49	0.32	52	B:A	:- - . - -I- - . - -:	O	2MID

224.0	1200	96	8	0	0	0	2	6	51	56	: . . * :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	
224.5	1200	96	8	0	0	0	2	6	51	56	: . . * :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	
225.0	1200	96	8	5	3000	0	2	6	51	56	: . . * :	0.64	0.32	96	C:A	: . *I . :	O	ONION CREEK
225.5	1200	96	8	0	0	0	2	6	51	50	: . * . :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	2MID
226.0	1200	96	8	4	528	0	2	6	51	42	: . * . :	0.44	0.32	35	B:A	:- - . - -I- - . - -:	O	2MID
226.5	1200	96	8	0	0	0	2	6	51	48	: . * . :	0.37	0.32	15	B:A	:- - . - -I- - . - -:	O	SLAUGHTER CR
227.0	2160	173	8	0	0	0	2	6	51	48	: . * . :	0.67	0.58	15	C:C	:* . I . :	O	
227.5	2160	173	8	0	0	0	3	6	51	48	: . * . :	0.45	0.39	15	B:B	:- - . - -I- - . - -:	O	
228.0	2160	173	8	5	2000	0	3	6	51	48	: . * . :	0.59	0.39	52	C:B	: * I . :	O	
228.5	2160	173	8	-5	1600	0	3	6	51	48	: . * . :	0.59	0.39	52	C:B	: * I . :	O	
229.0	2160	173	8	0	0	0	3	6	51	48	: . * . :	0.45	0.39	15	B:B	:- - . - -I- - . - -:	O	
229.5	2160	173	8	5	1548	0	3	6	51	50	: . * . :	0.59	0.39	52	C:B	: * I . :	O	4MID
230.0	2160	173	8	5	1100	0	3	6	20	19	: * . . :	0.56	0.39	43	C:B	: MEDIAN TOO NARROW :	O	4MID
230.5	2160	173	8	-3	1500	0	3	6	20	25	: * . . :	0.56	0.39	43	C:B	: MEDIAN TOO NARROW :	O	
231.0	2160	173	8	0	0	0	3	6	20	25	: * . . :	0.45	0.39	15	B:B	: MEDIAN TOO NARROW :	O	WILLIAMSON CR
231.5	2160	173	8	0	0	0	3	6	20	25	: * . . :	0.45	0.39	15	B:B	: MEDIAN TOO NARROW :	O	
232.0	4360	349	8	4	1500	0	3	6	20	19	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	4MID
232.5	4360	349	8	0	0	0	3	6	20	25	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
233.0	4360	349	8	5	1100	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	NO PLANS?
233.5	4360	349	8	5	1000	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	
234.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	NO PLANS?
234.5	4360	349	8	-4	1584	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	
235.0	4360	349	8	6	1000	0	3	6	20	17	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	NO MED./NO E.H.
235.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
236.0	4360	349	8	4	1600	0	3	6	20	11	: * . . :	1.13	0.79	43	F:D	: #### LOS = F #### :	O	4MID
236.5	4360	349	8	-5	2600	0	3	6	20	17	: * . . :	1.20	0.79	52	F:D	: #### LOS = F #### :	O	NO PLANS?
237.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
237.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
238.0	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
238.5	4360	349	8	0	0	0	3	6	20	17	: * . . :	0.90	0.79	15	D:D	: MEDIAN TOO NARROW :	O	
239.0	4360	349	8	0	0	0	3	6	32	37	: . * . :	0.90	0.79	15	D:D	:* . I . :	O	
239.5	3760	301	8	3	2300	0	8	6	32	31	: * . . :	0.36	0.25	43	B:A	: MEDIAN TOO NARROW :	O	3MID
240.0	2800	224	8	0	0	0	8	6	32	37	: . * . :	0.22	0.19	15	A:A	:- - . - -I- - . - -:	O	
240.5	2800	224	8	-2	3000	0	8	6	32	37	: . * . :	0.27	0.19	43	A:A	:- - . - -I- - . - -:	O	
241.0	2800	224	8	0	0	0	8	6	32	37	: . * . :	0.22	0.19	15	A:A	:- - . - -I- - . - -:	O	
241.5	2800	224	8	-2	2700	0	8	6	32	37	: . * . :	0.27	0.19	43	A:A	:- - . - -I- - . - -:	O	
242.0	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
242.5	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
243.0	2800	224	8	0	0	0	3	6	54	53	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	4MID
243.5	2800	224	8	0	0	0	3	6	54	59	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	
244.0	2800	224	8	3	3200	0	3	6	54	59	: . . * :	0.72	0.51	43	C:B	: *. I . :	O	
244.5	2800	224	8	0	0	0	3	6	54	53	: . . * :	0.58	0.51	15	C:B	:* . I . :	O	3MID
245.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
245.5	1680	134	8	-5	1000	0	2	6	54	53	: . . * :	0.65	0.45	43	C:B	: *. I . :	O	2MID
246.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
246.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
247.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
247.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
248.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
248.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
249.0	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
249.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
250.0	1680	134	8	2	5000	0	2	6	54	53	: . . * :	0.65	0.45	43	C:B	: *. I . :	O	2MID
250.5	1680	134	8	0	0	0	2	6	54	59	: . . * :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
251.0	1680	134	8	0	0	0	2	6	44	49	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
251.5	1680	134	8	0	0	0	2	6	44	43	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	2MID
252.0	1680	134	8	0	0	0	2	6	44	49	: . * . :	0.52	0.45	15	B:B	:- - . - -I- - . - -:	O	
252.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
253.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
253.5	1603	128	8	0	0	0	2	6	44	43	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	17%;1MI N RONDROCK;2
254.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	

254.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
255.0	1603	128	8	0	0	0	2	6	44	43	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	2MID
255.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
256.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
256.5	1603	128	8	-2	3300	0	2	6	44	43	: . * . :	0.62	0.43	43	C:B	: *. I . :	O	2MID
257.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
257.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
258.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
258.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
259.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
259.5	1603	128	8	3	1600	0	2	6	44	49	: . * . :	0.62	0.43	43	C:B	: *. I . :	O	
260.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
260.5	1603	128	8	0	0	0	2	6	44	43	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	2MID
261.0	1603	128	8	0	0	0	2	6	44	43	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	2MID
261.5	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
262.0	1603	128	8	0	0	0	2	6	44	49	: . * . :	0.50	0.43	15	B:B	:- - . - -I- - . - -:	O	
262.5	960	173	18	0	0	0	2	6	44	43	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	2MID
263.0	960	173	18	0	0	0	2	6	44	49	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	
263.5	960	173	18	0	0	0	2	6	44	49	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	
264.0	960	173	18	0	0	0	2	6	44	49	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	
264.5	960	173	18	0	0	0	2	6	44	43	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	
265.0	960	173	18	0	0	0	2	6	44	49	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	3MID
265.5	960	173	18	2	3700	0	2	6	44	49	: . * . :	0.49	0.23	110	B:A	:- - . - -I- - . - -:	O	
266.0	960	173	18	0	0	0	2	6	44	49	: . * . :	0.32	0.23	37	A:A	:- - . - -I- - . - -:	O	
266.5	668	120	18	0	0	0	2	6	44	43	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	5 SETS OF 3 PIERS
267.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
267.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
268.0	668	120	18	-1	4600	0	2	6	44	49	: . * . :	0.27	0.16	66	A:A	:- - . - -I- - . - -:	O	
268.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
269.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
269.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
270.0	668	120	18	-2	3600	0	2	6	44	49	: . * . :	0.34	0.16	110	A:A	:- - . - -I- - . - -:	O	
270.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
271.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
271.5	668	120	18	-3	1700	0	2	6	44	43	: . * . :	0.34	0.16	110	A:A	:- - . - -I- - . - -:	O	2MID
272.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
272.5	668	120	18	-2	2700	0	2	6	44	49	: . * . :	0.34	0.16	110	A:A	:- - . - -I- - . - -:	O	
273.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
273.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
274.0	668	120	18	0	0	0	2	6	44	43	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	2MID
274.5	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
275.0	668	120	18	0	0	0	2	6	44	49	: . * . :	0.22	0.16	37	A:A	:- - . - -I- - . - -:	O	
275.5	595	107	18	0	0	0	2	6	44	49	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
276.0	595	107	18	0	0	0	2	6	44	49	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
276.5	595	107	18	0	0	0	2	6	48	53	: . . * :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
277.0	595	107	18	0	0	0	2	6	40	39	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	2MID
277.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
278.0	595	107	18	-5	1000	0	2	6	40	45	: . * . :	0.30	0.14	110	A:A	:- - . - -I- - . - -:	O	
278.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
279.0	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
279.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
280.0	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
280.5	595	107	18	0	0	0	2	6	40	39	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	2MID
281.0	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
281.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
282.0	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
282.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
283.0	595	107	18	-2	3500	0	2	6	40	39	: . * . :	0.30	0.14	110	A:A	:- - . - -I- - . - -:	O	32%;1 MI N PRARIE DE
283.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
284.0	595	107	18	0	0	0	2	6	40	31	: * . . :	0.20	0.14	37	A:A	: MEDIAN TOO NARROW :	O	2MID
284.5	595	107	18	0	0	0	2	6	40	37	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	

285.0	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
285.5	595	107	18	0	0	0	2	6	40	45	: . * . :	0.20	0.14	37	A:A	:- - . - -I- - . - -:	O	
286.0	595	107	18	0	0	0	2	6	28	33	: * . . :	0.20	0.14	37	A:A	: MEDIAN TOO NARROW :	O	
286.5	699	126	18	0	0	0	2	6	40	39	: . * . :	0.23	0.17	37	A:A	:- - . - -I- - . - -:	O	2MID
287.0	699	126	18	0	0	0	2	6	40	45	: . * . :	0.23	0.17	37	A:A	:- - . - -I- - . - -:	O	
287.5	699	126	18	0	0	0	2	6	40	45	: . * . :	0.23	0.17	37	A:A	:- - . - -I- - . - -:	O	
288.0	699	126	18	3	3000	0	2	6	40	39	: . * . :	0.39	0.17	132	B:A	:- - . - -I- - . - -:	O	2MID
288.5	699	126	18	-4	1300	0	2	6	40	45	: . * . :	0.32	0.17	88	A:A	:- - . - -I- - . - -:	O	
289.0	699	126	18	-5	1400	0	2	6	40	45	: . * . :	0.43	0.17	154	B:A	:- - . - -I- - . - -:	O	
289.5	699	126	18	4	1200	0	2	6	40	39	: . * . :	0.32	0.17	88	A:A	:- - . - -I- - . - -:	O	2MID
290.0	699	126	18	0	0	0	2	6	40	45	: . * . :	0.23	0.17	37	A:A	:- - . - -I- - . - -:	O	
290.5	699	126	18	0	0	0	2	6	40	39	: . * . :	0.23	0.17	37	A:A	:- - . - -I- - . - -:	O	2MID
291.0	699	126	18	4	1800	0	2	6	40	45	: . * . :	0.39	0.17	132	B:A	:- - . - -I- - . - -:	O	
291.5	768	138	18	0	0	0	3	6	40	39	: . * . :	0.17	0.12	37	A:A	:- - . - -I- - . - -:	O	2MID
292.0	768	138	18	0	0	0	3	6	40	45	: . * . :	0.17	0.12	37	A:A	:- - . - -I- - . - -:	O	
292.5	768	138	18	0	0	0	3	6	40	45	: . * . :	0.17	0.12	37	A:A	:- - . - -I- - . - -:	O	
293.0	1400	140	10	0	0	0	2	6	40	39	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	8MID
293.5	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
294.0	1400	140	10	0	0	0	2	6	40	39	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	4MID
294.5	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
295.0	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
295.5	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
296.0	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
296.5	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
297.0	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
297.5	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
298.0	1400	140	10	0	0	0	2	6	40	45	: . * . :	0.44	0.37	19	B:B	:- - . - -I- - . - -:	O	
298.5	1480	148	10	0	0	0	2	6	40	45	: . * . :	0.47	0.39	19	B:B	:- - . - -I- - . - -:	O	NO DETAIL PLANS
299.0	1480	148	10	5	1000	0	2	6	40	45	: . * . :	0.61	0.39	56	C:B	: * I . :	O	
299.5	1480	148	10	0	0	0	2	6	40	45	: . * . :	0.47	0.39	19	B:B	:- - . - -I- - . - -:	O	
300.0	1480	148	10	-5	1000	0	2	6	17	22	: * . . :	0.61	0.39	56	C:B	: MEDIAN TOO NARROW :	O	
300.5	1240	124	10	0	0	0	8	6	17	22	: * . . :	0.10	0.08	19	A:A	: MEDIAN TOO NARROW :	O	NO PLANS
301.0	1240	124	10	3	1600	0	8	6	17	22	: * . . :	0.13	0.08	56	A:A	: MEDIAN TOO NARROW :	O	
301.5	1240	124	10	0	0	0	2	6	17	16	: * . . :	0.39	0.33	19	B:A	: MEDIAN TOO NARROW :	O	4MID
302.0	1240	124	10	0	0	0	2	6	17	22	: * . . :	0.39	0.33	19	B:A	: MEDIAN TOO NARROW :	O	
302.5	1240	124	10	0	0	0	2	6	17	16	: * . . :	0.39	0.33	19	B:A	: MEDIAN TOO NARROW :	O	3MID;R/R
303.0	897	126	14	0	0	0	2	6	17	16	: * . . :	0.29	0.23	28	A:A	: MEDIAN TOO NARROW :	O	5MID
303.5	897	126	14	-4	2000	0	2	6	17	22	: * . . :	0.45	0.23	98	B:A	: MEDIAN TOO NARROW :	O	
304.0	897	126	14	4	1800	0	2	6	17	22	: * . . :	0.45	0.23	98	B:A	: MEDIAN TOO NARROW :	O	
304.5	897	126	14	0	0	0	2	6	40	45	: . * . :	0.29	0.23	28	A:A	:- - . - -I- - . - -:	O	
305.0	897	126	14	0	0	0	2	6	40	45	: . * . :	0.29	0.23	28	A:A	:- - . - -I- - . - -:	O	
305.5	897	126	14	0	0	0	2	6	40	45	: . * . :	0.29	0.23	28	A:A	:- - . - -I- - . - -:	O	24%;4MI N TEMPLE
306.0	897	126	14	0	0	0	2	6	40	45	: . * . :	0.29	0.23	28	A:A	:- - . - -I- - . - -:	O	
306.5	897	126	14	0	0	0	2	6	40	45	: . * . :	0.29	0.23	28	A:A	:- - . - -I- - . - -:	O	
307.0	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	2MID
307.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
308.0	850	119	14	-1	5800	0	2	6	40	45	: . * . :	0.35	0.21	65	A:A	:- - . - -I- - . - -:	O	
308.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
309.0	850	119	14	-5	1300	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	NO PLANS
309.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
310.0	850	119	14	-3	1600	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
310.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
311.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
311.5	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	2MID
312.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
312.5	850	119	14	-5	1900	0	2	6	40	45	: . * . :	0.46	0.21	114	B:A	:- - . - -I- - . - -:	O	
313.0	850	119	14	3	2000	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
313.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
314.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
314.5	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	3MID
315.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	

315.5	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	3MID
316.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
316.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
317.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
317.5	850	119	14	-2	2600	0	2	6	40	45	: . * . :	0.35	0.21	65	A:A	:- - . - -I- - . - -:	O	
318.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
318.5	850	119	14	-3	1800	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
319.0	850	119	14	2	3000	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
319.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
320.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
320.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
321.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
321.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
322.0	850	119	14	-4	1200	0	2	6	40	39	: . * . :	0.35	0.21	65	A:A	:- - . - -I- - . - -:	O	3MID
322.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
323.0	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	3MID
323.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
324.0	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
324.5	850	119	14	-5	1200	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
325.0	850	119	14	0	0	0	2	6	40	39	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	3MID
325.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
326.0	850	119	14	3	1700	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
326.5	850	119	14	0	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	27%;8.23MI S WACO
327.0	850	119	14	-3	2000	0	2	6	40	45	: . * . :	0.39	0.21	81	B:A	:- - . - -I- - . - -:	O	
327.5	850	119	14	4	1700	0	2	6	40	45	: . * . :	0.42	0.21	98	B:A	:- - . - -I- - . - -:	O	
328.0	850	119	14	4	1584	0	2	6	40	39	: . * . :	0.42	0.21	98	B:A	:- - . - -I- - . - -:	O	3MID
328.5	850	119	14	4	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
329.0	850	119	14	-5	1400	0	2	6	40	45	: . * . :	0.46	0.21	114	B:A	:- - . - -I- - . - -:	O	
329.5	850	119	14	4	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
330.0	850	119	14	4	0	0	2	6	40	45	: . * . :	0.27	0.21	28	A:A	:- - . - -I- - . - -:	O	
330.5	1320	132	10	0	0	0	2	6	40	39	: . * . :	0.42	0.35	19	B:A	:- - . - -I- - . - -:	O	3MID
331.0	1320	132	10	0	0	0	2	6	40	45	: . * . :	0.42	0.35	19	B:A	:- - . - -I- - . - -:	O	
331.5	1320	132	10	0	0	0	2	6	40	45	: . * . :	0.42	0.35	19	B:A	:- - . - -I- - . - -:	O	
332.0	1320	132	10	0	0	0	3	6	48	53	: . . * :	0.28	0.23	19	A:A	:- - . - -I- - . - -:	O	
332.5	1320	132	10	-6	900	0	3	6	48	53	: . . * :	0.36	0.23	56	B:A	:- - . - -I- - . - -:	O	
333.0	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	
333.5	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	
334.0	1840	184	10	0	0	0	3	6	48	47	: . * . :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	6MID
334.5	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	PED X-ING
335.0	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	
335.5	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	
336.0	1840	184	10	0	0	0	3	6	48	53	: . . * :	0.39	0.32	19	B:A	:- - . - -I- - . - -:	O	
336.5	1840	184	10	5	1200	0	3	6	48	53	: . . * :	0.51	0.32	56	B:A	:- - . - -I- - . - -:	O	
337.0	1360	136	10	-5	1000	0	3	6	48	53	: . . * :	0.37	0.24	56	B:A	:- - . - -I- - . - -:	O	
337.5	1360	136	10	0	0	0	3	6	48	53	: . . * :	0.29	0.24	19	A:A	:- - . - -I- - . - -:	O	
338.0	1360	136	10	3	1600	0	3	6	48	53	: . . * :	0.37	0.24	56	B:A	:- - . - -I- - . - -:	O	
338.5	1360	136	10	0	0	0	3	6	48	53	: . . * :	0.29	0.24	19	A:A	:- - . - -I- - . - -:	O	
339.0	880	141	16	0	0	0	3	6	48	53	: . . * :	0.19	0.14	32	A:A	:- - . - -I- - . - -:	O	
339.5	880	141	16	0	0	0	3	6	48	53	: . . * :	0.19	0.14	32	A:A	:- - . - -I- - . - -:	O	
340.0	880	141	16	0	0	0	3	6	48	53	: . . * :	0.19	0.14	32	A:A	:- - . - -I- - . - -:	O	
340.5	880	141	16	0	0	0	3	6	48	53	: . . * :	0.19	0.14	32	A:A	:- - . - -I- - . - -:	O	
341.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
341.5	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
342.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
342.5	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
343.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
343.5	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
344.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
344.5	880	141	16	0	0	0	2	6	48	47	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	3MID
345.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	
345.5	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	O	

346.0	880	141	16	0	0	0	2	6	48	53	: . . * :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
346.5	880	141	16	0	0	0	2	6	48	47	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	3MID
347.0	880	141	16	0	0	0	2	6	40	45	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
347.5	880	141	16	0	0	0	2	6	40	39	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	3MID
348.0	880	141	16	0	0	0	2	6	40	45	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
348.5	880	141	16	0	0	0	2	6	40	45	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
349.0	880	141	16	0	0	0	2	6	40	39	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	3MID
349.5	880	141	16	0	0	0	2	6	40	45	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
350.0	880	141	16	2	3000	0	2	6	40	45	: . * . :	0.42	0.22	95	B:A	:- - . - -I- - . - -:	0	
350.5	880	141	16	0	0	0	2	6	40	45	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	
351.0	880	141	16	0	0	0	2	6	40	39	: . * . :	0.29	0.22	32	A:A	:- - . - -I- - . - -:	0	3MID
351.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	31%;15MI N WACO REST
352.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
352.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
353.0	784	125	16	0	0	0	2	6	40	39	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	3MID
353.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
354.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
354.5	784	125	16	0	0	0	2	6	40	39	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	3MID
355.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
355.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	NO PLANS
356.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
356.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
357.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
357.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
358.0	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
358.5	784	125	16	0	0	0	2	6	40	45	: . * . :	0.26	0.19	32	A:A	:- - . - -I- - . - -:	0	
359.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	26%;12MI S HILSBORO;
359.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
360.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
360.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
361.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
361.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
362.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
362.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
363.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
363.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
364.0	228	46	20	0	0	0	2	6	40	39	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	2MID
364.5	228	46	20	0	0	0	2	6	40	39	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	3MID
365.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
365.5	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
366.0	228	46	20	0	0	0	2	6	40	45	: . * . :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	
366.5	228	46	20	0	0	0	2	6	76	75	: . . * :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	3MID
367.0	228	46	20	0	0	0	2	6	76	75	: . . * :	0.08	0.05	42	A:A	:- - . - -I- - . - -:	0	3MID
367.5	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
368.0	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
368.5	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
369.0	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
369.5	857	171	20	0	0	0	2	6	76	73	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	2MID;R/R
370.0	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
370.5	857	171	20	0	0	0	2	6	76	81	: . . * :	0.29	0.20	43	A:A	:- - . - -I- - . - -:	0	
371.0	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	33%;I35 E HILLSBORO
371.5	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	
372.0	475	95	20	3	2000	0	2	6	76	81	: . . * :	0.25	0.11	125	A:A	:- - . - -I- - . - -:	0	
372.5	475	95	20	3	1700	0	2	6	76	81	: . . * :	0.25	0.11	125	A:A	:- - . - -I- - . - -:	0	
373.0	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	
373.5	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	
374.0	475	95	20	0	0	0	2	6	76	75	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	3MID
374.5	475	95	20	-3	2500	0	2	6	76	81	: . . * :	0.25	0.11	125	A:A	:- - . - -I- - . - -:	0	
375.0	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	
375.5	475	95	20	-4	2000	0	2	6	76	81	: . . * :	0.28	0.11	150	A:A	:- - . - -I- - . - -:	0	
376.0	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	0	

376.5	475	95	20	0	0	0	2	6	76	81	: . . * :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	O	
377.0	475	95	20	0	0	0	2	6	40	39	: . * . :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	O	3MID
377.5	475	95	20	0	0	0	2	6	40	45	: . * . :	0.16	0.11	42	A:A	:- - . - -I- - . - -:	O	
378.0	475	95	20	-3	1600	0	2	6	40	45	: . * . :	0.25	0.11	125	A:A	:- - . - -I- - . - -:	O	
378.5	475	95	20	3	2000	0	2	6	40	45	: . * . :	0.25	0.11	125	A:A	:- - . - -I- - . - -:	O	
379.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
379.5	96	19	20	-3	1500	0	2	6	40	45	: . * . :	0.05	0.02	124	A:A	:- - . - -I- - . - -:	O	
380.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
380.5	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
381.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
381.5	96	19	20	3	2000	0	2	6	40	39	: . * . :	0.05	0.02	124	A:A	:- - . - -I- - . - -:	O	2MID
382.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
382.5	96	19	20	0	0	0	2	6	40	39	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	2MID
383.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
383.5	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
384.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	29%;12MI N HILSBRO R
384.5	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
385.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
385.5	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
386.0	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
386.5	96	19	20	0	0	0	2	6	40	45	: . * . :	0.03	0.02	42	A:A	:- - . - -I- - . - -:	O	
387.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
387.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
388.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
388.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
389.0	136	40	29	3	2000	0	2	6	40	45	: . * . :	0.09	0.03	203	A:A	:- - . - -I- - . - -:	O	
389.5	136	40	29	2	3500	0	2	6	40	45	: . * . :	0.09	0.03	203	A:A	:- - . - -I- - . - -:	O	
390.0	136	40	29	0	0	0	2	6	40	39	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	2MID
390.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
391.0	136	40	29	-1	5200	0	2	6	40	39	: . * . :	0.06	0.03	122	A:A	:- - . - -I- - . - -:	O	4MID
391.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
392.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	25%;20MI N HILSBRO R
392.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
393.0	136	40	29	0	0	0	2	6	40	39	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	2MID
393.5	136	40	29	0	0	0	2	6	40	39	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	2MID
394.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
394.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
395.0	136	40	29	0	0	0	2	6	40	39	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	2MID
395.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
396.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
396.5	136	40	29	3	1700	0	2	6	40	45	: . * . :	0.09	0.03	203	A:A	:- - . - -I- - . - -:	O	
397.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
397.5	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	
398.0	136	40	29	0	0	0	2	6	40	45	: . * . :	0.05	0.03	69	A:A	:- - . - -I- - . - -:	O	NO DETAIL PLANS
398.5	704	204	29	0	0	0	2	6	40	45	: . * . :	0.25	0.15	69	A:A	:- - . - -I- - . - -:	O	
399.0	704	204	29	0	0	0	2	6	40	45	: . * . :	0.25	0.15	69	A:A	:- - . - -I- - . - -:	O	NO DETAIL PLANS
399.5	704	204	29	0	0	0	2	6	40	45	: . * . :	0.25	0.15	69	A:A	:- - . - -I- - . - -:	O	
400.0	704	204	29	0	0	0	2	6	40	45	: . * . :	0.25	0.15	69	A:A	:- - . - -I- - . - -:	O	
400.5	704	204	29	0	0	0	2	6	24	29	: * . . :	0.25	0.15	69	A:A	: MEDIAN TOO NARROW :	O	NO DETAIL PLANS
401.0	704	204	29	0	0	0	2	6	24	29	: * . . :	0.25	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
401.5	704	204	29	0	0	0	2	6	24	29	: * . . :	0.25	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
402.0	704	204	29	0	0	0	2	6	24	29	: * . . :	0.25	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
402.5	704	204	29	0	0	0	2	6	24	29	: * . . :	0.25	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
403.0	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
403.5	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
404.0	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	NOT ON AERIAL;NO PLA
404.5	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
405.0	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	NOT ON AERIAL;NO PLA
405.5	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	
406.0	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	NOT ON AERIAL;NO PLA
406.5	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	O	

407.0	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	0	
407.5	724	210	29	0	0	0	2	6	24	29	: * . . :	0.26	0.15	69	A:A	: MEDIAN TOO NARROW :	0	NOT ON AERIAL;NO PLA
408.0	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
408.5	840	168	20	3	2200	0	2	6	24	29	: * . . :	0.44	0.20	125	B:A	: MEDIAN TOO NARROW :	0	
409.0	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
409.5	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
410.0	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	NOT ON AERIAL;NO PLA
410.5	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
411.0	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	NOT ON AERIAL;NO PLA
411.5	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
412.0	840	168	20	0	0	0	2	6	24	29	: * . . :	0.28	0.20	42	A:A	: MEDIAN TOO NARROW :	0	
412.5	1000	200	20	0	0	0	2	6	24	29	: * . . :	0.34	0.24	42	A:A	: MEDIAN TOO NARROW :	0	
413.0	1000	200	20	0	0	0	2	6	24	29	: * . . :	0.34	0.24	42	A:A	: MEDIAN TOO NARROW :	0	
413.5	1000	200	20	0	0	0	2	6	24	29	: * . . :	0.34	0.24	42	A:A	: MEDIAN TOO NARROW :	0	
414.0	1000	200	20	0	0	0	2	6	24	29	: * . . :	0.34	0.24	42	A:A	: MEDIAN TOO NARROW :	0	
414.5	1000	200	20	0	0	0	2	6	48	61	: . . * :	0.34	0.24	42	A:A	:- - . - -I- - . - -:	0	

END OF FILE

END OF ANALYSIS RUN FOR FULL ADT DATA: I-35

```
XXXXXXXXXX   XXXXXXXXXXX  XXXXXXXXXX   XXXXXXXXXXX  XXXXXXXXXX    XXXXXXXXX   XXXXXXXXXXX  XX       XX
XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXX   XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX  XXX      XX
XX       XX  XX               XX       XX           XX       XX  XX       XX  XX           XXXX     XX
XX       XX  XX               XX       XX           XX       XX  XX           XX           XX XX    XX
XXXXXXXXXXX  XXXXXXX          XX       XXXXXXX      XXXXXXXXXXX  XXXXXXXXXX   XXXXXXX      XX  XX   XX
XXXXXXXXXX   XXXXXXX          XX       XXXXXXX      XXXXXXXXXX    XXXXXXXXXX  XXXXXXX      XX   XX  XX
XX           XX               XX       XX           XX    XX             XX  XX           XX    XX XX
XX           XX               XX       XX           XX     XX    XX       XX  XX           XX     XXXX
XX           XXXXXXXXXXX      XX       XXXXXXXXXXX  XX      XX   XXXXXXXXXXX  XXXXXXXXXXX  XX      XXX
XX           XXXXXXXXXXX      XX       XXXXXXXXXXX  XX       XX   XXXXXXXXX   XXXXXXXXXXX  XX       XX
```

```
********************** I T E M I Z E D   J O B   C O S T **********************
*                                                                              *
* BOX      JOB NAME          COMMENTS                 DATE        JOB NUMBER *
* 503D     TRUCKLN       PETERSEN           13.20.38    85.240    5889        *
*                                                                              *
* I T E M                QUANTITY           COST       PREVIOUS               *
*                                                        BALANCE      871.716 *
* CPU                   18.21  SECONDS      1.457                              *
* CARD IMAGES READ       1700  IMAGES       0.510                              *
* XEROX PRINT SIMPLEX      53  PAGES        1.802                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                                                              *
*                                            TOTAL CHARGES          3.769 *
*                                                                              *
* PRIORITY 5                  DPSR W348      CURRENT BALANCE      867.947 *
*                                                                              *
********************************************************************************
```



```
XXXXXXXXXXX    XXXXXXX     XXXXXXXXX   XXXXXXXXX                    XXXXXXXXXXX   XXXXXXXXX    XXXXXXXXX    XXXXXXXXX
XXXXXXXXXXX   XXXXXXXXX   XXXXXXXXXXX  XXXXXXXXXX                   XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX
XX           XXX     XXX  XX       XX  XX       XX                  XX           XX       XX  XX       XX  XX       XX
XX           XX       XX          XXX  XX       XX                  XX           XX       XX  XX       XX  XX       XX
XXXXXXXXXX   XX       XX        XXXX   XX       XX                  XXXXXXXXXX    XXXXXXXXX    XXXXXXXXX   XXXXXXXXXXX
XXXXXXXXXXX  XX       XX        XXXX   XX       XX                  XXXXXXXXXXX   XXXXXXXXX    XXXXXXXXX    XXXXXXXXXX
         XX  XX       XX          XXX  XX       XX                           XX  XX       XX  XX       XX           XX
XX       XX  XXX     XXX  XX       XX  XX       XX                  XX       XX  XX       XX  XX       XX           XX
XXXXXXXXXXX   XXXXXXXXX   XXXXXXXXXXX  XXXXXXXXXX                   XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX  XXXXXXXXXXX
 XXXXXXXXX     XXXXXXX     XXXXXXXXX   XXXXXXXXX                     XXXXXXXXX    XXXXXXXXX    XXXXXXXXX    XXXXXXXXX
```

8.2 TRAFFIC PROJECTIONS FOR EACH COUNTY

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 168.0 GROWTH FACTORS USED: 2.17% 1985 - 1989; 2.50% 1990 +

BEXAR COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 168.0 & MP 168.5

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	2080	229	11	0	0	0	2	6	24	37	: . * . :	0.66	0.54	21	C:B	: * . I . :	0	
1986	2125	234	11	0	0	0	2	6	24	37	: . * . :	0.67	0.56	21	C:C	: * . I . :	0	
1987	2171	239	11	0	0	0	2	6	24	37	: . * . :	0.69	0.57	21	C:C	: * . I . :	0	
1988	2218	244	11	0	0	0	2	6	24	37	: . * . :	0.70	0.58	21	C:C	: * . I . :	0	
1989	2266	249	11	0	0	0	2	6	24	37	: . * . :	0.72	0.59	21	C:C	: * . I . :	0	
1990	2315	254	11	0	0	0	2	6	24	37	: . * . :	0.73	0.61	21	C:C	: * . I . :	0	
1991	2373	260	11	0	0	0	2	6	24	37	: . * . :	0.75	0.62	21	C:C	: * . I . :	0	
1992	2432	266	11	0	0	0	2	6	24	37	: . * . :	0.77	0.64	21	C:C	: * . I . :	0	
1993	2493	273	11	0	0	0	2	6	24	37	: . * . :	0.79	0.65	21	D:C	: * . I . :	0	
1994	2555	280	11	0	0	0	2	6	24	37	: . * . :	0.81	0.67	21	D:C	: * . I . :	0	
1995	2619	287	11	0	0	0	2	6	24	37	: . * . :	0.83	0.69	21	D:C	: * . I . :	0	
1996	2684	294	11	0	0	0	2	6	24	37	: . * . :	0.85	0.70	21	D:C	: * . I . :	0	
1997	2751	301	11	0	0	0	2	6	24	37	: . * . :	0.87	0.72	21	D:C	: * . I . :	0	
1998	2820	309	11	0	0	0	2	6	24	37	: . * . :	0.89	0.74	21	D:C	: * . I . :	0	
1999	2890	317	11	0	0	0	2	6	24	37	: . * . :	0.92	0.76	21	D:C	: * . I . :	0	
2000	2962	325	11	0	0	0	2	6	24	37	: . * . :	0.94	0.78	21	E:D	: * . I . :	0	
2001	3036	333	11	0	0	0	2	6	24	37	: . * . :	0.96	0.79	21	E:D	: * . I . :	0	
2002	3112	341	11	0	0	0	2	6	24	37	: . * . :	0.99	0.81	21	E:D	: * . I . :	0	
2003	3190	350	11	0	0	0	2	6	24	37	: . * . :	1.01	0.84	21	F:D	: #### LOS = F #### :	0	
2004	3270	359	11	0	0	0	2	6	24	37	: . * . :	1.04	0.86	21	F:D	: #### LOS = F #### :	0	
2005	3352	368	11	0	0	0	2	6	24	37	: . * . :	1.06	0.88	21	F:D	: #### LOS = F #### :	0	
2006	3436	377	11	0	0	0	2	6	24	37	: . * . :	1.09	0.90	21	F:D	: #### LOS = F #### :	0	
2007	3522	386	11	0	0	0	2	6	24	37	: . * . :	1.12	0.92	21	F:D	: #### LOS = F #### :	0	
2008	3610	396	11	0	0	0	2	6	24	37	: . * . :	1.14	0.95	21	F:E	: #### LOS = F #### :	0	
2009	3700	406	11	0	0	0	2	6	24	37	: . * . :	1.17	0.97	21	F:E	: #### LOS = F #### :	0	
2010	3792	416	11	0	0	0	2	6	24	37	: . * . :	1.20	0.99	21	F:E	: #### LOS = F #### :	0	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 185.5 GROWTH FACTORS USED: 4.36% 1985 - 1989; 4.31% 1990 +

COMAL COUNTY: CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 185.5 & MP 186.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1313	144	11	4	1500	0	2	6	44	41	: . * . :	0.60	0.34	74	C:A	: . * I . :	0	
1986	1370	150	11	4	1500	0	2	6	44	41	: . * . :	0.62	0.36	74	C:B	: . * I . :	0	
1987	1430	157	11	4	1500	0	2	6	44	41	: . * . :	0.65	0.37	74	C:B	: . * I . :	0	
1988	1492	164	11	4	1500	0	2	6	44	41	: . * . :	0.68	0.39	74	C:B	: . * I . :	0	
1989	1557	171	11	4	1500	0	2	6	44	41	: . * . :	0.71	0.41	74	C:B	: . * I . :	0	
1990	1625	178	11	4	1500	0	2	6	44	41	: . * . :	0.74	0.43	74	C:B	: . * I . :	0	
1991	1695	186	11	4	1500	0	2	6	44	41	: . * . :	0.77	0.44	74	C:B	: . * I . :	0	
1992	1768	194	11	4	1500	0	2	6	44	41	: . * . :	0.81	0.46	74	D:B	: . * I . :	0	
1993	1844	202	11	4	1500	0	2	6	44	41	: . * . :	0.84	0.48	74	D:B	: . * I . :	0	
1994	1923	211	11	4	1500	0	2	6	44	41	: . * . :	0.88	0.50	74	D:B	: . * I . :	0	
1995	2006	220	11	4	1500	0	2	6	44	41	: . * . :	0.91	0.53	74	D:B	: . * I . :	0	
1996	2092	229	11	4	1500	0	2	6	44	41	: . * . :	0.95	0.55	74	E:C	: . * I . :	0	
1997	2182	239	11	4	1500	0	2	6	44	41	: . * . :	0.99	0.57	74	E:C	: . * I . :	0	
1998	2276	249	11	4	1500	0	2	6	44	41	: . * . :	1.04	0.60	74	F:C	: #### LOS = F #### :	0	
1999	2374	260	11	4	1500	0	2	6	44	41	: . * . :	1.08	0.62	74	F:C	: #### LOS = F #### :	0	
2000	2476	271	11	4	1500	0	2	6	44	41	: . * . :	1.13	0.65	74	F:C	: #### LOS = F #### :	0	
2001	2583	283	11	4	1500	0	2	6	44	41	: . * . :	1.18	0.68	74	F:C	: #### LOS = F #### :	0	
2002	2694	295	11	4	1500	0	2	6	44	41	: . * . :	1.23	0.71	74	F:C	: #### LOS = F #### :	0	
2003	2810	308	11	4	1500	0	2	6	44	41	: . * . :	1.28	0.74	74	F:C	: #### LOS = F #### :	0	
2004	2931	321	11	4	1500	0	2	6	44	41	: . * . :	1.34	0.77	74	F:C	: #### LOS = F #### :	0	
2005	3057	335	11	4	1500	0	2	6	44	41	: . * . :	1.39	0.80	74	F:D	: #### LOS = F #### :	0	
2006	3189	349	11	4	1500	0	2	6	44	41	: . * . :	1.45	0.84	74	F:D	: #### LOS = F #### :	0	
2007	3326	364	11	4	1500	0	2	6	44	41	: . * . :	1.52	0.87	74	F:D	: #### LOS = F #### :	0	
2008	3469	380	11	4	1500	0	2	6	44	41	: . * . :	1.58	0.91	74	F:D	: #### LOS = F #### :	0	
2009	3619	396	11	4	1500	0	2	6	44	41	: . * . :	1.65	0.95	74	F:E	: #### LOS = F #### :	0	
2010	3775	413	11	4	1500	0	2	6	44	41	: . * . :	1.72	0.99	74	F:E	: #### LOS = F #### :	0.	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 205.5 GROWTH FACTORS USED: 1.83% 1985 - 1989; 2.96% 1990 +

HAYS COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 205.5 & MP 206.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1414	141	10	3	1500	0	2	4	48	53	: . . * :	0.59	0.38	56	C:B	: * I . :	0	
1986	1440	144	10	3	1500	0	2	4	48	53	: . . * :	0.60	0.39	56	C:B	: * I . :	0	
1987	1466	147	10	3	1500	0	2	4	48	53	: . . * :	0.61	0.39	56	C:B	: * I . :	0	
1988	1493	150	10	3	1500	0	2	4	48	53	: . . * :	0.62	0.40	56	C:B	: * I . :	0	
1989	1520	153	10	3	1500	0	2	4	48	53	: . . * :	0.63	0.41	56	C:B	: * I . :	0	
1990	1548	156	10	3	1500	0	2	4	48	53	: . . * :	0.64	0.41	56	C:B	: * I . :	0	
1991	1594	161	10	3	1500	0	2	4	48	53	: . . * :	0.66	0.43	56	C:B	: * I . :	0	
1992	1641	166	10	3	1500	0	2	4	48	53	: . . * :	0.68	0.44	56	C:B	: * I . :	0	
1993	1690	171	10	3	1500	0	2	4	48	53	: . . * :	0.70	0.45	56	C:B	: * I . :	0	
1994	1740	176	10	3	1500	0	2	4	48	53	: . . * :	0.72	0.46	56	C:B	: * I . :	0	
1995	1792	181	10	3	1500	0	2	4	48	53	: . . * :	0.75	0.48	56	C:B	: * I . :	0	
1996	1845	186	10	3	1500	0	2	4	48	53	: . . * :	0.77	0.49	56	C:B	: * I . :	0	
1997	1900	192	10	3	1500	0	2	4	48	53	: . . * :	0.79	0.51	56	D:B	: * I . :	0	
1998	1956	198	10	3	1500	0	2	4	48	53	: . . * :	0.81	0.52	56	D:B	: * I . :	0	
1999	2014	204	10	3	1500	0	2	4	48	53	: . . * :	0.84	0.54	56	D:B	: * I . :	0	
2000	2074	210	10	3	1500	0	2	4	48	53	: . . * :	0.86	0.55	56	D:C	: * I . :	0	
2001	2135	216	10	3	1500	0	2	4	48	53	: . . * :	0.89	0.57	56	D:C	: * I . :	0	
2002	2198	222	10	3	1500	0	2	4	48	53	: . . * :	0.91	0.59	56	D:C	: * I . :	0	
2003	2263	229	10	3	1500	0	2	4	48	53	: . . * :	0.94	0.60	56	E:C	: * I . :	0	
2004	2330	236	10	3	1500	0	2	4	48	53	: . . * :	0.97	0.62	56	E:C	: * I . :	0	
2005	2399	243	10	3	1500	0	2	4	48	53	: . . * :	1.00	0.64	56	E:C	: * I . :	0	
2006	2470	250	10	3	1500	0	2	4	48	53	: . . * :	1.03	0.66	56	F:C	: #### LOS = F #### :	0	
2007	2543	257	10	3	1500	0	2	4	48	53	: . . * :	1.06	0.68	56	F:C	: #### LOS = F #### :	0	
2008	2618	265	10	3	1500	0	2	4	48	53	: . . * :	1.09	0.70	56	F:C	: #### LOS = F #### :	0	
2009	2695	273	10	3	1500	0	2	4	48	53	: . . * :	1.12	0.72	56	F:C	: #### LOS = F #### :	0	
2010	2775	281	10	3	1500	0	2	4	48	53	: . . * :	1.15	0.74	56	F:C	: #### LOS = F #### :	0	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 233.5 GROWTH FACTORS USED: 3.24% 1985 - 1989; 3.58% 1990 +

TRAVIS COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 233.5 & MP 234.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36	36-52	52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	4360	349	8	5	1000	0	3	4	20	17	: *	.	. :	1.14	0.79	43	F:D	: #### LOS = F #### :	0	
1986	4501	360	8	5	1000	0	3	4	20	17	: *	.	. :	1.25	0.82	52	F:D	: #### LOS = F #### :	0	
1987	4647	372	8	5	1000	0	3	4	20	17	: *	.	. :	1.21	0.85	43	F:D	: #### LOS = F #### :	0	
1988	4798	384	8	5	1000	0	3	4	20	17	: *	.	. :	1.25	0.87	43	F:D	: #### LOS = F #### :	0	
1989	4953	396	8	5	1000	0	3	4	20	17	: *	.	. :	1.37	0.90	52	F:D	: #### LOS = F #### :	0	
1990	5113	409	8	5	1000	0	3	4	20	17	: *	.	. :	1.42	0.93	52	F:D	: #### LOS = F #### :	0	
1991	5296	424	8	5	1000	0	3	4	20	17	: *	.	. :	1.38	0.96	43	F:E	: #### LOS = F #### :	0	
1992	5486	439	8	5	1000	0	3	4	20	17	: *	.	. :	1.43	1.00	43	F:E	: #### LOS = F #### :	0	
1993	5682	455	8	5	1000	0	3	4	20	17	: *	.	. :	1.49	1.04	43	F:F	: #### LOS = F #### :	0	
1994	5885	471	8	5	1000	0	3	4	20	17	: *	.	. :	1.54	1.07	43	F:F	: #### LOS = F #### :	0	
1995	6096	488	8	5	1000	0	3	4	20	17	: *	.	. :	1.59	1.11	43	F:F	: #### LOS = F #### :	0	
1996	6314	505	8	5	1000	0	3	4	20	17	: *	.	. :	1.75	1.15	52	F:F	: #### LOS = F #### :	0	
1997	6540	523	8	5	1000	0	3	4	20	17	: *	.	. :	1.81	1.19	52	F:F	: #### LOS = F #### :	0	
1998	6774	542	8	5	1000	0	3	4	20	17	: *	.	. :	1.77	1.23	43	F:F	: #### LOS = F #### :	0	
1999	7017	561	8	5	1000	0	3	4	20	17	: *	.	. :	1.95	1.28	52	F:F	: #### LOS = F #### :	0	
2000	7268	581	8	5	1000	0	3	4	20	17	: *	.	. :	2.02	1.32	52	F:F	: #### LOS = F #### :	0	
2001	7528	602	8	5	1000	0	3	4	20	17	: *	.	. :	2.09	1.37	52	F:F	: #### LOS = F #### :	0	
2002	7798	624	8	5	1000	0	3	4	20	17	: *	.	. :	2.04	1.42	43	F:F	: #### LOS = F #### :	0	
2003	8077	646	8	5	1000	0	3	4	20	17	: *	.	. :	2.24	1.47	52	F:F	: #### LOS = F #### :	0	
2004	8366	669	8	5	1000	0	3	4	20	17	: *	.	. :	2.32	1.52	52	F:F	: #### LOS = F #### :	0	
2005	8666	693	8	5	1000	0	3	4	20	17	: *	.	. :	2.40	1.58	52	F:F	: #### LOS = F #### :	0	
2006	8976	718	8	5	1000	0	3	4	20	17	: *	.	. :	2.49	1.64	52	F:F	: #### LOS = F #### :	0	
2007	9297	744	8	5	1000	0	3	4	20	17	: *	.	. :	2.43	1.69	43	F:F	: #### LOS = F #### :	0	
2008	9630	771	8	5	1000	0	3	4	20	17	: *	.	. :	2.52	1.75	43	F:F	: #### LOS = F #### :	0	
2009	9975	799	8	5	1000	0	3	4	20	17	: *	.	. :	2.61	1.82	43	F:F	: #### LOS = F #### :	0	
2010	10332	828	8	5	1000	0	3	4	20	17	: *	.	. :	2.70	1.88	44	F:F	: #### LOS = F #### :	0	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 250.0 GROWTH FACTORS USED: 7.15% 1985 - 1989; 7.36% 1990 +

WILLIAMSON COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 250.0 & MP 250.5

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1680	134	8	2	5000	0	2	4	54	53	: . . * :	0.70	0.46	52	C:B	: * I . :	0	2MID
1986	1800	144	8	2	5000	0	2	4	54	53	: . . * :	0.71	0.49	43	C:B	: *. I . :	0	2MID
1987	1929	154	8	2	5000	0	2	4	54	53	: . . * :	0.80	0.53	52	D:B	: * I . :	0	2MID
1988	2067	165	8	2	5000	0	2	4	54	53	: . . * :	0.86	0.57	52	D:C	: * I . :	0	2MID
1989	2215	177	8	2	5000	0	2	4	54	53	: . . * :	0.92	0.61	52	D:C	: * I . :	0	2MID
1990	2373	190	8	2	5000	0	2	4	54	53	: . . * :	0.93	0.65	43	D:C	: *. I . :	0	2MID
1991	2548	204	8	2	5000	0	2	4	54	53	: . . * :	1.00	0.70	43	E:C	: *. I . :	0	2MID
1992	2736	219	8	2	5000	0	2	4	54	53	: . . * :	1.07	0.75	43	F:C	: #### LOS = F #### :	0	2MID
1993	2937	235	8	2	5000	0	2	4	54	53	: . . * :	1.15	0.80	43	F:D	: #### LOS = F #### :	0	2MID
1994	3153	252	8	2	5000	0	2	4	54	53	: . . * :	1.31	0.86	52	F:D	: #### LOS = F #### :	0	2MID
1995	3385	271	8	2	5000	0	2	4	54	53	: . . * :	1.33	0.93	43	F:D	: #### LOS = F #### :	0	2MID
1996	3634	291	8	2	5000	0	2	4	54	53	: . . * :	1.43	0.99	43	F:E	: #### LOS = F #### :	0	2MID
1997	3901	312	8	2	5000	0	2	4	54	53	: . . * :	1.62	1.07	52	F:F	: #### LOS = F #### :	0	2MID
1998	4188	335	8	2	5000	0	2	4	54	53	: . . * :	1.74	1.14	52	F:F	: #### LOS = F #### :	0	2MID
1999	4496	360	8	2	5000	0	2	4	54	53	: . . * :	1.76	1.23	43	F:F	: #### LOS = F #### :	0	2MID
2000	4827	386	8	2	5000	0	2	4	54	53	: . . * :	2.01	1.32	52	F:F	: #### LOS = F #### :	0	2MID
2001	5182	414	8	2	5000	0	2	4	54	53	: . . * :	2.16	1.42	52	F:F	: #### LOS = F #### :	0	2MID
2002	5563	444	8	2	5000	0	2	4	54	53	: . . * :	2.31	1.52	52	F:F	: #### LOS = F #### :	0	2MID
2003	5972	477	8	2	5000	0	2	4	54	53	: . . * :	2.48	1.63	52	F:F	: #### LOS = F #### :	0	2MID
2004	6412	512	8	2	5000	0	2	4	54	53	: . . * :	2.67	1.75	52	F:F	: #### LOS = F #### :	0	2MID
2005	6884	550	8	2	5000	0	2	4	54	53	: . . * :	2.86	1.88	52	F:F	: #### LOS = F #### :	0	2MID
2006	7391	590	8	2	5000	0	2	4	54	53	: . . * :	3.07	2.02	52	F:F	: #### LOS = F #### :	0	2MID
2007	7935	633	8	2	5000	0	2	4	54	53	: . . * :	3.30	2.17	52	F:F	: #### LOS = F #### :	0	2MID
2008	8519	680	8	2	5000	0	2	4	54	53	: . . * :	3.54	2.33	52	F:F	: #### LOS = F #### :	0	2MID
2009	9146	730	8	2	5000	0	2	4	54	53	: . . * :	3.80	2.50	52	F:F	: #### LOS = F #### :	0	2MID
2010	9819	784	8	2	5000	0	2	4	54	53	: . . * :	4.08	2.68	52	F:F	: #### LOS = F #### :	0	2MID

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 299.0 GROWTH FACTORS USED: 2.73% 1985 - 1989; 3.13% 1990 +

BELL COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 299.0 & MP 299.5

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36	36-52	52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0%	50%	100%	150%	200%	OBS	COMMENTS
1985	1480	148	10	5	1000	0	2	4	40	45 :	.	*	. :	0.62	0.40	56	C:B	:	*	I	.	:	O	
1986	1520	152	10	5	1000	0	2	4	40	45 :	.	*	. :	0.63	0.41	56	C:B	:	*	I	.	:	O	
1987	1561	156	10	5	1000	0	2	4	40	45 :	.	*	. :	0.65	0.42	56	C:B	:	*	I	.	:	O	
1988	1604	160	10	5	1000	0	2	4	40	45 :	.	*	. :	0.67	0.43	56	C:B	:	*	I	.	:	O	
1989	1648	164	10	5	1000	0	2	4	40	45 :	.	*	. :	0.69	0.44	55	C:B	:	*	I	.	:	O	
1990	1693	168	10	5	1000	0	2	4	40	45 :	.	*	. :	0.70	0.45	55	C:B	:	*	I	.	:	O	
1991	1746	173	10	5	1000	0	2	4	40	45 :	.	*	. :	0.73	0.47	55	C:B	:	*	I	.	:	O	
1992	1801	178	10	5	1000	0	2	4	40	45 :	.	*	. :	0.75	0.48	55	C:B	:	*	I	.	:	O	
1993	1857	184	10	5	1000	0	2	4	40	45 :	.	*	. :	0.77	0.50	55	C:B	:	*	I	.	:	O	
1994	1915	190	10	5	1000	0	2	4	40	45 :	.	*	. :	0.80	0.51	55	D:B	:	*	I	.	:	O	
1995	1975	196	10	5	1000	0	2	4	40	45 :	.	*	. :	0.82	0.53	55	D:B	:	*	I	.	:	O	
1996	2037	202	10	5	1000	0	2	4	40	45 :	.	*	. :	0.85	0.55	55	D:C	:	*	I	.	:	O	
1997	2101	208	10	5	1000	0	2	4	40	45 :	.	*	. :	0.87	0.56	55	D:C	:	*	I	.	:	O	
1998	2167	215	10	5	1000	0	2	4	40	45 :	.	*	. :	0.90	0.58	55	D:C	:	*	I	.	:	O	
1999	2235	222	10	5	1000	0	2	4	40	45 :	.	*	. :	0.93	0.60	55	D:C	:	*	I	.	:	O	
2000	2305	229	10	5	1000	0	2	4	40	45 :	.	*	. :	0.96	0.62	55	E:C	:	*	I	.	:	O	
2001	2377	236	10	5	1000	0	2	4	40	45 :	.	*	. :	0.99	0.64	55	E:C	:	*	I	.	:	O	
2002	2451	243	10	5	1000	0	2	4	40	45 :	.	*	. :	1.02	0.66	55	F:C	:	####	LOS =	F	#### :	O	
2003	2528	251	10	5	1000	0	2	4	40	45 :	.	*	. :	1.05	0.68	55	F:C	:	####	LOS =	F	#### :	O	
2004	2607	259	10	5	1000	0	2	4	40	45 :	.	*	. :	1.08	0.70	55	F:C	:	####	LOS =	F	#### :	O	
2005	2689	267	10	5	1000	0	2	4	40	45 :	.	*	. :	1.12	0.72	55	F:C	:	####	LOS =	F	#### :	O	
2006	2773	275	10	5	1000	0	2	4	40	45 :	.	*	. :	1.15	0.74	55	F:C	:	####	LOS =	F	#### :	O	
2007	2860	284	10	5	1000	0	2	4	40	45 :	.	*	. :	1.19	0.77	55	F:C	:	####	LOS =	F	#### :	O	
2008	2950	293	10	5	1000	0	2	4	40	45 :	.	*	. :	1.23	0.79	55	F:D	:	####	LOS =	F	#### :	O	
2009	3042	302	10	5	1000	0	2	4	40	45 :	.	*	. :	1.27	0.81	55	F:D	:	####	LOS =	F	#### :	O	
2010	3137	311	10	5	1000	0	2	4	40	45 :	.	*	. :	1.30	0.84	55	F:D	:	####	LOS =	F	#### :	O	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 336.5 GROWTH FACTORS USED: 1.57% 1985 - 1989; 1.98% 1990 +

MCCLENNAN COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 336.5 & MP 337.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW: -36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1840	184	10	5	1200	0	3	4	48	53 : . . * :	0.51	0.33	56	B:A	:- - . - -I- - . - -:	0	
1986	1869	187	10	5	1200	0	3	4	48	53 : . . * :	0.52	0.33	56	B:A	:- - . - -I- - . - -:	0	
1987	1898	190	10	5	1200	0	3	4	48	53 : . . * :	0.53	0.34	56	B:A	:- - . - -I- - . - -:	0	
1988	1928	193	10	5	1200	0	3	4	48	53 : . . * :	0.53	0.34	56	B:A	:- - . - -I- - . - -:	0	
1989	1958	196	10	5	1200	0	3	4	48	53 : . . * :	0.54	0.35	56	B:A	: * I . :	0	
1990	1989	199	10	5	1200	0	3	4	48	53 : . . * :	0.55	0.35	56	C:A	: * I . :	0	
1991	2028	203	10	5	1200	0	3	4	48	53 : . . * :	0.56	0.36	56	C:B	: * I . :	0	
1992	2068	207	10	5	1200	0	3	4	48	53 : . . * :	0.57	0.37	56	C:B	: * I . :	0	
1993	2109	211	10	5	1200	0	3	4	48	53 : . . * :	0.58	0.38	56	C:B	: * I . :	0	
1994	2151	215	10	5	1200	0	3	4	48	53 : . . * :	0.60	0.38	56	C:B	: * I . :	0	
1995	2194	219	10	5	1200	0	3	4	48	53 : . . * :	0.61	0.39	56	C:B	: * I . :	0	
1996	2237	223	10	5	1200	0	3	4	48	53 : . . * :	0.62	0.40	56	C:B	: * I . :	0	
1997	2281	227	10	5	1200	0	3	4	48	53 : . . * :	0.63	0.41	55	C:B	: * I . :	0	
1998	2326	231	10	5	1200	0	3	4	48	53 : . . * :	0.64	0.41	55	C:B	: * I . :	0	
1999	2372	236	10	5	1200	0	3	4	48	53 : . . * :	0.66	0.42	55	C:B	: * I . :	0	
2000	2419	241	10	5	1200	0	3	4	48	53 : . . * :	0.67	0.43	55	C:B	: * I . :	0	
2001	2467	246	10	5	1200	0	3	4	48	53 : . . * :	0.68	0.44	56	C:B	: * I . :	0	
2002	2516	251	10	5	1200	0	3	4	48	53 : . . * :	0.70	0.45	56	C:B	: * I . :	0	
2003	2566	256	10	5	1200	0	3	4	48	53 : . . * :	0.71	0.46	56	C:B	: * I . :	0	
2004	2617	261	10	5	1200	0	3	4	48	53 : . . * :	0.73	0.47	56	C:B	: * I . :	0	
2005	2669	266	10	5	1200	0	3	4	48	53 : . . * :	0.74	0.48	55	C:B	: * I . :	0	
2006	2722	271	10	5	1200	0	3	4	48	53 : . . * :	0.75	0.49	55	C:B	: * I . :	0	
2007	2776	276	10	5	1200	0	3	4	48	53 : . . * :	0.77	0.50	55	C:B	: * I . :	0	
2008	2831	281	10	5	1200	0	3	4	48	53 : . . * :	0.78	0.51	55	D:B	: * I . :	0	
2009	2887	287	10	5	1200	0	3	4	48	53 : . . * :	0.80	0.51	55	D:B	: * I . :	0	
2010	2944	293	10	5	1200	0	3	4	48	53 : . . * :	0.82	0.53	55	D:B	: * I . :	0	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 369.0 GROWTH FACTORS USED: 1.40% 1985 - 1989; 2.44% 1990 +

HILL COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 369.0 & MP 369.5

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36 36-52 52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	857	171	20	0	0	0	2	4	76	81	: . . * :	0.29	0.20	42	A:A	:- - . - -I- - . - -:	0	
1986	869	173	20	0	0	0	2	4	76	81	: . . * :	0.29	0.21	42	A:A	:- - . - -I- - . - -:	0	
1987	881	175	20	0	0	0	2	4	76	81	: . . * :	0.30	0.21	42	A:A	:- - . - -I- - . - -:	0	
1988	893	177	20	0	0	0	2	4	76	81	: . . * :	0.30	0.21	42	A:A	:- - . - -I- - . - -:	0	
1989	906	179	20	0	0	0	2	4	76	81	: . . * :	0.31	0.22	42	A:A	:- - . - -I- - . - -:	0	
1990	919	182	20	0	0	0	2	4	76	81	: . . * :	0.31	0.22	42	A:A	:- - . - -I- - . - -:	0	
1991	941	186	20	0	0	0	2	4	76	81	: . . * :	0.32	0.22	42	A:A	:- - . - -I- - . - -:	0	
1992	964	191	20	0	0	0	2	4	76	81	: . . * :	0.33	0.23	42	A:A	:- - . - -I- - . - -:	0	
1993	988	196	20	0	0	0	2	4	76	81	: . . * :	0.33	0.24	42	A:A	:- - . - -I- - . - -:	0	
1994	1012	201	20	0	0	0	2	4	76	81	: . . * :	0.34	0.24	42	A:A	:- - . - -I- - . - -:	0	
1995	1037	206	20	0	0	0	2	4	76	81	: . . * :	0.35	0.25	42	A:A	:- - . - -I- - . - -:	0	
1996	1062	211	20	0	0	0	2	4	76	81	: . . * :	0.36	0.25	42	B:A	:- - . - -I- - . - -:	0	
1997	1088	216	20	0	0	0	2	4	76	81	: . . * :	0.37	0.26	42	B:A	:- - . - -I- - . - -:	0	
1998	1115	221	20	0	0	0	2	4	76	81	: . . * :	0.38	0.27	42	B:A	:- - . - -I- - . - -:	0	
1999	1142	226	20	0	0	0	2	4	76	81	: . . * :	0.39	0.27	42	B:A	:- - . - -I- - . - -:	0	
2000	1170	232	20	0	0	0	2	4	76	81	: . . * :	0.40	0.28	42	B:A	:- - . - -I- - . - -:	0	
2001	1199	238	20	0	0	0	2	4	76	81	: . . * :	0.41	0.29	42	B:A	:- - . - -I- - . - -:	0	
2002	1228	244	20	0	0	0	2	4	76	81	: . . * :	0.42	0.29	42	B:A	:- - . - -I- - . - -:	0	
2003	1258	250	20	0	0	0	2	4	76	81	: . . * :	0.43	0.30	42	B:A	:- - . - -I- - . - -:	0	
2004	1289	256	20	0	0	0	2	4	76	81	: . . * :	0.44	0.31	42	B:A	:- - . - -I- - . - -:	0	
2005	1320	262	20	0	0	0	2	4	76	81	: . . * :	0.45	0.31	42	B:A	:- - . - -I- - . - -:	0	
2006	1352	268	20	0	0	0	2	4	76	81	: . . * :	0.46	0.32	42	B:A	:- - . - -I- - . - -:	0	
2007	1385	275	20	0	0	0	2	4	76	81	: . . * :	0.47	0.33	42	B:A	:- - . - -I- - . - -:	0	
2008	1419	282	20	0	0	0	2	4	76	81	: . . * :	0.48	0.34	42	B:A	:- - . - -I- - . - -:	0	
2009	1454	289	20	0	0	0	2	4	76	81	: . . * :	0.49	0.35	42	B:A	:- - . - -I- - . - -:	0	
2010	1489	296	20	0	0	0	2	4	76	81	: . . * :	0.50	0.35	42	B:A	:- - . - -I- - . - -:	0	

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 408.5 GROWTH FACTORS USED: 3.03% 1985 - 1989; 4.12% 1990 +

ELLIS COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 408.5 & MP 409.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36	36-52	52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS COMMENTS
1985	840	168	20	3	2200	0	2	4	24	29	*	.	.	0.45	0.20	125	B:A	MEDIAN TOO NARROW	0
1986	865	173	20	3	2200	0	2	4	24	29	*	.	.	0.46	0.21	125	B:A	MEDIAN TOO NARROW	0
1987	891	178	20	3	2200	0	2	4	24	29	*	.	.	0.48	0.21	125	B:A	MEDIAN TOO NARROW	0
1988	918	183	20	3	2200	0	2	4	24	29	*	.	.	0.49	0.22	125	B:A	MEDIAN TOO NARROW	0
1989	946	189	20	3	2200	0	2	4	24	29	*	.	.	0.51	0.22	125	B:A	MEDIAN TOO NARROW	0
1990	975	195	20	3	2200	0	2	4	24	29	*	.	.	0.52	0.23	125	B:A	MEDIAN TOO NARROW	0
1991	1015	203	20	3	2200	0	2	4	24	29	*	.	.	0.54	0.24	125	B:A	MEDIAN TOO NARROW	0
1992	1057	211	20	3	2200	0	2	4	24	29	*	.	.	0.57	0.25	125	C:A	MEDIAN TOO NARROW	0
1993	1101	220	20	3	2200	0	2	4	24	29	*	.	.	0.59	0.26	125	C:A	MEDIAN TOO NARROW	0
1994	1146	229	20	3	2200	0	2	4	24	29	*	.	.	0.61	0.27	125	C:A	MEDIAN TOO NARROW	0
1995	1193	238	20	3	2200	0	2	4	24	29	*	.	.	0.64	0.28	125	C:A	MEDIAN TOO NARROW	0
1996	1242	248	20	3	2200	0	2	4	24	29	*	.	.	0.66	0.30	125	C:A	MEDIAN TOO NARROW	0
1997	1293	258	20	3	2200	0	2	4	24	29	*	.	.	0.69	0.31	125	C:A	MEDIAN TOO NARROW	0
1998	1346	269	20	3	2200	0	2	4	24	29	*	.	.	0.72	0.32	125	C:A	MEDIAN TOO NARROW	0
1999	1401	280	20	3	2200	0	2	4	24	29	*	.	.	0.75	0.33	125	C:A	MEDIAN TOO NARROW	0
2000	1459	292	20	3	2200	0	2	4	24	29	*	.	.	0.78	0.35	125	D:A	MEDIAN TOO NARROW	0
2001	1519	304	20	3	2200	0	2	4	24	29	*	.	.	0.81	0.36	125	D:B	MEDIAN TOO NARROW	0
2002	1582	317	20	3	2200	0	2	4	24	29	*	.	.	0.85	0.38	125	D:B	MEDIAN TOO NARROW	0
2003	1647	330	20	3	2200	0	2	4	24	29	*	.	.	0.88	0.39	125	D:B	MEDIAN TOO NARROW	0
2004	1715	344	20	3	2200	0	2	4	24	29	*	.	.	0.92	0.41	125	D:B	MEDIAN TOO NARROW	0
2005	1786	358	20	3	2200	0	2	4	24	29	*	.	.	0.96	0.42	125	E:B	MEDIAN TOO NARROW	0
2006	1860	373	20	3	2200	0	2	4	24	29	*	.	.	0.99	0.44	125	E:B	MEDIAN TOO NARROW	0
2007	1937	388	20	3	2200	0	2	4	24	29	*	.	.	1.04	0.46	125	F:B	#### LOS = F ####	0
2008	2017	404	20	3	2200	0	2	4	24	29	*	.	.	1.08	0.48	125	F:B	#### LOS = F ####	0
2009	2100	421	20	3	2200	0	2	4	24	29	*	.	.	1.12	0.50	125	F:B	#### LOS = F ####	0
2010	2187	438	20	3	2200	0	2	4	24	29	*	.	.	1.17	0.52	125	F:B	#### LOS = F ####	0

TTI TRUCKLANE ANALYSIS PROGRAM OUTPUT

ANALYSIS OF I-35 GROWTH: ADT * K AT MILEPOST 413.5 GROWTH FACTORS USED: 2.02% 1985 - 1989; 2.52% 1990 +

DALLAS COUNTY; CRITICAL (HIGHEST) V/C PHV OCCURS BETWEEN MP 413.5 & MP 414.0

YEAR	PHV	TRUCKS	%T	%GRADE	L	T	N	LAT	MEDW	TW:	-36	36-52	52+	V/C	V/CA	%V/C	LOS70	IMPROVEMENT IN V/C 0% 50% 100% 150% 200%	OBS	COMMENTS
1985	1000	200	20	0	0	0	2	4	24	29	*	.	.	0.34	0.24	42	A:A	MEDIAN TOO NARROW	0	
1986	1020	204	20	0	0	0	2	4	24	29	*	.	.	0.35	0.24	42	A:A	MEDIAN TOO NARROW	0	
1987	1041	208	20	0	0	0	2	4	24	29	*	.	.	0.35	0.25	42	A:A	MEDIAN TOO NARROW	0	
1988	1062	212	20	0	0	0	2	4	24	29	*	.	.	0.36	0.25	42	B:A	MEDIAN TOO NARROW	0	
1989	1083	216	20	0	0	0	2	4	24	29	*	.	.	0.37	0.26	42	B:A	MEDIAN TOO NARROW	0	
1990	1105	220	20	0	0	0	2	4	24	29	*	.	.	0.37	0.26	42	B:A	MEDIAN TOO NARROW	0	
1991	1133	226	20	0	0	0	2	4	24	29	*	.	.	0.38	0.27	42	B:A	MEDIAN TOO NARROW	0	
1992	1162	232	20	0	0	0	2	4	24	29	*	.	.	0.39	0.28	42	B:A	MEDIAN TOO NARROW	0	
1993	1191	238	20	0	0	0	2	4	24	29	*	.	.	0.40	0.28	42	B:A	MEDIAN TOO NARROW	0	
1994	1221	244	20	0	0	0	2	4	24	29	*	.	.	0.41	0.29	42	B:A	MEDIAN TOO NARROW	0	
1995	1252	250	20	0	0	0	2	4	24	29	*	.	.	0.42	0.30	42	B:A	MEDIAN TOO NARROW	0	
1996	1284	256	20	0	0	0	2	4	24	29	*	.	.	0.43	0.31	42	B:A	MEDIAN TOO NARROW	0	
1997	1316	262	20	0	0	0	2	4	24	29	*	.	.	0.45	0.31	42	B:A	MEDIAN TOO NARROW	0	
1998	1349	269	20	0	0	0	2	4	24	29	*	.	.	0.46	0.32	42	B:A	MEDIAN TOO NARROW	0	
1999	1383	276	20	0	0	0	2	4	24	29	*	.	.	0.47	0.33	42	B:A	MEDIAN TOO NARROW	0	
2000	1418	283	20	0	0	0	2	4	24	29	*	.	.	0.48	0.34	42	B:A	MEDIAN TOO NARROW	0	
2001	1454	290	20	0	0	0	2	4	24	29	*	.	.	0.49	0.35	42	B:A	MEDIAN TOO NARROW	0	
2002	1491	297	20	0	0	0	2	4	24	29	*	.	.	0.50	0.35	42	B:A	MEDIAN TOO NARROW	0	
2003	1529	304	20	0	0	0	2	4	24	29	*	.	.	0.52	0.36	42	B:B	MEDIAN TOO NARROW	0	
2004	1568	312	20	0	0	0	2	4	24	29	*	.	.	0.53	0.37	42	B:B	MEDIAN TOO NARROW	0	
2005	1608	320	20	0	0	0	2	4	24	29	*	.	.	0.54	0.38	42	B:B	MEDIAN TOO NARROW	0	
2006	1649	328	20	0	0	0	2	4	24	29	*	.	.	0.56	0.39	42	C:B	MEDIAN TOO NARROW	0	
2007	1691	336	20	0	0	0	2	4	24	29	*	.	.	0.57	0.40	42	C:B	MEDIAN TOO NARROW	0	
2008	1734	344	20	0	0	0	2	4	24	29	*	.	.	0.59	0.41	42	C:B	MEDIAN TOO NARROW	0	
2009	1778	353	20	0	0	0	2	4	24	29	*	.	.	0.60	0.42	42	C:B	MEDIAN TOO NARROW	0	
2010	1823	362	20	0	0	0	2	4	24	29	*	.	.	0.62	0.43	42	C:B	MEDIAN TOO NARROW	0	

END OF FILE

8.3 LEVEL OF SERVICE CALCULATIONS

VERIFICATION OF COMPUTER OUTPUT

Hand calculations of level of service for the manual count locations were done in order to check the computer output as described in Section 5.0. As an example of the methodology used for these calculations, the computations for the count location five miles south of New Braunfels are included herein. This method is the same as that found in the Highway Capacity Manual (HCM) (1).

Level of service (LOS) criteria for basic freeway segments are given in Table 3-1 for 70 mph, 60 mph, and 50 mph design speeds. (Table numbers in this section correspond to table numbers found in the HCM). By knowing the appropriate design speed and the volume-to-capacity (v/c) ratio, Table 3-1 can be used to find the corresponding LOS for the facility. The maximum service flow rate (MSF) is given in the table: it is related to the v/c ratio by the following relationship:

$$MSF_i = c_j * (v/c)_i;$$

where:

MSF_i =the maximum service flow rate per lane for LOS "i" under ideal conditions, in pcph; and

c_j = capacity under ideal conditions for design speed, "j".

The values in Table 3-1 represent ideal conditions of 12-foot lanes, adequate lateral clearance, and all passenger cars in the traffic stream. Therefore, adjustments must be made to reflect the prevailing conditions. Correction factors are as follows:

$$SF_i = MSF_i * N * f_w * f_{HV} * f_p$$

where:

SF_i=the service flow rate for LOS "i" under prevailing conditions for N lanes in one direction;

N = number of lanes in one direction;

f_w=adjustment factor for lane widths or lateral obstructions;

f_{HV} = adjustment factor for heavy vehicles; and

f_p = adjustment factor for driver population.

Combining the first and third equations, the following relationship is derived:

$$v/c = SF/(c_j * N * f_w * f_{HV} * f_p) \quad \text{Equation (1)}$$

The service flow rate (SF) is equal to the actual hourly demand volume for the segment divided by the peak hour factor (PHF) for the segment. For these hand calculations, the actual hourly demand volumes were taken from

TABLE 3-1. LEVELS OF SERVICE FOR BASIC FREEWAY SECTIONS

LOS	DENSITY (PC/MI/LN)	70 MPH DESIGN SPEED			60 MPH DESIGN SPEED			50 MPH DESIGN SPEED		
		SPEED[b] (MPH)	v/c	MSF[a] (PCPHPL)	SPEED[b] (MPH)	v/c	MSF[a] (PCPHPL)	SPEED[b] (MPH)	v/c	MSF[a] (PCPHPL)
A	≤ 12	≥ 60	0.35	700	—	—	—	—	—	—
B	≤ 20	≥ 57	0.54	1,100	≥ 50	0.49	1,000	—	—	—
C	≤ 30	≥ 54	0.77	1,550	≥ 47	0.69	1,400	≥ 43	0.67	1,300
D	≤ 42	≥ 46	0.93	1,850	≥ 42	0.84	1,700	≥ 40	0.83	1,600
E	≤ 67	≥ 30	1.00	2,000	≥ 30	1.00	2,000	≥ 28	1.00	1,900
F	> 67	< 30	[c]	[c]	< 30	[c]	[c]	< 28	[c]	[c]

[a] Maximum service flow rate per lane under ideal conditions.
[b] Average travel speed.
[c] Highly variable, unstable.
NOTE: All values of *MSF* Rounded to the nearest 50 pcph.

the spreadsheets. The phf's were taken from the Design Division Operations and Procedures Manual(15). The following factors are recommended:

PHF = 0.91 for large metropolitan areas over one million population;

PHF = 0.83 for areas between 500,000 and one million; and

PHF = 0.77 for areas under 500,000 population.

For purposes of this study, a factor of 0.85 was used throughout the corridor. To determine the actual peak period demand, the peak hour demand is divided by the PHF of 0.85:

$$SF = V/PHF$$

where:

V = actual hourly demand volume; and
PHF = peak hour factor for the segment in question.

The capacity (c_j) is 2,000 pcphpl for 60 mph and 70 mph freeway elements and 1,900 pcphpl for 50 mph freeway elements.

Adjustment factors must be determined from the following tables:

Table 3-2 - Restricted lane widths/lateral clearance
Table 3-3 - Passenger-car equivalents on general freeway segments
Table 3-6 - Passenger-car equivalents for heavy trucks
Table 3-10 - Character of the traffic stream

When the proportion of trucks in the traffic stream is greater than 20 percent, the truck adjustment factor is determined by the following formula:

$$f_{HV} = 1/(1 + P_T(E_T - 1) + P_R(E_R - 1) + P_B(E_B - 1))$$

Where:

f_{HV} = adjustment for the combined effect of trucks, RV's and buses;

E_T, E_R, E_B = passenger car equivalents for trucks, RV's, and buses, respectively; and

P_T, P_R, P_B = proportion of trucks, RV's, and buses, respectively in the traffic stream.

For purposes of this study, the recreational vehicles and buses were ignored.

The volume-to-capacity (v/c) ratio can now be calculated by using Equation (1) above. Then, by using the calculated v/c ratio and the design speed of the facility, the LOS can be obtained from Table 3-1.

TABLE 3-2. ADJUSTMENT FACTOR FOR RESTRICTED LANE WIDTH AND LATERAL CLEARANCE

DISTANCE FROM TRAVELED PAVEMENT[a] (FT)	ADJUSTMENT FACTOR, f_w							
	OBSTRUCTIONS ON ONE SIDE OF THE ROADWAY				OBSTRUCTIONS ON BOTH SIDES OF THE ROADWAY			
	LANE WIDTH (FT)							
	12	11	10	9	12	11	10	9
	4-LANE FREEWAY (2 LANES EACH DIRECTION)							
≥ 6	1.00	0.97	0.91	0.81	1.00	0.97	0.91	0.81
5	0.99	0.96	0.90	0.80	0.99	0.96	0.90	0.80
4	0.99	0.96	0.90	0.80	0.98	0.95	0.89	0.79
3	0.98	0.95	0.89	0.79	0.96	0.93	0.87	0.77
2	0.97	0.94	0.88	0.79	0.94	0.91	0.86	0.76
1	0.93	0.90	0.85	0.76	0.87	0.85	0.80	0.71
0	0.90	0.87	0.82	0.73	0.81	0.79	0.74	0.66
	6- or 8- LANE FREEWAY (3 or 4 LANES EACH DIRECTION)							
≥ 6	1.00	0.96	0.89	0.78	1.00	0.96	0.89	0.78
5	0.99	0.95	0.88	0.77	0.99	0.95	0.88	0.77
4	0.99	0.95	0.88	0.77	0.98	0.94	0.87	0.77
3	0.98	0.94	0.87	0.76	0.97	0.93	0.86	0.76
2	0.97	0.93	0.87	0.76	0.96	0.92	0.85	0.75
1	0.95	0.92	0.86	0.75	0.93	0.89	0.83	0.72
0	0.94	0.91	0.85	0.74	0.91	0.87	0.81	0.70

[a] Certain types of obstructions, high-type median barriers in particular, do not cause any deleterious effect on traffic flow. Judgment should be exercised in applying these factors.

TABLE 3-3. PASSENGER-CAR EQUIVALENTS ON EXTENDED GENERAL FREEWAY SEGMENTS

FACTOR	TYPE OF TERRAIN		
	LEVEL	ROLLING	MOUNTAINOUS
E_T for Trucks	1.7	4.0	8.0
E_B for Buses	1.5	3.0	5.0
E_R for RV's	1.6	3.0	4.0

TABLE 3-10. ADJUSTMENT FACTOR FOR THE CHARACTER OF THE TRAFFIC STREAM

TRAFFIC STREAM TYPE	FACTORS, f_p
Weekday or Commuter	1.0
Other	0.75–0.90[a]

[a] Engineering judgment and/or local data must be used in selecting an exact value.

TABLE 3-6. PASSENGER-CAR EQUIVALENTS FOR HEAVY TRUCKS (300 LB/HP)

GRADE (%)	LENGTH (MI)	PASSENGER-CAR EQUIVALENT, E_T															
		4-LANE FREEWAYS								6–8 LANE FREEWAYS							
PERCENT TRUCKS		2	4	5	6	8	10	15	20	2	4	5	6	8	10	15	20
< 1	All	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1	0–1/4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1/4–1/2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	1/2–3/4	4	4	4	4	3	3	3	3	4	4	4	3	3	3	3	3
	3/4–1	5	4	4	4	3	3	3	3	5	4	4	4	3	3	3	3
	1–1½	6	5	5	5	4	4	4	3	6	5	5	4	4	4	3	3
	> 1½	7	5	5	5	4	4	4	3	7	5	5	5	4	4	3	3
2	0–1/4	4	4	4	3	3	3	3	3	4	4	4	3	3	3	3	3
	1/4–1/2	7	6	6	5	4	4	4	4	7	5	5	5	4	4	4	4
	1/2–3/4	8	6	6	5	5	4	4	4	8	6	6	6	5	5	4	4
	3/4–1	8	6	6	6	5	5	5	5	8	6	6	6	5	5	5	5
	1–1½	9	7	7	7	6	6	5	5	9	7	7	6	5	5	5	5
	> 1½	10	7	7	7	6	6	5	5	10	7	7	6	5	5	5	5
3	0–1/4	6	5	5	5	4	4	4	3	6	5	5	5	4	4	4	3
	1/4–1/2	9	7	7	6	5	5	5	5	8	7	7	6	5	5	5	5
	1/2–3/4	12	8	8	7	6	6	6	6	10	8	7	6	5	5	5	5
	3/4–1	13	9	9	8	7	7	7	7	11	8	8	7	6	6	6	6
	> 1	14	10	10	9	8	8	7	7	12	9	9	8	7	7	7	7
4	0–1/4	7	5	5	5	4	4	4	4	7	5	5	5	4	4	3	3
	1/4–1/2	12	8	8	7	6	6	6	6	10	8	7	6	5	5	5	5
	1/2–3/4	13	9	9	8	7	7	7	7	11	9	9	8	7	6	6	6
	3/4–1	15	10	10	9	8	8	8	8	12	10	10	9	8	7	7	7
	> 1	17	12	12	10	9	9	9	9	13	10	10	9	8	8	8	8
5	0–1/4	8	6	6	6	5	5	5	5	8	6	6	6	5	5	5	5
	1/4–1/2	13	9	9	8	7	7	7	7	11	8	8	7	6	6	6	6
	1/2–3/4	20	15	15	14	11	11	11	11	14	11	11	10	9	9	9	9
	> 3/4	22	17	17	16	13	13	13	13	17	14	14	13	12	11	11	11
6	0–1/4	9	7	7	7	6	6	6	6	9	7	7	6	5	5	5	5
	1/4–1/2	17	12	12	11	9	9	9	9	13	10	10	9	8	8	8	8
	> 1/2	28	22	22	21	18	18	18	18	20	17	17	16	15	14	14	14

NOTE: If a length of grade falls on a boundary condition, the equivalent from the longer grade category is used. For any grade steeper than the percent shown, use the next higher grade category.

Sample Calculation - 6 Miles South of New Braunfels

The hourly demand volume of 1,191 vph in the southbound lanes was used to determine the level of service. Proportion of trucks in the traffic stream at this location was 16 percent. Terrain was practically level so a passenger car equivalency factor of 2.0 was used. A peak hour factor of 0.85 was used. The design speed used was 70 mph so c_j = 2,000 pcphpl. There are two lanes in each direction.

The adjustment for trucks (ignoring RV's and buses):

$$f_{HV} = 1/(1 + P_T(E_T - 1))$$

Substituting:

$$f_{HV} = 1/(1 + 0.16(2.0 - 1))$$

$$f_{HV} = 0.86$$

$$f_w = 0.99 \quad \text{(4-foot shoulders)}$$

$$f_p = 0.90 \quad \text{(Some recreational traffic)}$$

Service Flow, SF = V/PHF = 1405/0.85 = 1,653 vph

Equation (1) can now be used to compute the volume to capacity ratio:

$$v/c = SF/(c_j * N * f_w * f_{HV} * f_p)$$

$$v/c = 1,653/(2,000 * 2 * 0.99 * 0.86 * 0.90$$

$$v/c = 0.54 \quad . . . \text{LOS "B" from Table 3-1}$$