TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-91/1161-3, Volume 3		

4. Title and Subtitle	5. Report Date
Urban Arterial Work Zone Data	October 1990 February 1991/Revised
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
H.G. Hawkins Jr., M.A. Ogden, E.C. Crowe	Research Report 1161-3, Volume 3

9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135	11. Contract or Grant No. Study No. 2-18-89-1161

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Texas State Department of Highways and Public Transportation; Transportation Planning Division P.O. Box 5051 Austin, Texas 78763	Interim: September 1989 August 1990
	14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with DOT, FHWA.
Research Study Title: Design Process for Work Zone Speed Control and Traffic Control Guidelines for Urban Arterial Street Work Zones.

16. Abstract

A three-year study of urban arterial work zones is currently in progress. The objective of the study is to develop improved guidelines for selecting and implementing work zone traffic control on urban arterials. The second year study efforts are documented in a three volume report. The Technical Report appears in Volume 1 and the Appendices for Volume 1 appear in Volume 2. This report is Volume 3, and contains the data and supporting documentation used in the research analysis. The data includes traffic volumes, travel times, and traffic accidents. It also includes the motorist survey instruments and typical traffic control plans.

The study activities of the first two years confirm the need for improved guidelines. Current research and guidelines do not thoroughly address the topic. Field practice indicates a variation in the significance given to work zone traffic control on arterials. Traffic data indicates a decrease in traffic performance in the vicinity of construction zones. Surveys of motorists indicated they do not adequately understand construction signing and are concerned about the impacts of the construction on their mobility.

The preliminary findings and preliminary guidelines included in Volume 1 address a number of problem areas related to urban arterial work zones including traffic signals, left turns, lane widths, accidents, construction activities, driver needs, and public relations.

17. Key Words	18. Distribution Statement
Arterial Work Zone, Urban Work Zone, Work Zone, Urban Arterial Work Zone Guidelines	No restrictions. This document is available to the public through the National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	53	

Form DOT F 1700.7 (8-69)

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	centimetres	cm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km
AREA				
in^2	square inches	645.2	centimetres squared	cm^2
ft^2	square feet	0.0929	metres squared	m^2
yd^2	square yards	0.836	metres squared	m^2
mi^2	square miles	2.59	kilometres squared	km^2
ac	acres	0.395	hectares	ha
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft^3	cubic feet	0.0328	metres cubed	m^3
yd^3	cubic yards	0.0765	metres cubed	m^3

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

TEMPERATURE (exact)

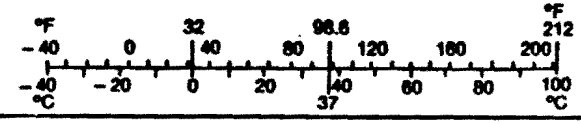
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi
AREA				
mm^2	millimetres squared	0.0016	square inches	in^2
m^2	metres squared	10.764	square feet	ft^2
km^2	kilometres squared	0.39	square miles	mi^2
ha	hectores (10 000 m^2)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T
VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m^3	metres cubed	35.315	cubic feet	ft^3
m^3	metres cubed	1.308	cubic yards	yd^3

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

URBAN ARTERIAL WORK ZONE DATA

VOLUME 3 - DATA

by

H. Gene Hawkins, Jr.
Assistant Research Engineer

Michael A. Ogden
Engineering Research Associate

Elizabeth C. Crowe
Engineering Research Associate

Research Report 1161-3, Volume 3
Study Number 2-18-89-1161

Design Process for Work Zone Speed Control
and
Traffic Control Guidelines for Urban Arterial Street Work Zones

Sponsored by
Texas State Department of Highways and Public Transportation
in Cooperation with the
U.S. Department of Transportation
Federal Highway Administration

Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843

October 1990

ABSTRACT

A three-year study of urban arterial work zones is currently in progress. The objective of the study is to develop improved guidelines for selecting and implementing work zone traffic control on urban arterials. The second year study efforts are documented in a three volume report. The Technical Report appears in Volume 1 and the Appendices for Volume 1 appear in Volume 2. This report is Volume 3, and contains the data and supporting documentation used in the research analysis. The data includes traffic volumes, travel times, and traffic accidents. It also includes the motorist survey instruments and typical traffic control plans.

The study activities of the first two years confirm the need for improved guidelines. Current research and guidelines do not adequately address the topic. Field practice indicates a variation in the significance given to work zone traffic control on arterials. Traffic data indicates a decrease in traffic performance in the vicinity of construction zones. Surveys of motorists indicated they do not adequately understand construction signing and are concerned about the impacts of the construction on their mobility.

The preliminary findings and preliminary guidelines included in Volume 1 address a number of problem areas related to urban arterial work zones including traffic signals, left turns, lane widths, accidents, construction activities, driver needs, and public relations.

IMPLEMENTATION STATEMENT

This study was sponsored by the Texas State Department of Highways and Public Transportation with the major objectives of establishing a comprehensive work zone speed control design process and developing improved traffic control guidelines applicable to urban arterial work zones. The results of this research effort will provide more uniform implementation of work zone speed zoning and speed control measures as well as lead to improved operations, and safety for both workers and drivers in urban arterial work zones.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas State Department of Highways and Public Transportation. This report does not constitute a standard, specification, or regulation.

TABLE OF CONTENTS

SUMMARY

Urban arterials are being required to carry a greater traffic load than in the past. Therefore, arterial construction has increased in order to provide additional capacity for the vehicular demand. The SDHPT has established the PASS (Principal Arterial Street System) program for the upgrading of major arterial streets. The resulting construction has led to a recognition of the lack of adequate guidelines for work zones on urban arterials.

One objective of this three year research study is to develop improved guidelines for selecting and implementing work zone traffic control on urban arterials. Study activities during the first two years include a literature review, selection of study sites, data collection at three study sites, two motorist surveys, and a review of current practice. The data collected as part of this study includes traffic volumes, travel times, and accident histories.

Second year efforts related to the urban arterial work zone study are documented in three separate reports. Research report 1161-3, Volume 1, Traffic Control Guidelines for Urban Arterial Work Zones - Technical Report provides a brief description of research activities and includes the preliminary findings and preliminary guidelines developed during the first two years of study. Research report 1161-3, Volume 2, Traffic Control Guidelines for Urban Arterial Work Zones - Appendices contains several appendices which provide additional detail about specific research activities summarized in Volume 1. Research report 1161-3, Volume 3, Urban Arterial Work Zone Data (this document) contains data related to the study sites and surveys.

Early research efforts focused on identifying and evaluating reference material addressing urban arterial work zones. The literature review indicated a large discrepancy between the availability of research information on freeway and rural highway work zones, and that on urban arterial work zones.

Early in the research study, three study sites were identified where appropriate data could be collected. The study sites selected include a 7 mile segment of F.M. 1960 in Houston, 6 miles of S.H. 6 in Houston, and a 2 mile segment of Abrams Road in Dallas.

Data collected at the study sites includes traffic volumes, travel times, and accident records. Data has been or will be collected during the preconstruction, construction, and postconstruction periods at most of the study sites. Preliminary analysis of the data was used in identifying preliminary problems and preliminary guidelines.

Two motorist surveys were conducted in conjunction with this project. The first survey was administered on F.M. 1960 in Houston and the second on Abrams Road in Dallas. Both surveys were similar in format and delivery. The surveys were developed to ascertain knowledge about work zone signing in general, determine confusing or problematic areas of the signing, and elicit information from motorists concerning problems with the construction projects that may not be related to understanding traffic control devices. The surveys were conducted at shopping areas and drivers license offices by asking participants to respond to a series of pictures and questions related to the work zone in the area of the survey.

Discussions were held with city and state traffic personnel in order to determine the current practice of traffic control on urban arterial work zones. A survey was conducted of traffic engineers from local transportation agencies. A survey of city traffic engineers indicated that there is variation in the degree in which urban arterial work zone traffic control is stressed. Several individuals indicated the Texas MUTCD did not sufficiently address work zone traffic control on urban arterials.

The research activities of the first and second year have identified a number of preliminary findings related to urban arterial work zones. These findings are listed in Volume 1. Most of the issues present some form of an obstacle to safe and efficient movement of traffic through the arterial work zone. Three categories have been developed for classifying the major issues: 1) traffic control and operations, 2) construction activities, and 3) driver needs.

Preliminary findings related to traffic control and operations address traffic signals, left turns, lane widths, pedestrians, traffic diversion, accidents, and transit. Preliminary findings related to construction activities address lane striping, barriers, lane closures, scheduling,

crossovers, and grades. Preliminary findings related to driver needs address street signing, business signing, enforcement, and public relations.

An analysis of the preliminary findings led to the development of preliminary guidelines for use on urban arterial work zones. The preliminary guidelines are found in Volume 1 and are divided into those related to the traffic control plan, traffic control devices, construction or contractor activities, and public relations.

One year of research remains on this contract. Activities during the third year will include continuing previous study efforts and performing additional activities to evalute the preliminary guidelines contained in this report.

SECTION I

TRAFFIC VOLUME DATA

This section of Volume 3 contains the following traffic volume data for F.M. 1960, S.H. 6, and Abrams Road:

F.M. 1960

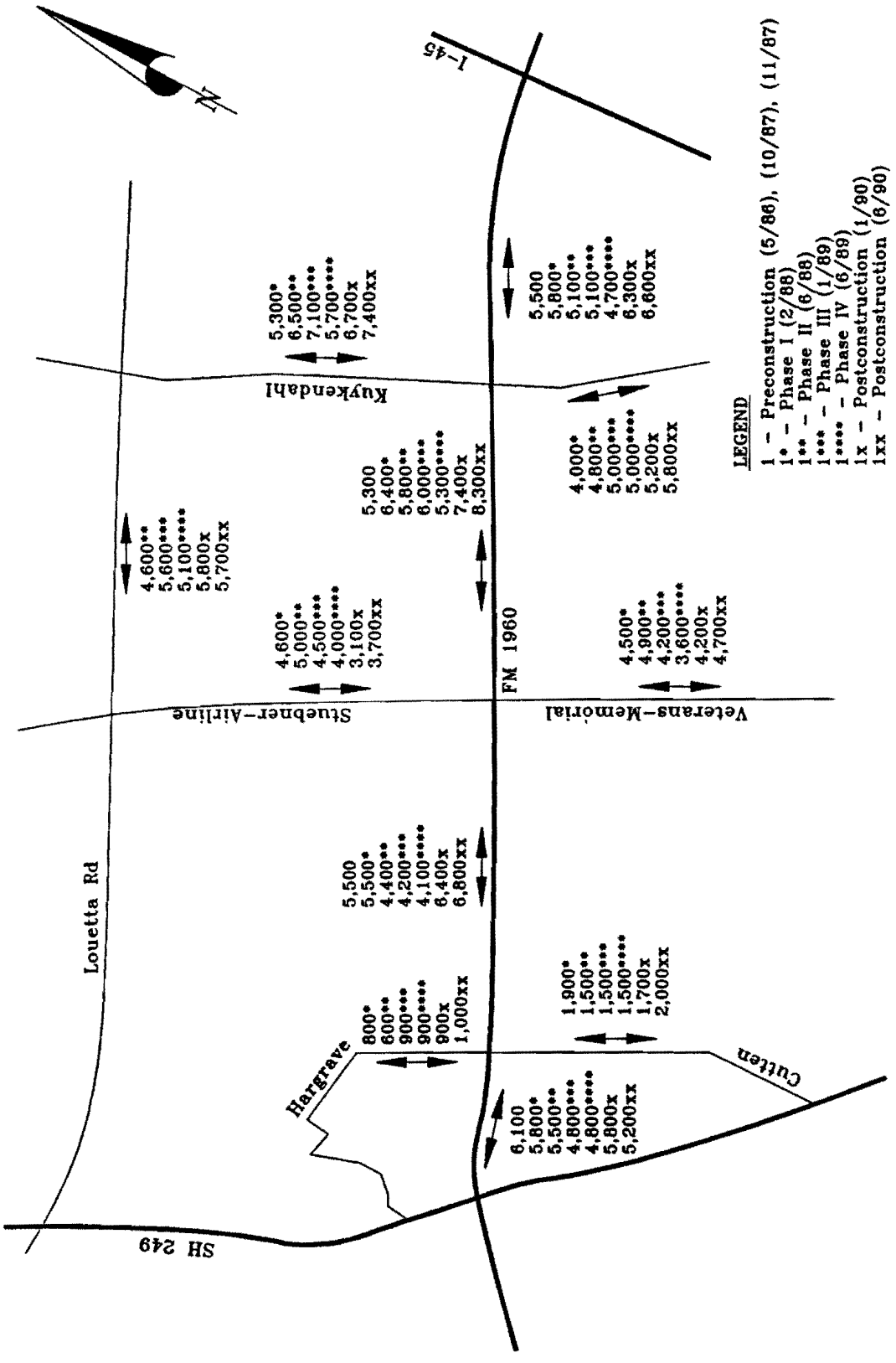
Morning Peak Period Volumes
Evening Peak Period Volumes
Eastbound Hourly Volume Plot - Cutten Road to Veterans Memorial
Westbound Hourly Volume Plot - Cutten Road to Veterans Memorial
Eastbound Hourly Volume Plot - Veterans Memorial to Kuykendahl
Westbound Hourly Volume Plot - Veterans Memorial to Kuykendahl

S.H. 6

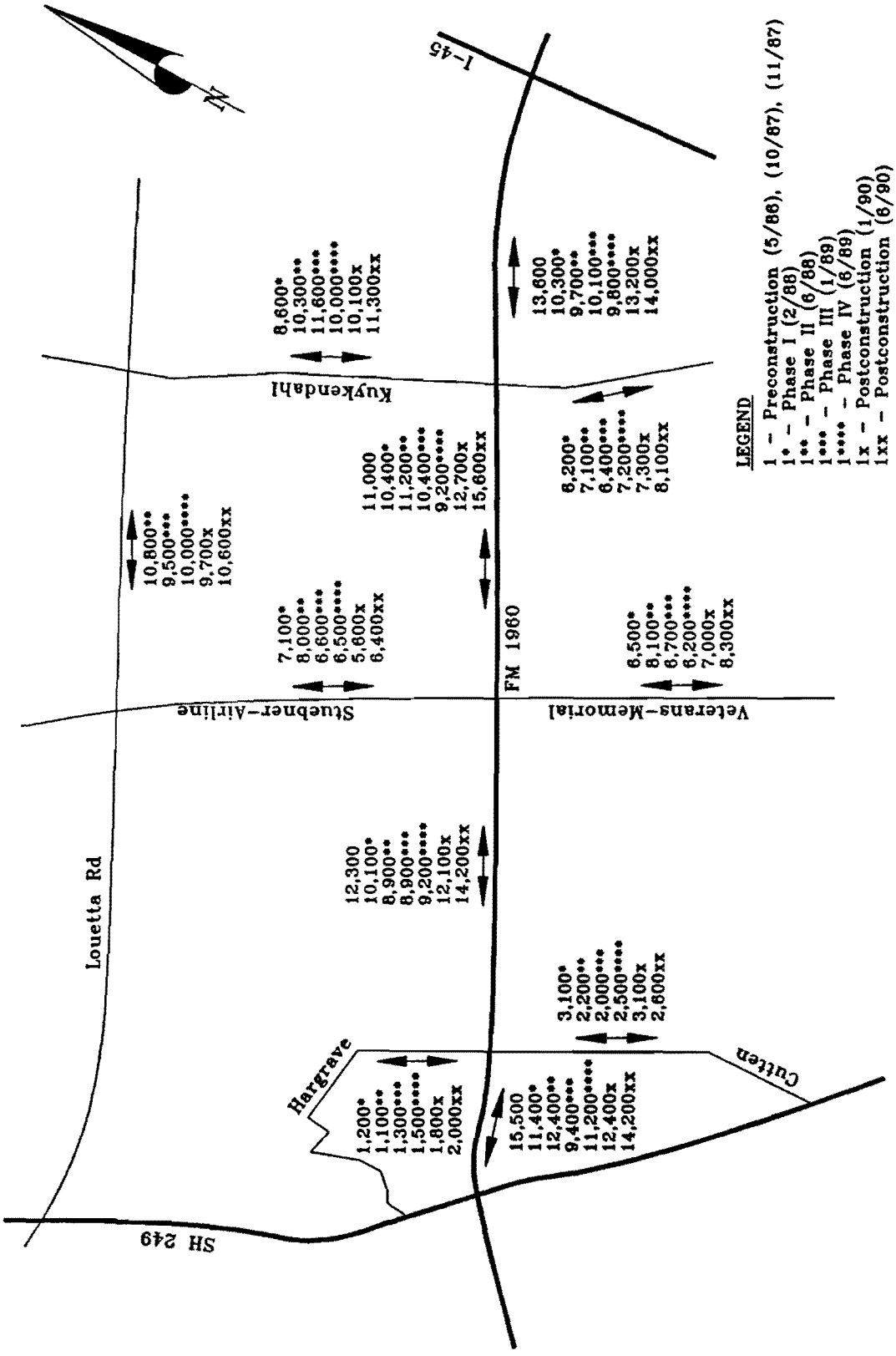
Morning Peak Period Volumes
Evening Peak Period Volumes
Northbound Hourly Volume Plot - Kieth Harrow to Little York
Southbound Hourly Volume Plot - Kieth Harrow to Little York
Northbound Hourly Volume Plot - F.M. 529 to West Road
Southbound Hourly Volume Plot - F.M. 529 to West Road

Abrams Road

Morning Peak Period Volumes
Evening Peak Period Volumes
Northbound Hourly Volume Plot - Church Street to Royal Lane
Southbound Hourly Volume Plot - Church Street to Royal Lane
Northbound Hourly Volume Plot - Royal Lane to Whitehurst
Southbound Hourly Volume Plot - Royal Lane to Whitehurst
Northbound Hourly Volume Plot - Whitehurst to Forest
Southbound Hourly Volume Plot - Whitehurst to Forest



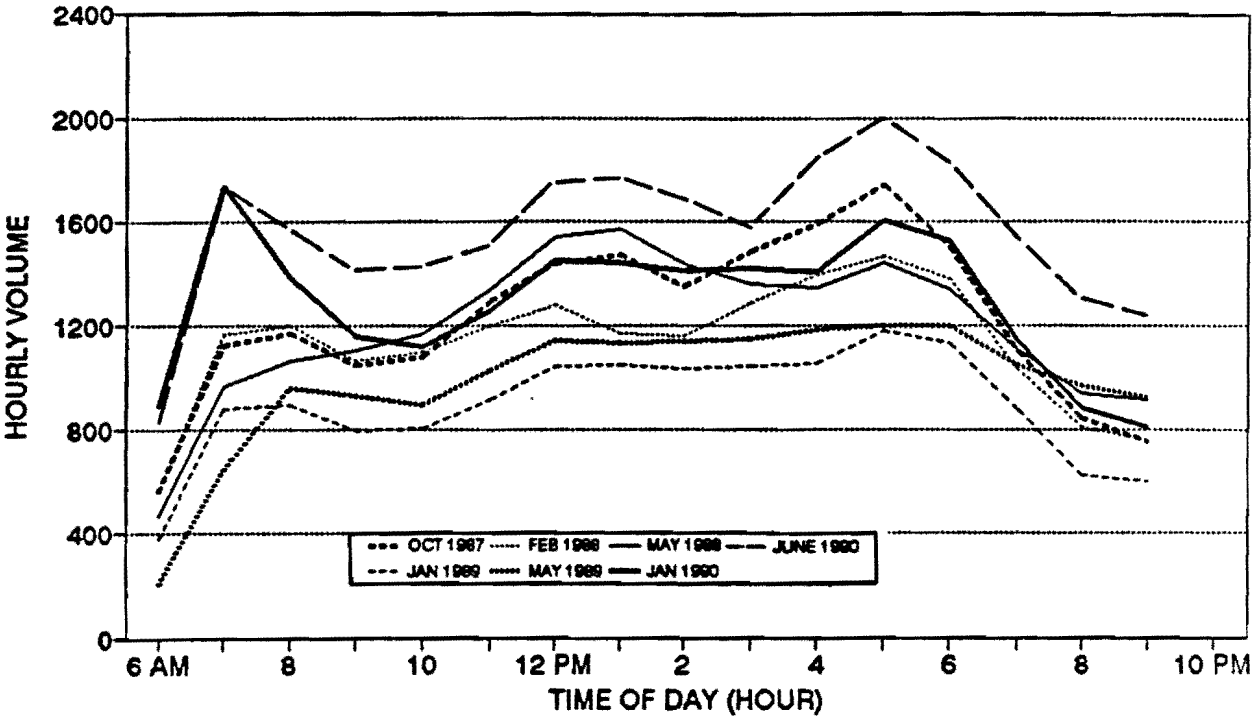
F.M. 1960 Area Morning Peak Period Volumes (6:00 - 9:00 a.m.)



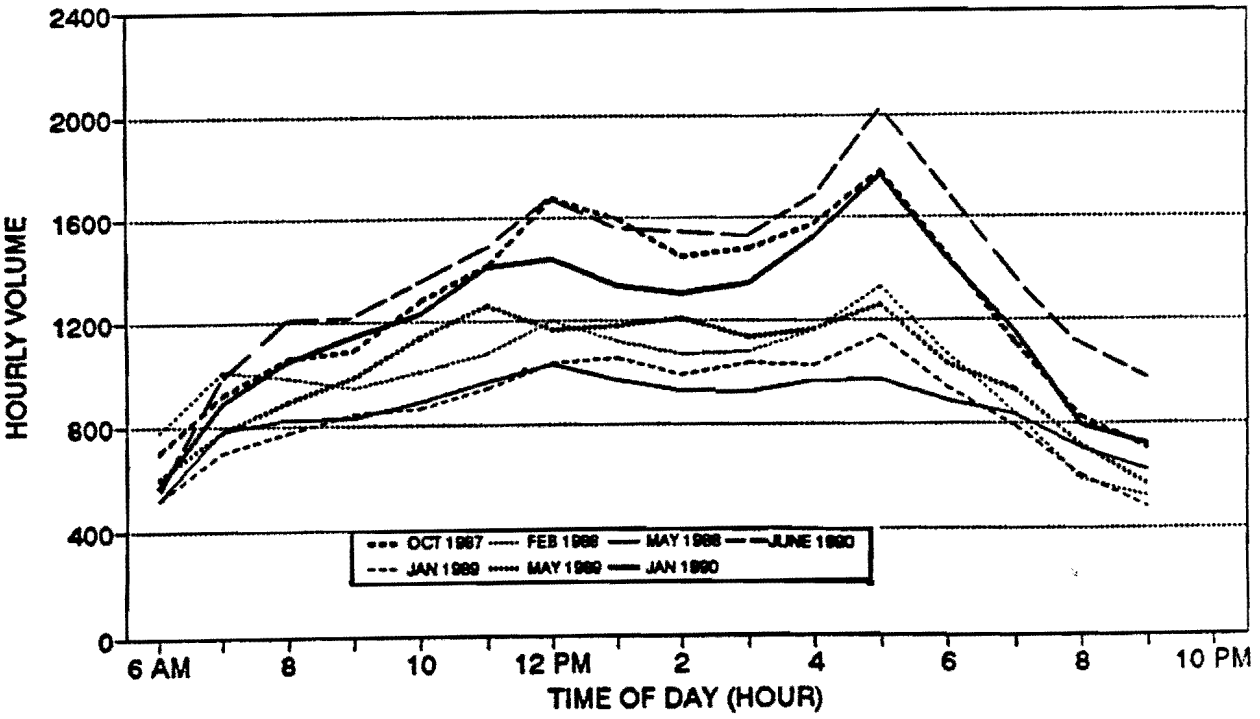
F.M. 1960 Area Evening Peak Period Volumes (3:00 - 7:00 p.m.)

FM 1960
CUTTEN ROAD TO VETERANS MEMORIAL

EASTBOUND

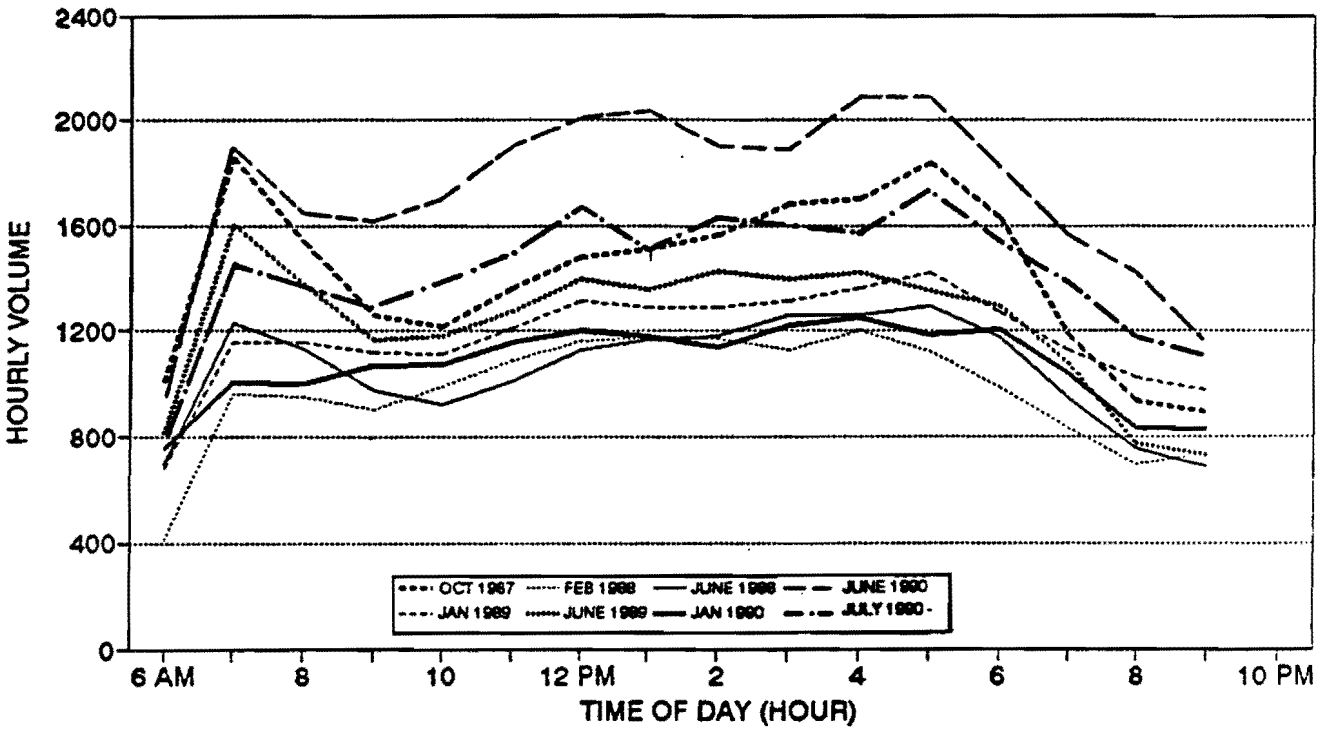


WESTBOUND

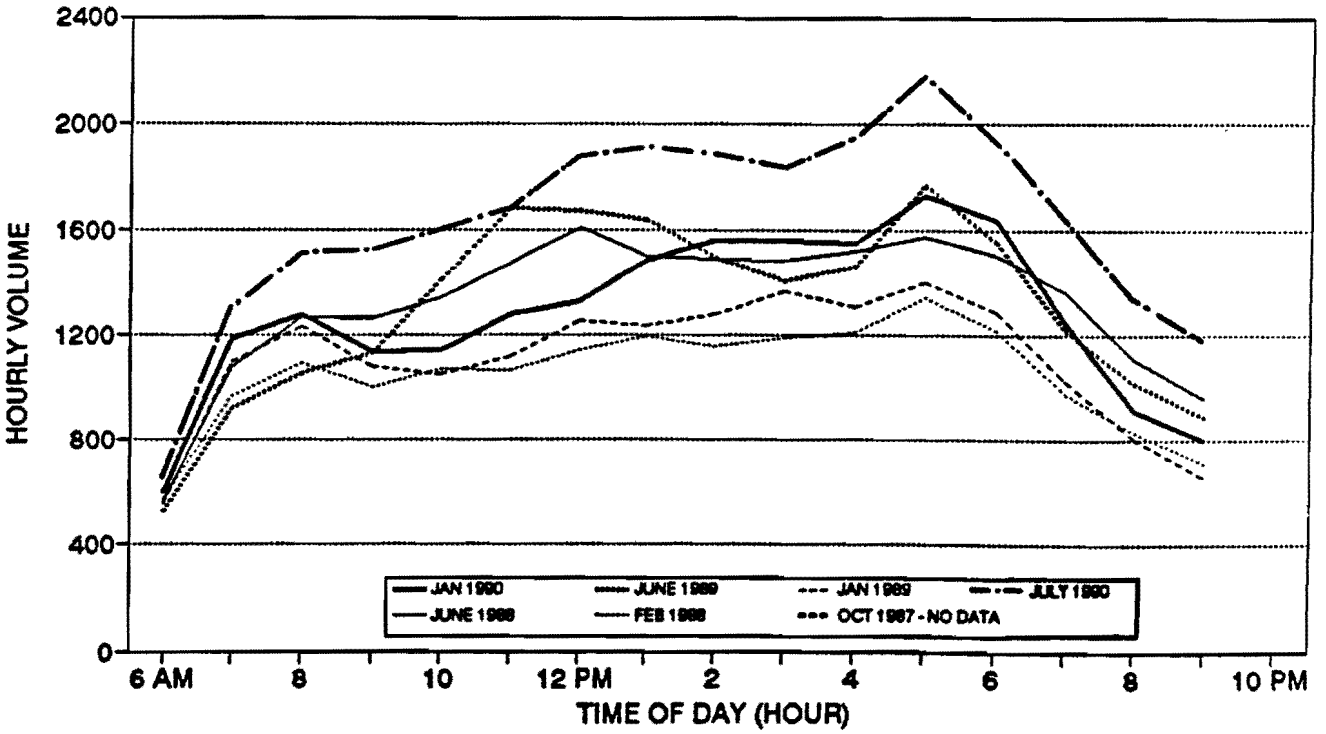


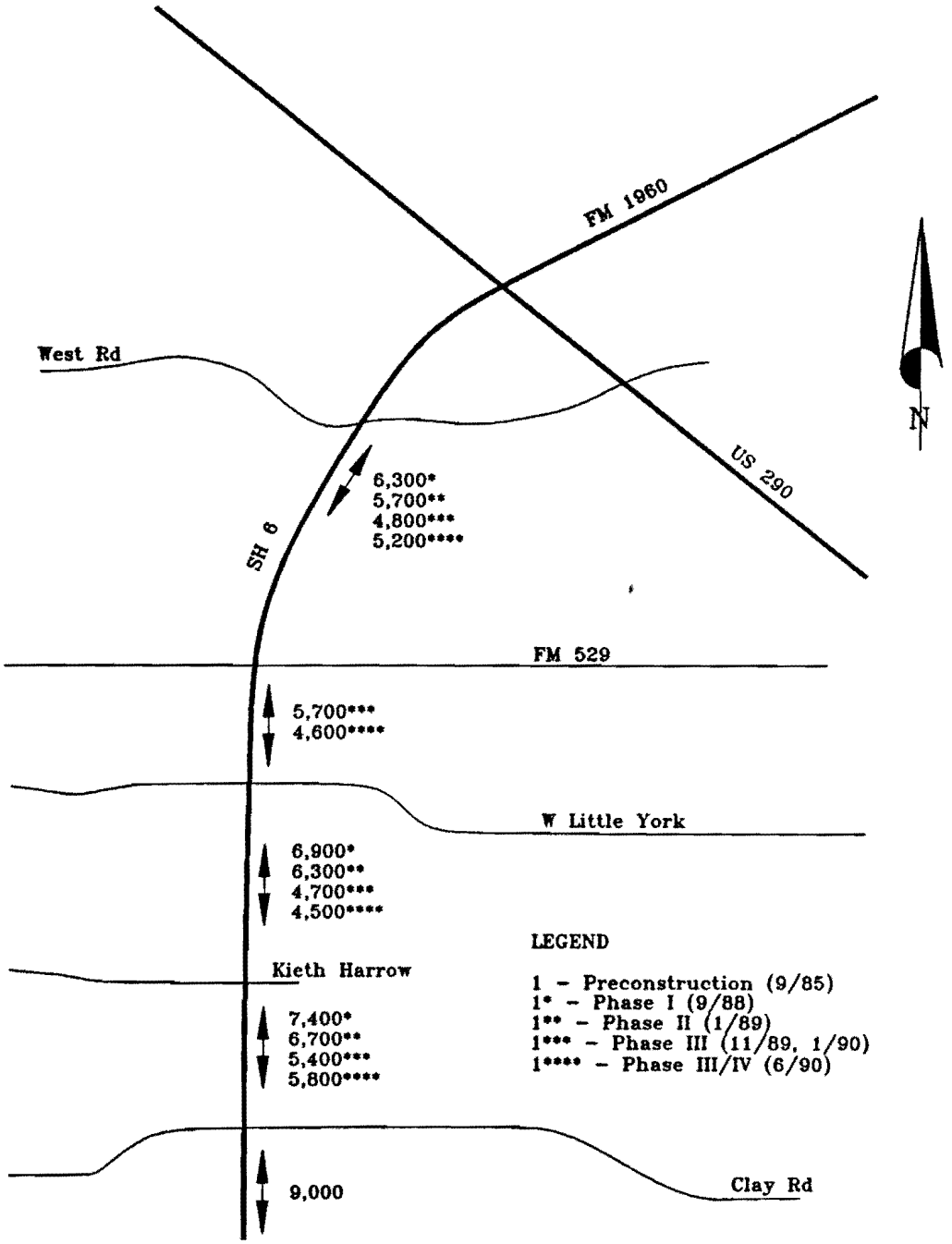
FM 1960
VETERANS MEMORIAL TO KUYKENDAHL

EASTBOUND

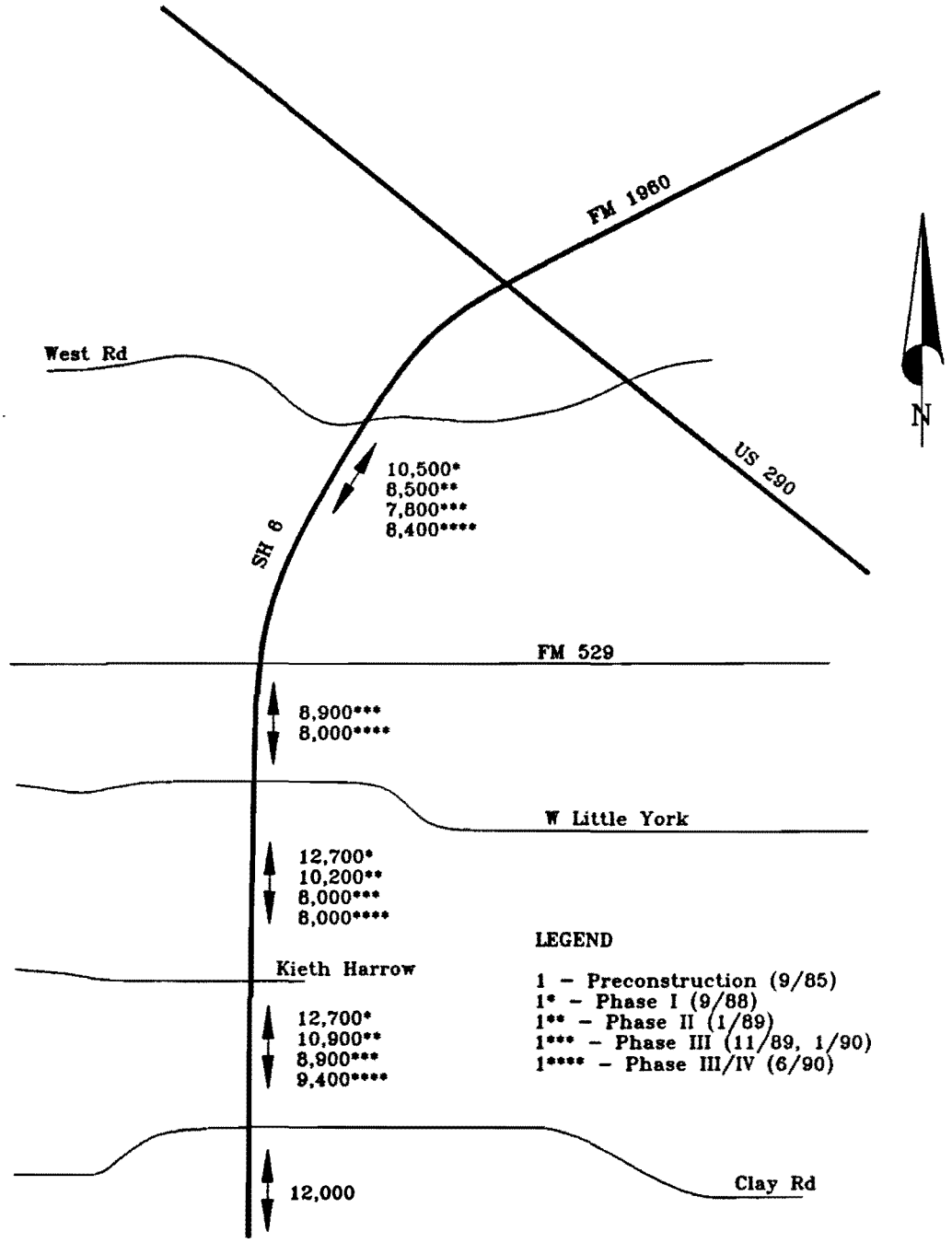


WESTBOUND





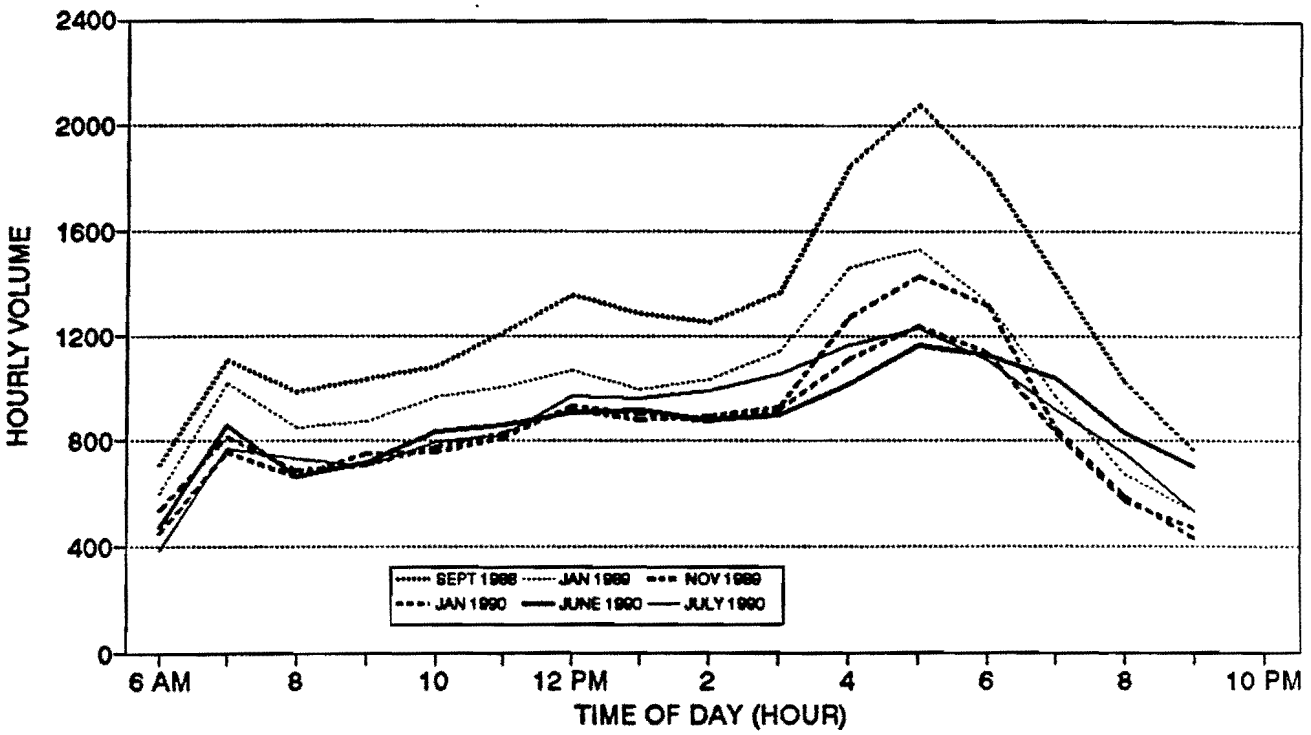
S.H. 6 Morning Peak Period Volumes (6:00 - 9:00 a.m.)



S.H. 6 Evening Peak Period Volumes (3:00 - 7:00 p.m.)

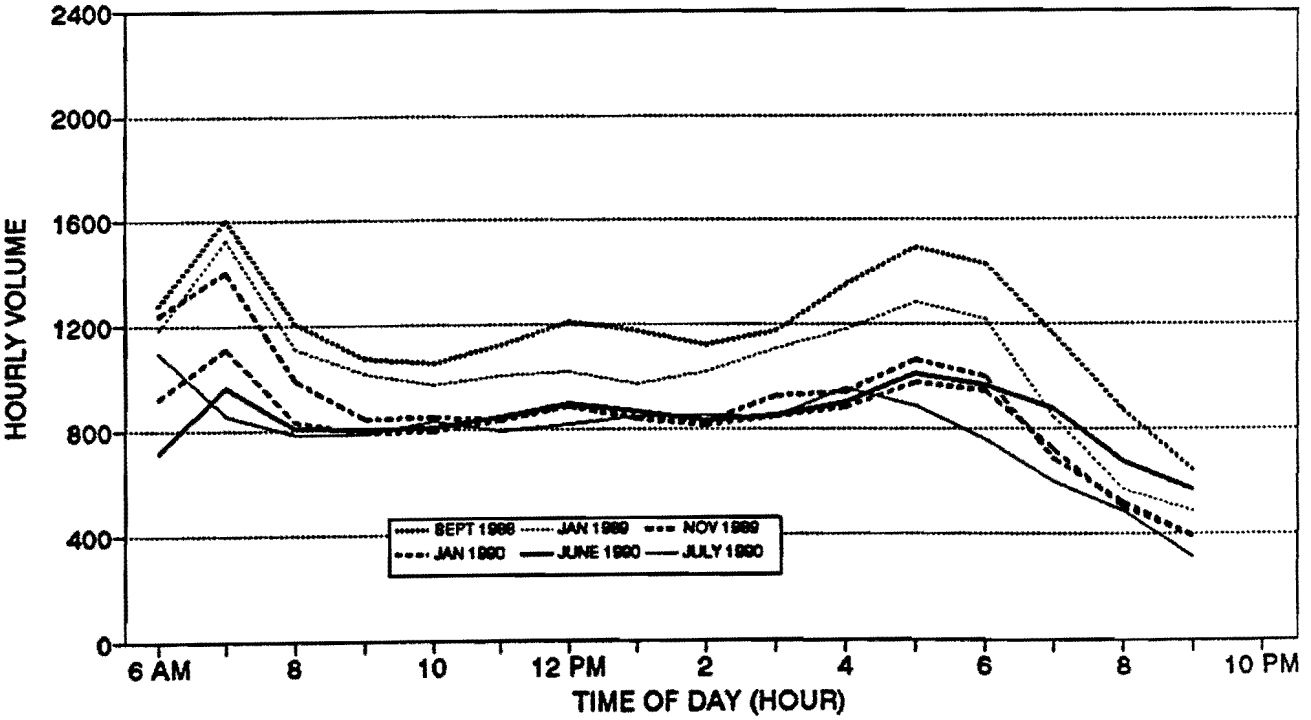
STATE HIGHWAY 6
KIETH HARROW TO LITTLE YORK *

NORTHBOUND



* EXCEPTION: JULY 1990 TAKEN SOUTH OF FM 529

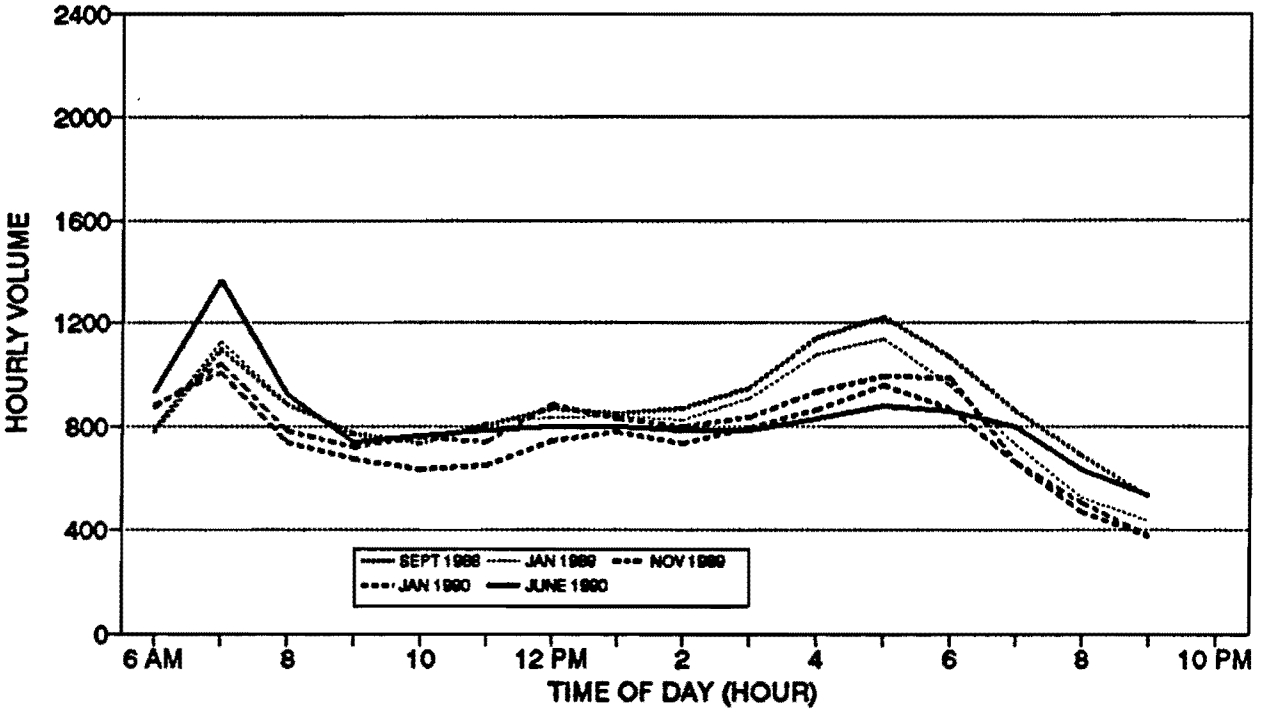
SOUTHBOUND



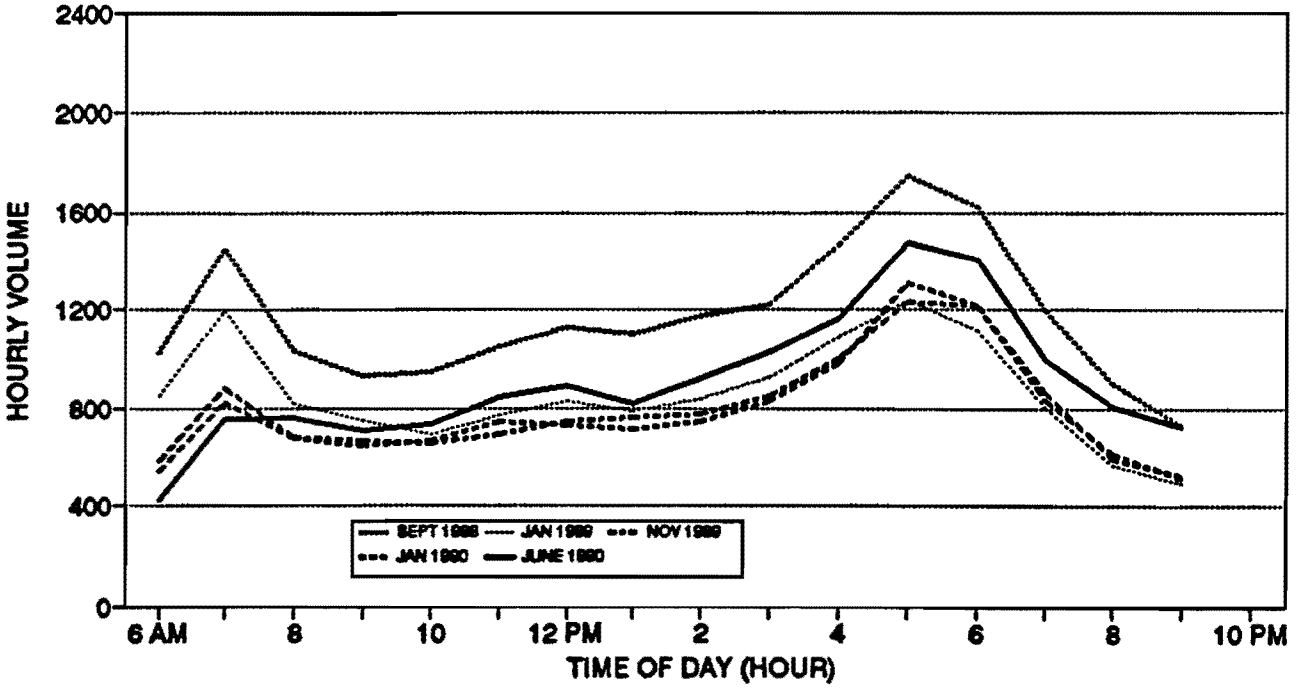
* EXCEPTION: NOV 1989 AND JULY 1990 TAKEN FROM SOUTH OF FM 529

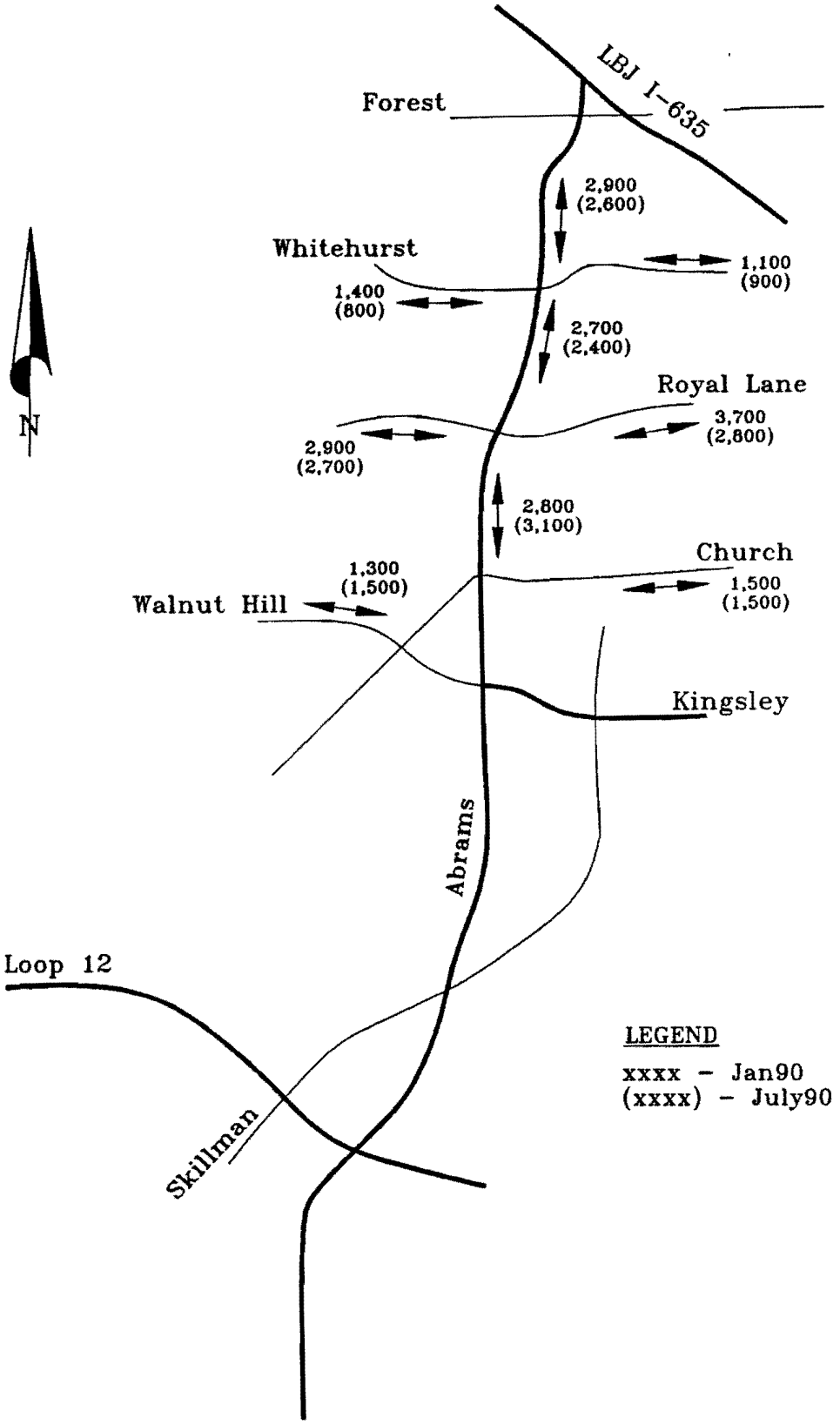
STATE HIGHWAY 6
FM 529 TO WEST ROAD

NORTHBOUND

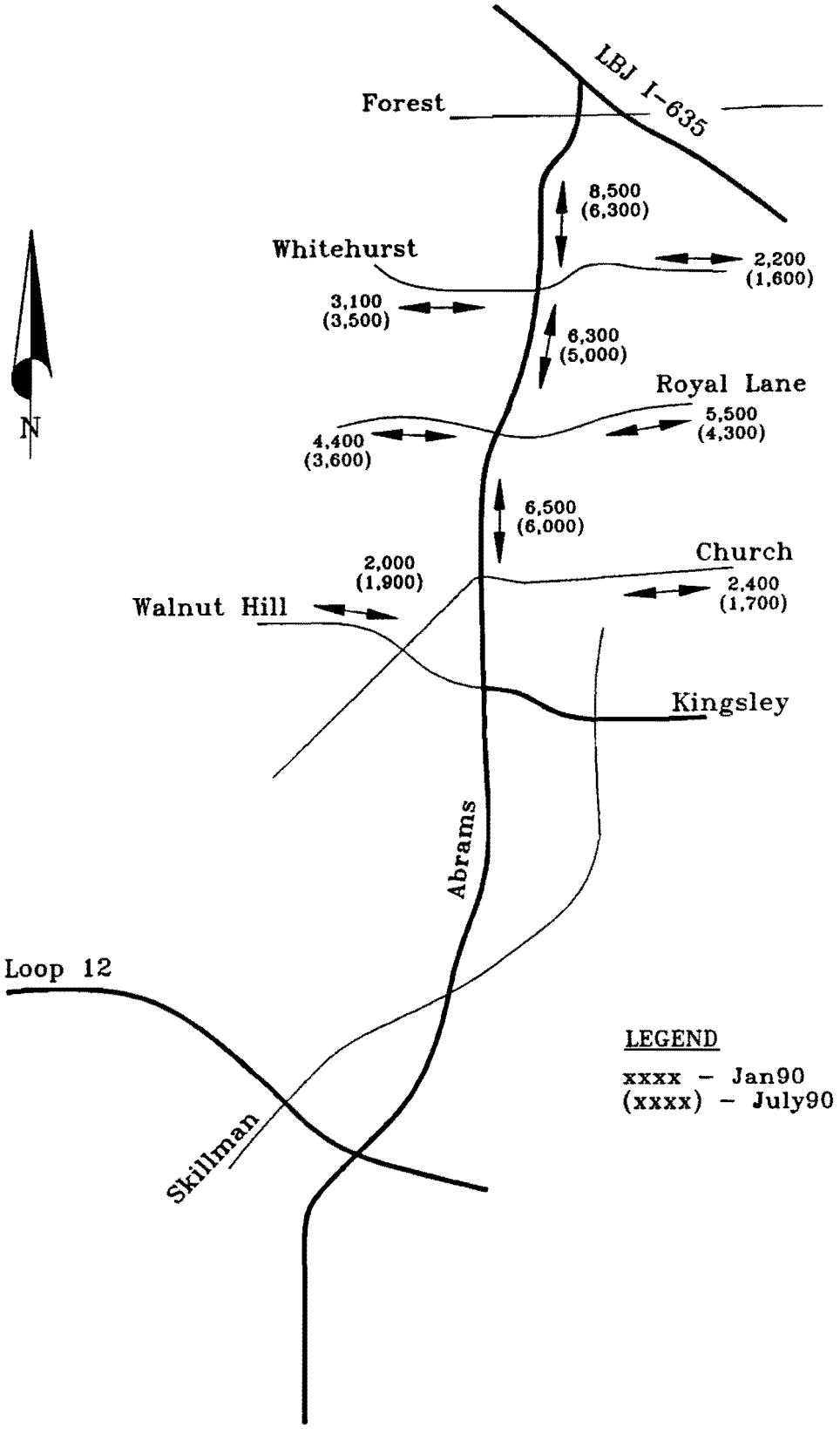


SOUTHBOUND





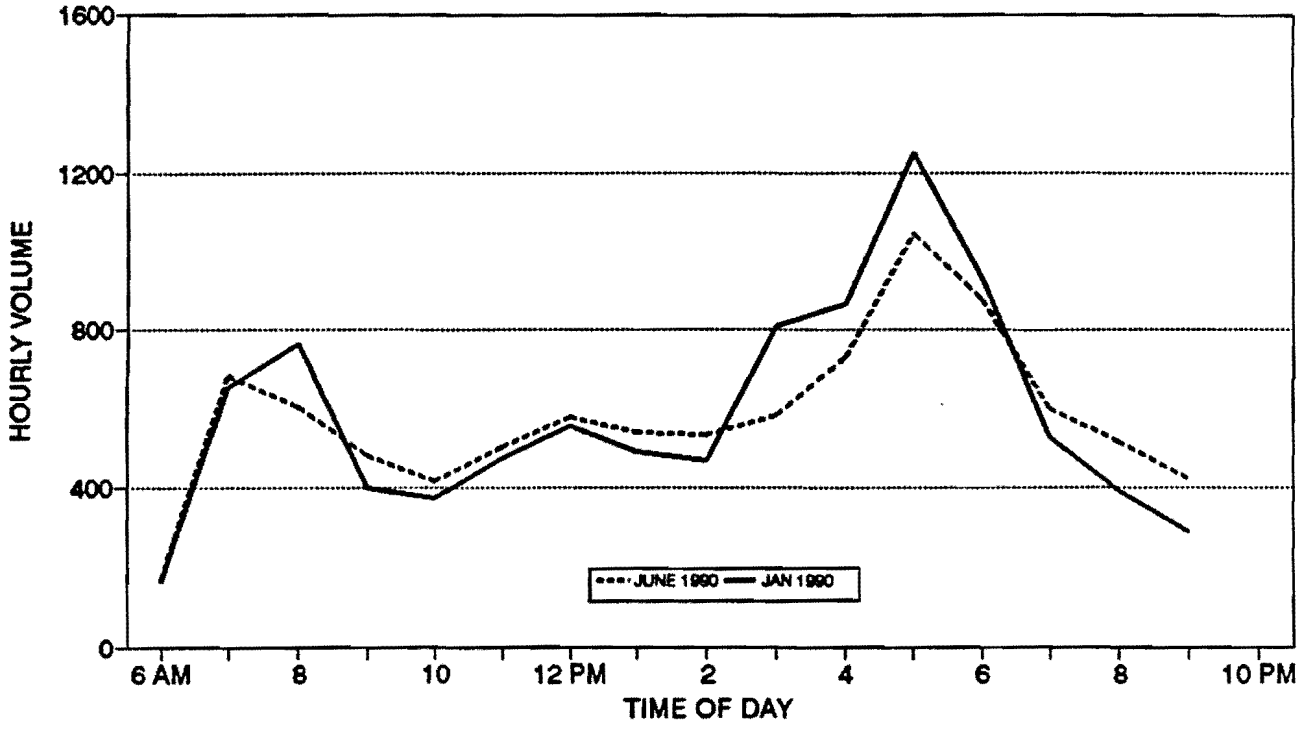
Abrams Road Morning Peak Period Volumes (6:00 - 9:00 a.m.)



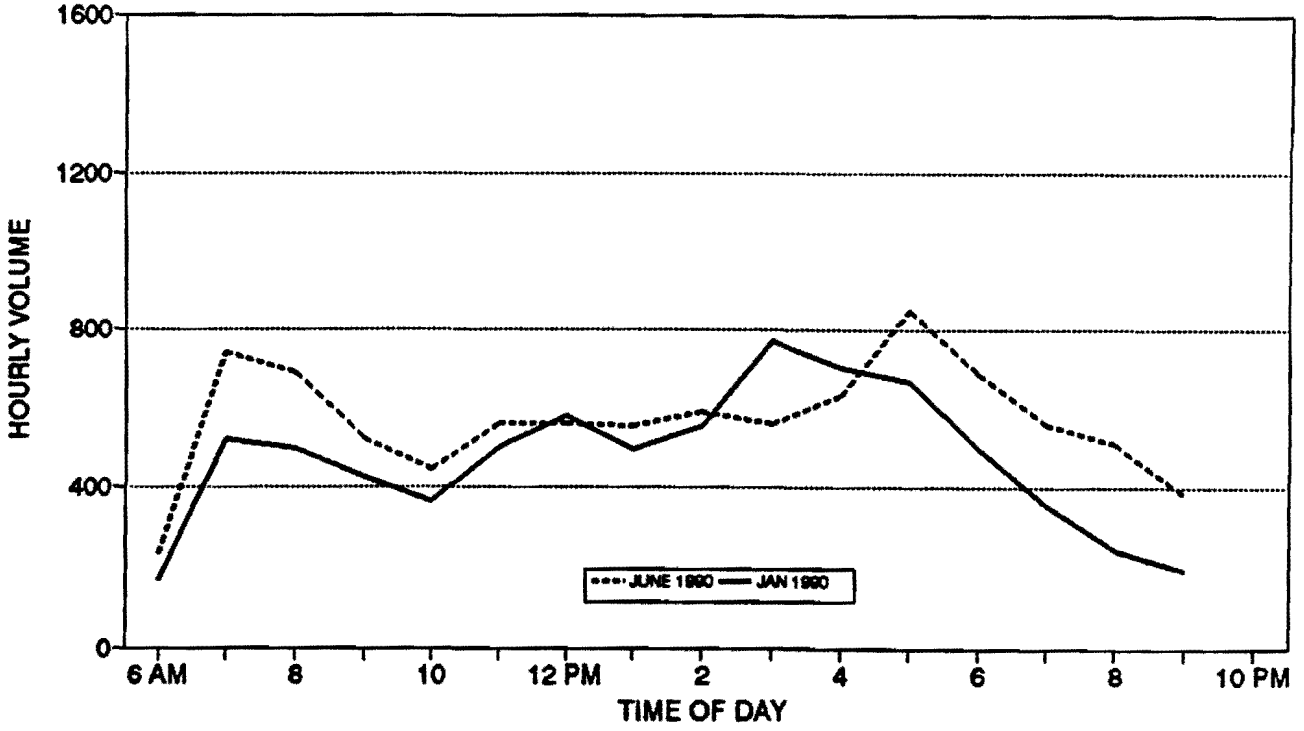
Abrams Road Evening Peak Period Volumes (3:00 - 7:00 a.m.)

ABRAMS ROAD
CHURCH TO ROYAL

NORTHBOUND

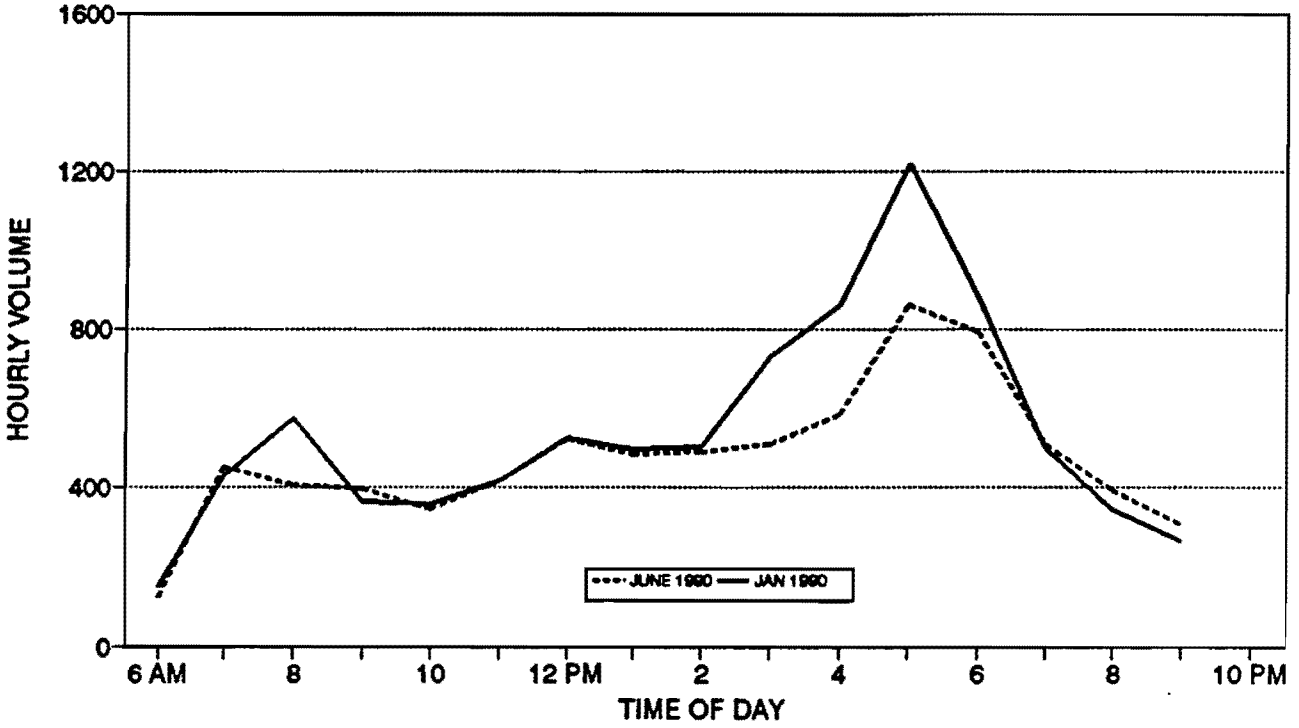


SOUTHBOUND

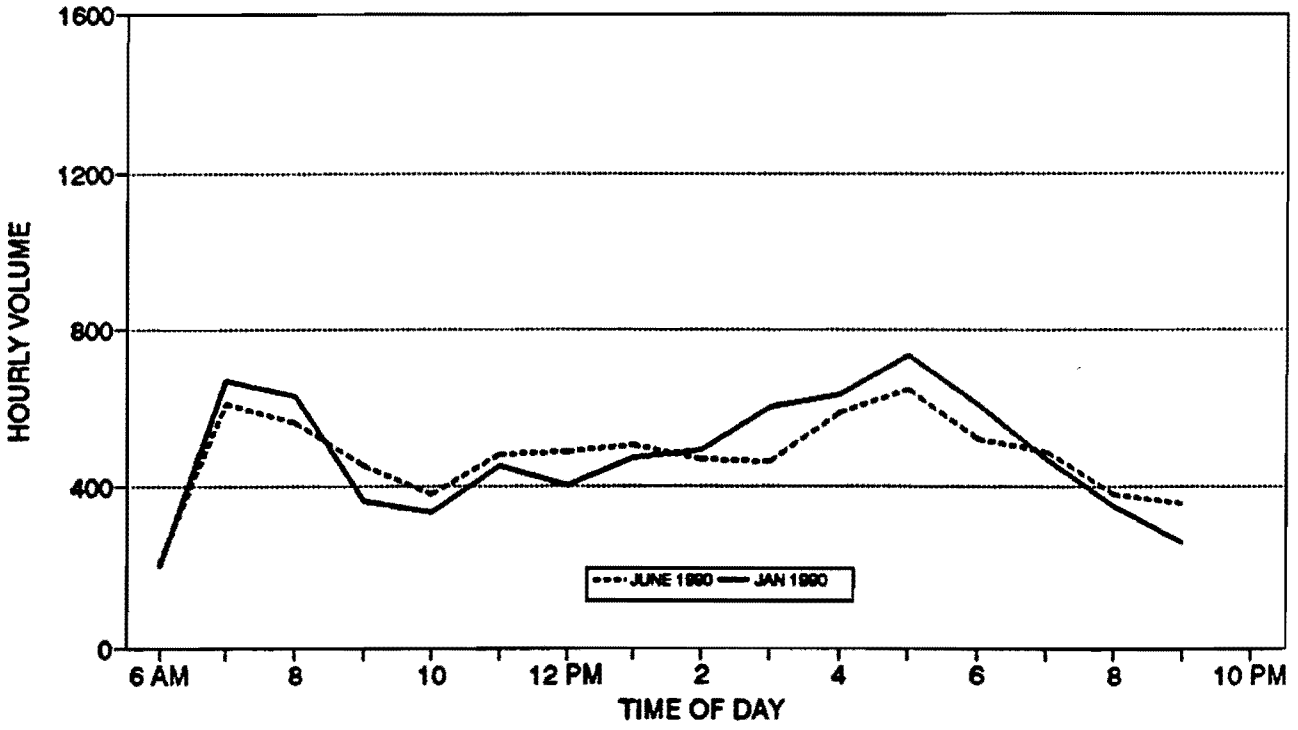


ABRAMS ROAD
ROYAL TO WHITEHURST

NORTHBOUND

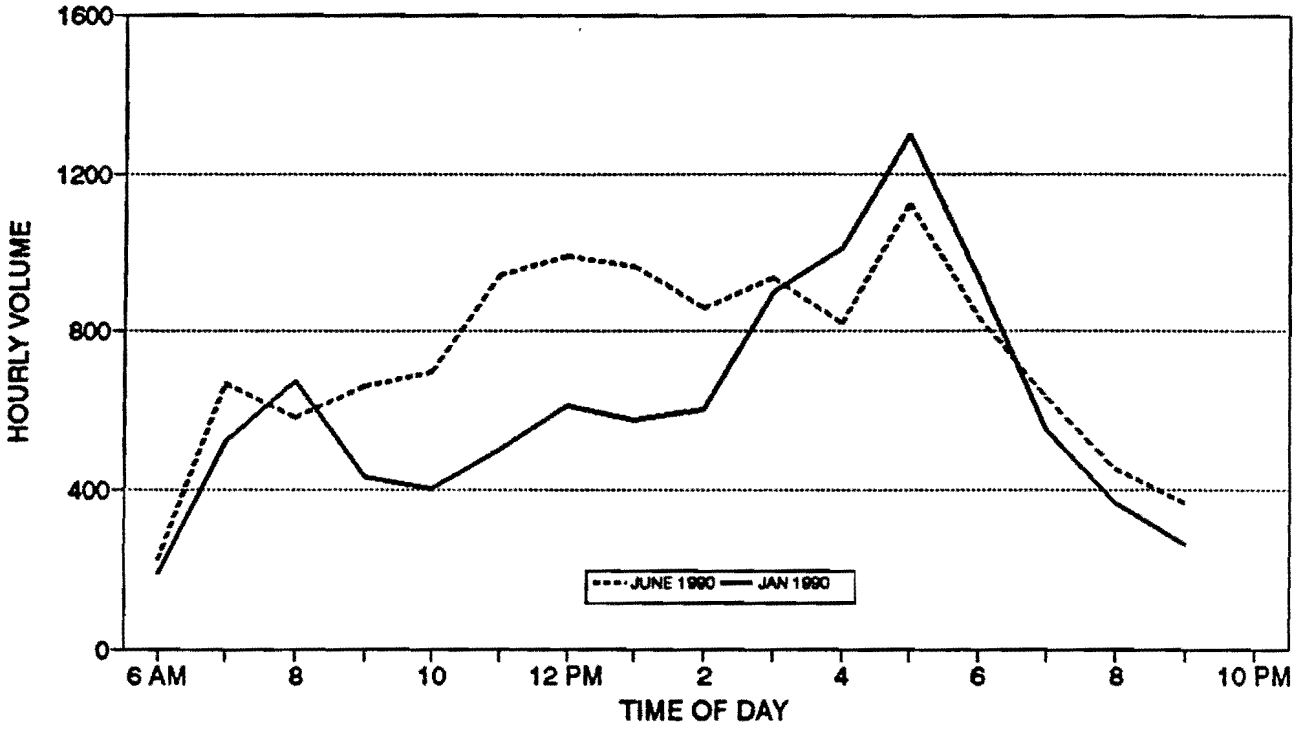


SOUTHBOUND

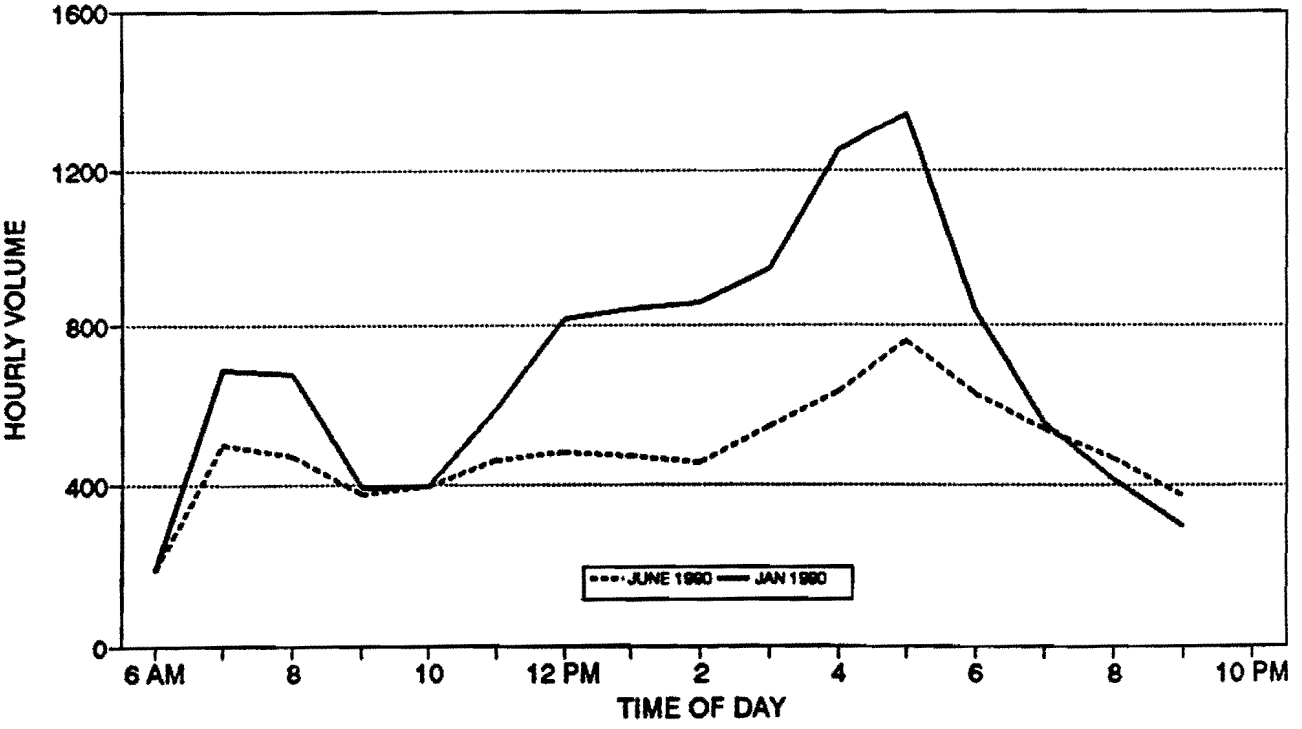


ABRAMS ROAD
WHITEHURST TO FOREST

NORTHBOUND



SOUTHBOUND



SECTION II

TRAVEL TIME DATA

This section of Volume 3 provides a summary of the travel time runs made on F.M. 1960, S.H. 6, and Abrams Road during various construction phases. The following travel time data is included:

F.M. 1960

Westbound - Hafer Road to S.H. 249

Eastbound - S.H. 249 to Hafer Road

S.H. 6

Northbound - Clay Road to U.S. 290

Southbound - U.S. 290 to Clay Road

Abrams Road

Northbound - Kingsley to Forest Lane

Southbound - Forest Lane to Kingsley

FM 1960 - Westbound
Limits - Hafer Road to State Highway 249

DATE	PHASE	PEAK PERIOD					
		AM		OFF		PM	
		TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Mar. 16, 1988	II	16.91	27.33	20.98	22.02	21.42	21.57
Mar. 29, 1988		16.30	28.35	23.55	19.62	20.92	22.09
Mar. 30, 1988		15.97	28.92	--	--	--	--
Mar. 31, 1988		--	--	28.20	16.38	--	--
Apr. 4, 1988		--	--	--	--	24.61	18.78
June 28, 1988		15.71	29.41	20.48	22.56	19.51	23.68
June 29, 1988		15.70	29.43	20.88	22.12	20.29	22.77
June 30, 1988		16.13	28.65	22.42	20.61	21.08	21.91
Jan. 17, 1989	III	16.10	28.70	19.39	23.83	22.08	20.93
Jan. 19, 1989		15.95	28.96	20.01	23.09	21.44	21.55
May 6, 1989	IV	18.74	24.66	21.72	21.28	23.49	32.00
May 7, 1989		17.52	26.37	25.86	17.87	25.86	17.87
Jan. 25, 1990	POST	15.45	29.91	16.86	27.42	--	--
Jan. 31, 1990		--	--	14.10	32.77	--	--
Feb. 13, 1990		--	--	16.59	29.75	19.00	24.32
May 11, 1990		--	--	16.68	27.79	16.48	28.21
May 12, 1990		15.08	30.63	15.54	29.87	17.20	27.00
May 14, 1990		--	--	--	--	17.93	25.77
May 22, 1990		14.67	31.49	--	--	--	--
July 11, 1990		--	--	16.68	27.79	16.48	28.21
July 12, 1990		15.08	30.63	15.54	29.87	17.20	27.00

FM 1960 - Eastbound
Limits - State Highway 249 to Hafer Road

DATE	PHASE	PEAK PERIOD					
		AM		OFF		PM	
		TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Mar. 16, 1988	II	15.84	29.16	20.30	22.76	17.47	26.45
Mar. 29, 1988		14.68	31.46	18.03	25.62	18.73	24.67
Mar. 30, 1988		15.00	30.80	22.53	20.51	15.68	29.46
June 28, 1988		15.68	29.46	21.90	21.10	19.73	23.41
June 29, 1988		15.49	29.83	20.00	23.10	19.02	24.29
June 30, 1988		15.32	30.16	20.69	22.34	21.45	21.54
Jan. 17, 1989	III	17.77	25.99	19.15	24.13	20.51	22.53
Jan. 19, 1989		16.44	28.10	19.78	23.35	20.27	22.80
May 6, 1989	IV	18.87	24.48	24.49	18.86	22.21	20.80
May 7, 1989		17.51	26.39	20.97	22.04	24.01	19.24
Jan. 13, 1990	POST	--	--	15.96	28.95	--	--
Jan. 25, 1990		14.28	32.35	16.19	28.54	--	--
Jan. 31, 1990		--	--	14.41	32.05	--	--
Feb. 13, 1990		--	--	--	--	17.35	26.63
May 14, 1990		--	--	--	--	15.64	29.55
June 22, 1990		14.16	32.63	--	--	--	--
July 11, 1990		13.97	33.07	15.98	28.90	15.27	30.25
July 12, 1990		--	--	15.00	30.81	15.85	29.16

S.H. 6 Northbound
Limits - Clay Road to US 290

DATE	PEAK PERIOD					
	AM		OFF		PM	
	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Oct. 25, 1988	10.65	35.77	12.65	30.12	13.20	28.86
Jan. 25, 1989	12.14	31.38	11.49	33.17	12.53	30.42
Jan. 25, 1989	13.66	27.89	13.27	28.72	--	--
Nov. 1, 1989	11.81	32.26	10.81	35.26	11.92	31.96
Nov. 2, 1989	--	--	13.35	28.54	15.05	25.32
Nov. 3, 1989	14.60	26.10	--	--	--	--
Jan. 23, 1990	12.29	31.00	14.13	26.96	15.18	25.10
Jan. 24, 1990	13.50	28.22	14.04	27.14	13.82	27.57
May 15, 1990	12.21	31.2	12.34	30.88	13.32	28.60
May 16, 1990	13.61	27.99	15.27	24.94	12.73	29.93
May 17, 1990	12.27	31.05	--	--	13.31	28.63
June 21, 1990	12.48	30.53	--	--	--	--
July 11, 1990	--	--	15.84	24.05	14.07	27.08
July 12, 1990	12.51	30.46	--	--	--	--
July 13, 1990	13.57	27.27	--	--	--	--

Note: Phases are not listed due to different phasing within the different construction segments.

S.H. 6 Southbound
Limits - U.S. 290 to Clay Road

DATE	PEAK PERIOD					
	AM		OFF		PM	
	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Oct. 25, 1988	13.23	28.81	11.11	34.29	12.16	31.35
Jan. 24, 1989	15.88	24.00	12.82	29.73	13.73	27.70
Jan. 25, 1989	15.78	24.14	13.85	27.52	13.93	27.35
Nov.1, 1989	12.02	31.70	12.64	30.15	12.93	29.47
Nov. 2, 1989	13.50	28.22	13.33	28.58	13.55	28.12
Nov. 3, 1989	12.31	30.95	--	--	--	--
Jan. 22, 1990	--	--	11.40	33.42	12.43	30.65
Jan. 23, 1990	13.48	28.26	12.27	31.05	13.36	28.52
Jan. 24, 1990	13.87	27.47	--	--	--	--
May 15, 1990	13.40	28.43	13.10	29.08	14.22	26.79
May 16, 1990	13.75	27.71	13.79	27.63	13.44	28.35
May 17, 1990	13.59	28.04	--	--	13.40	28.43
June 21, 1990	13.14	28.99	11.87	32.10	15.00	25.40
July 21, 1990	--	--	14.69	25.94	14.92	25.54
July 12, 1990	13.70	27.81	--	--	--	--
July 13, 1990	13.04	29.21	--	--	--	--

Note: Phases are not listed due to the different phasing within the different construction segments.

Abrams Road - Northbound
Limits - Kingsley to Forest Lane

DATE	PHASE	PEAK PERIOD					
		AM		OFF		PM	
		TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Jan. 1, 1990	II	4.86	25.94	3.59	35.10	4.62	27.27
Feb. 13, 1990		4.83	26.11	3.87	32.59	5.20	24.23
June 26, 1990	II & III	4.41	28.56	4.64	27.17	5.19	24.28
June 28, 1990		4.41	28.56	3.94	32.02	4.36	28.87

Abrams Road - Southbound
Limits - Forest Lane to Kingsley

DATE	PHASE	PEAK PERIOD					
		AM		OFF		PM	
		TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)	TIME (Min)	SPEED (MPH)
Jan. 1, 1990	II	4.44	28.35	4.23	29.75	4.72	26.71
Feb. 13, 1990		4.64	27.16	4.53	27.82	5.18	24.31
June 26, 1990	II & III	4.06	31.05	5.08	24.82	4.36	28.91
June 28, 1990		4.75	26.54	4.74	26.56	4.36	28.93

SECTION III

TRAFFIC ACCIDENT DATA

The traffic accident data summarized in this section provides detailed information about the different factors related to traffic accidents for F.M. 1960, S.H. 6, and Abrams Road. The data addresses the following factors for each arterial:

- Day of Week
  - Weekend
  - Weekday
- Time of Day
  - Daylight
  - Night
- First Harmful Movement
  - Non-Collision
  - Overturned
  - Pedestrian
  - Other Motor Vehicles
  - Train
  - Parked Car
  - Pedalcyclist
  - Animal
  - Fixed Object
  - Other Object
  - Motor Vehicle in Other Road
- Weather
  - Dry
  - Wet
- Location
  - Intersection
  - Intersection Related
  - Driveway Access
  - Non-Intersection
- Manner of Collision
  - Angle
  - Rear-End
  - Sideswipe
  - Other
- Fact 1
  - Sight Restriction
  - In Construction Area
  - Construction Related
  - Other
- Total Vehicles in Accident
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
DAY OF WEEK	WEEKEND	21	27	34	27	41
		17%	29%	29%	25%	23%
	WEEKDAY	101	67	85	84	136
		83%	71%	71%	75%	77%
TIME OF DAY	DAYLIGHT	67	67	72	69	105
		55%	71%	61%	62%	59%
	NIGHT	55	27	47	43	72
		45%	29%	40%	38%	41%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDESTRIAN	0	0	2	1	1
		0%	0%	2%	1%	1%
	OTHER MOTOR VEH	117	93	110	107	170
		96%	99%	92%	96%	96%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	0	1	0	0
		0%	0%	8%	3%	0%
	PEDALCYCLIST	0	1	0	0	0
		0%	1%	0%	0%	0%
	ANIMAL	0	0	0	0	1
		0%	0%	0%	0%	1%
	FIXED OBJECT	5	0	6	4	4
		4%	0%	5%	3%	2%
	OTHER OBJECT	0	0	0	0	1
		0%	0%	0%	0%	1%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	98	84	94	92	156
		80%	89%	79%	83%	88%
	WET	24	10	25	20	21
		20%	11%	21%	17%	12%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
INTERSECTION	INTERSECTION	28	22	37	29	49
		23%	23%	31%	26%	28%
	INTER RELATED	36	18	26	27	28
		30%	19%	22%	24%	16%
	DRIVEWAY ACCESS	34	41	34	36	50
		28%	44%	29%	33%	28%
	NON-INTER	24	13	22	20	50
		20%	14%	18%	17%	28%
MANNER OF COLLISION	ANGLE	40	43	42	42	53
		33%	46%	35%	38%	30%
	REAR-END	56	27	39	41	71
		46%	29%	33%	36%	40%
	SIDESWIPE	4	4	3	4	7
		32%	4%	3%	13%	4%
	OTHER	22	20	35	26	46
		18%	21%	29%	23%	26%
FACT1	SIGHT RESTRICTION	1	0	1	1	1
		82%	0%	1%	28%	1%
	IN CONST AREA	1	1	0	1	114
		1%	1%	0%	1%	64%
	CON RELATED	0	0	0	0	6
		0%	0%	0%	0%	3%
	OTHER	120	93	118	110	56
		98%	99%	9%	69%	32%
TOTAL VEHICLE	1	5	1	7	4	5
		4%	1%	6%	4%	3%
	2	92	85	101	93	154
		75%	90%	85%	84%	87%
	3	20	7	9	12	12
		16%	8%	8%	11%	7%
	4	5	1	2	3	6
		4%	1%	2%	2%	3%
	5	0	0	0	0	0
		0%	0%	0%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

FM 1960 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
DAY OF WEEK	WEEKEND	175	149	148	157	231
		29%	23%	24%	25%	26%
	WEEKDAY	433	491	460	461	647
		71%	77%	76%	75%	74%
TIME OF DAY	DAYLIGHT	426	481	451	453	633
		70%	75%	74%	73%	72%
	NIGHT	182	159	157	166	245
		30%	25%	26%	27%	28%
FIRST HARMFUL MOVEMENT	NON-COLLISION	1	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	2	0	1	1	5
		0%	0%	0%	0%	1%
	PEDESTRIAN	4	8	1	4	3
		1%	1%	0%	1%	0%
	OTHER MOTOR VEH	583	606	592	594	834
		96%	95%	97%	96%	95%
	TRAIN	0	0	0	0	1
		0%	0%	0%	0%	0%
	PARKED CAR	2	1	0	1	4
		0%	0%	0%	0%	0%
	PEDALCYCLIST	3	6	4	4	30
		0%	1%	1%	1%	3%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	13	18	9	13	30
		2%	3%	1%	2%	3%
	OTHER OBJECT	0	1	1	1	1
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	539	561	542	547	824
		89%	88%	89%	88%	94%
	WET	69	79	66	71	54
		11%	12%	11%	12%	6%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 2

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
INTERSECTION	INTERSECTION	118	147	166	144	289
		19%	23%	27%	23%	33%
	INTER RELATED	122	106	98	109	110
		20%	17%	16%	18%	13%
	DRIVEWAY ACCESS	229	240	190	220	254
		38%	38%	31%	35%	29%
	NON-INTER	139	147	154	147	225
		23%	23%	25%	24%	26%
MANNER OF COLLISION	ANGLE	190	210	220	207	304
		31%	33%	36%	33%	35%
	REAR-END	215	200	221	212	261
		35%	31%	37%	34%	30%
	SIDESWIPE	33	40	29	34	75
		5%	6%	5%	5%	9%
	OTHER	170	190	138	166	238
		28%	30%	23%	27%	27%
FACT1	SIGHT RESTRICTION	1	3	6	3	4
		0%	0%	1%	1%	0%
	IN CONST AREA	3	7	3	4	595
		0%	1%	0%	1%	68%
	CON RELATED	1	0	1	1	39
		0%	0%	0%	0%	4%
	OTHER	603	630	598	610	240
		99%	98%	98%	99%	27%
TOTAL VEHICLE	1	21	27	15	21	39
		4%	4%	2%	3%	4%
	2	500	535	500	512	711
		82%	84%	82%	83%	81%
	3	71	67	74	71	109
		12%	10%	12%	11%	12%
	4	12	9	17	13	17
		2%	1%	3%	2%	2%
	5	4	1	2	2	2
		1%	0%	0%	0%	0%
	6	0	1	0	0	0
		0%	0%	0%	0%	0%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 3

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
DAY OF WEEK	WEEKEND	49	47	46	47	50
		26%	31%	26%	27%	23%
	WEEKDAY	140	106	134	127	165
		74%	69%	74%	73%	77%
TIME OF DAY	DAYLIGHT	116	109	124	116	110
		61%	71%	69%	67%	51%
	NIGHT	73	44	56	58	105
		39%	29%	31%	33%	49%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	0	1	0	1
		0%	0%	1%	0%	0%
	PEDESTRIAN	0	1	2	1	0
		0%	1%	1%	1%	0%
	OTHER MOTOR VEH	181	149	169	166	199
		96%	97%	94%	96%	93%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	0	1	0	0
		0%	0%	1%	0%	0%
	PEDALCYCLIST	0	2	1	1	1
		0%	1%	1%	1%	0%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	8	1	6	5	13
		4%	1%	3%	3%	6%
	OTHER OBJECT	0	0	0	0	1
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	145	143	149	146	184
		77%	93%	83%	84%	86%
	WET	44	10	31	28	31
		23%	7%	17%	16%	14%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 3

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
INTERSECTION	INTERSECTION	40	42	59	47	87
		21%	27%	33%	27%	40%
	INTER RELATED	46	25	33	35	37
		24%	16%	18%	20%	17%
	DRIVEWAY ACCESS	68	61	57	62	42
		36%	40%	32%	36%	20%
	NON-INTER	35	25	31	30	49
		19%	16%	17%	17%	23%
MANNER OF COLLISION	ANGLE	61	58	71	63	62
		32%	38%	39%	37%	29%
	REAR-END	76	41	53	57	63
		40%	27%	29%	32%	29%
	SIDESWIPE	6	8	5	6	13
		3%	5%	3%	4%	6%
	OTHER	46	46	51	48	77
		24%	30%	28%	28%	36%
FACT1	SIGHT RESTRICTION	1	0	1	1	0
		1%	0%	1%	0%	0%
	IN CONST AREA	1	1	0	1	133
		1%	1%	0%	0%	62%
	CON RELATED	0	0	0	0	31
		0%	0%	0%	0%	14%
	OTHER	187	152	179	173	51
		99%	99%	99%	99%	24%
TOTAL VEHICLE	1	7	4	9	7	14
		4%	3%	5%	4%	7%
	2	150	137	156	148	183
		79%	90%	87%	85%	85%
	3	26	11	10	16	16
		14%	7%	6%	9%	7%
	4	6	1	5	4	2
		3%	1%	3%	2%	1%
	5	0	0	0	0	0
		0%	0%	0%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 4

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
DAY OF WEEK	WEEKEND	130	116	123	123	166
		26%	22%	26%	25%	25%
	WEEKDAY	361	406	354	374	487
		74%	78%	74%	75%	75%
TIME OF DAY	DAYLIGHT	343	401	363	369	447
		70%	77%	76%	74%	68%
	NIGHT	148	121	114	128	206
		30%	23%	24%	26%	32%
FIRST HARMFUL MOVEMENT	NON-COLLISION	1	0	0	0	1
		0%	0%	0%	0%	0%
	OVERTURNED	2	0	0	1	3
		0%	0%	0%	0%	0%
	PEDESTRIAN	4	6	1	4	3
		1%	1%	0%	1%	0%
	OTHER MOTOR VEH	470	492	464	475	625
		96%	94%	97%	96%	96%
	TRAIN	2	0	0	1	0
		0%	0%	0%	0%	0%
	PARKED CAR	3	1	0	1	0
		1%	0%	0%	0%	0%
	PEDALCYCLIST	0	5	3	3	1
		0%	1%	1%	1%	0%
	ANIMAL	0	0	0	0	2
		0%	0%	0%	0%	0%
	FIXED OBJECT	9	17	8	11	16
		2%	3%	2%	2%	2%
	OTHER OBJECT	0	1	1	1	1
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	450	450	435	445	595
		92%	86%	91%	90%	91%
	WET	41	72	42	52	58
		8%	14%	9%	10%	9%

FM 1960 COMPARISON
OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS
DURING PHASE 4

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG.	1988
INTERSECTION	INTERSECTION	97	118	128	114	180
		20%	23%	27%	23%	28%
	INTER RELATED	105	89	80	91	92
		21%	17%	17%	18%	14%
	DRIVEWAY ACCESS	172	192	144	169	201
		35%	37%	30%	34%	31%
	NON-INTER	117	123	125	122	180
		24%	24%	26%	25%	28%
MANNER OF COLLISION	ANGLE	154	171	166	164	191
		31%	33%	35%	33%	29%
	REAR-END	175	169	181	175	251
		36%	32%	38%	35%	38%
	SIDESWIPE	28	35	24	29	49
		6%	7%	5%	6%	8%
	OTHER	134	147	106	129	162
		0%	28%	22%	26%	25%
FACT1	SIGHT RESTRICTION	1	2	4	2	2
		0%	0%	1%	0%	0%
	IN CONST AREA	3	7	3	4	440
		1%	1%	1%	1%	67%
	CON RELATED	1	0	1	1	26
		0%	0%	0%	0%	4%
	OTHER	486	513	469	489	185
		10%	98%	98%	69%	28%
TOTAL VEHICLE	1	18	23	12	18	25
		4%	4%	3%	4%	4%
	2	401	430	388	406	547
		82%	82%	81%	82%	84%
	3	58	58	62	59	67
		12%	11%	13%	12%	10%
	4	10	9	14	11	12
		2%	2%	3%	2%	2%
	5	4	1	1	2	1
		1%	0%	0%	0%	0%
	6	0	1	0	0	1
		0%	0%	0%	0%	0%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1988
DAY OF WEEK	WEEKEND	6	6	4	5	8
		46%	30%	33%	36%	50%
	WEEKDAY	7	14	8	10	8
		53%	70%	67%	63%	50%
TIME OF DAY	DAYLIGHT	8	15	10	11	14
		61%	75%	83%	73%	88%
	NIGHT	5	5	2	4	2
		31%	25%	17%	24%	13%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDESTRIAN	0	0	0	0	0
		0%	0%	0%	0%	0%
	OTHER MOTOR VEH	11	20	11	14	16
		84%	100%	92%	93%	100%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDALCYCLIST	0	0	0	0	0
		0%	0%	0%	0%	0%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	7	0	1	3	0
		54%	0%	8%	31%	0%
	OTHER OBJECT	7	0	0	2	0
		54%	0%	0%	18%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	7	19	12	13	15
		54%	95%	100%	83%	94%
	WET	6	1	0	2	1
		46%	5%	0%	17%	6%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1988
INTERSECTION	INTERSECTION	1	5	3	3	9
		8%	25%	25%	19%	56%
	INTER RELATED	4	4	4	4	2
		31%	20%	33%	28%	13%
	DRIVEWAY ACCESS	4	7	3	5	1
		31%	35%	25%	27%	6%
	NON-INTER	4	4	2	3	4
		31%	20%	17%	23%	25%
MANNER OF COLLISION	ANGLE	3	7	4	5	5
		23%	35%	33%	30%	31%
	REAR-END	6	8	5	6	5
		46%	40%	50%	45%	31%
	SIDESWIPE	1	1	0	1	1
		8%	5%	0%	4%	6%
	OTHER	3	4	2	3	5
		23%	20%	17%	20%	31%
FACT1	SIGHT RESTRICTION	0	0	0	0	0
		0%	0%	0%	0%	0%
	IN CONST AREA	0	0	0	0	5
		0%	0%	0%	0%	31%
	CON RELATED	0	0	0	0	0
		0%	0%	0%	0%	0%
	OTHER	13	20	12	15	11
		0%	100%	100%	67%	69%
TOTAL VEHICLES	1	1	0	1	1	0
		0%	0%	8%	3%	0%
	2	10	16	11	12	13
		0%	80%	92%	57%	81%
	3	2	4	0	2	3
		0%	20%	0%	7%	19%
	4	0	0	0	0	0
		0%	0%	0%	0%	0%
	5	0	0	0	0	0
		0%	0%	0%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 2

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1988
INTERSECTION	INTERSECTION	6	3	1	3	3
		38%	20%	7%	21%	17%
	INTER RELATED	2	5	2	3	5
		13%	33%	13%	20%	28%
	DRIVEWAY ACCESS	2	5	7	5	5
		13%	33%	48%	31%	28%
	NON-INTER	6	2	5	4	5
		38%	13%	33%	28%	28%
MANNER OF COLLISION	ANGLE	4	2	2	3	3
		25%	13%	13%	17%	17%
	REAR-END	7	5	2	5	9
		44%	13%	13%	30%	50%
	SIDESWIPE	1	1	1	1	1
		6%	7%	7%	7%	6%
	OTHER	4	7	10	7	5
		25%	47%	67%	46%	28%
FACT1	SIGHT RESTRICTION	0	0	0	0	0
		0%	0%	0%	0%	0%
	IN CONST AREA	0	0	0	0	9
		0%	0%	0%	0%	50%
	CON RELATED	0	0	0	0%	1
		0%	0%	0%	0	6%
	OTHER	16	15	15	15%	8
		100%	100%	100%	0	44%
TOTAL VEHICLES	1	1	2	3	2	2
		6%	13%	20%	13%	11%
	2	15	11	11	12	14
		94%	73%	73%	80%	78%
	3	0	1	1	1	2
		0%	7%	7%	4%	11%
	4	0	1	0	0	0
		0%	7%	0%	2%	0%
	5	0	0	0	0	0
		0%	0%	0%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 2

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1988
DAY OF WEEK	WEEKEND	3	5	4	4	8
		19%	33%	27%	26%	44%
	WEEKDAY	13	10	11	11	10
		81%	67%	73%	74%	56%
TIME OF DAY	DAYLIGHT	9	10	5	8	10
		56%	67%	33%	52%	56%
	NIGHT	7	33	10	17	8
		44%	667%	67%	59%	44%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	1	1	1	0
		0%	7%	7%	4%	0%
	PEDESTRIAN	0	0	0	0	0
		0%	0%	0%	0%	0%
	OTHER MOTOR VEH	15	13	11	13	16
		94%	87%	73%	85%	89%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDALCYCLIST	0	1	0	0	0
		0%	7%	0%	2%	0%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	1	1	3	2	2
		6%	7%	20%	11%	11%
	OTHER OBJECT	0	0	0	0	0
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	12	12	14	13	17
		75%	80%	93%	83%	95%
	WET	4	3	1	3	1
		25%	20%	7%	17%	6%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 3

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1989
DAY OF WEEK	WEEKEND	15	14	19	16	32
		27%	25%	29%	27%	29%
	WEEKDAY	41	43	46	43	78
		73%	75%	71%	73%	71%
TIME OF DAY	DAYLIGHT	27	35	35	32	65
		48%	61%	54%	55%	59%
	NIGHT	29	22	30	27	45
		52%	39%	46%	46%	41%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDESTRIAN	0	0	0	0	0
		0%	0%	0%	0%	0%
	OTHER MOTOR VEH	53	55	60	56	102
		95%	97%	92%	95%	93%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	1	0	0	0	0
		2%	0%	0%	1%	0%
	PEDALCYCLIST	2	0	2	1	1
		4%	0%	3%	2%	1%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	0	2	3	2	7
		0%	4%	5%	3%	6%
	OTHER OBJECT	0	0	0	0	0
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	52	47	56	52	94
		93%	83%	86%	87%	86%
	WET	4	10	9	8	16
		7%	18%	14%	13%	15%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 1 SEGMENT 3

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		1985	1986	1987	AVG	1989
INTERSECTION	INTERSECTION	15	24	12	17	25
		27%	42%	19%	29%	23%
	INTER RELATED	7	9	10	9	19
		13%	16%	15%	15%	17%
	DRIVEWAY ACCESS	26	15	30	24	41
		46%	26%	16%	30%	37%
	NON-INTER	8	9	13	10	25
		14%	16%	20%	17%	23%
MANNER OF COLLISION	ANGLE	30	25	23	26	35
		54%	44%	36%	44%	32%
	REAR-END	13	21	26	20	44
		23%	37%	40%	33%	40%
	SIDESWIPE	0	1	2	1	5
		0%	2%	3%	2%	5%
	OTHER	13	10	14	12	26
		23%	18%	22%	21%	24%
FACT1	SIGHT RESTRICTION	0	1	2	1	1
		0%	0%	3%	1%	1%
	IN CONST AREA	1	0	0	0	50
		2%	0%	0%	1%	46%
	CON RELATED	0	0	0	0	11
		0%	0%	0%	0%	10%
	OTHER	55	56	63	58	48
		98%	98%	97%	98%	44%
TOTAL VEHICLES	1	2	2	5	3	8
		4%	4%	8%	5%	7%
	2	49	46	53	49	94
		88%	81%	82%	83%	85%
	3	4	7	5	5	8
		7%	12%	8%	9%	7%
	4	1	2	2	2	0
		2%	4%	3%	3%	0%
	5	0	0	0	0	0
		0%	0%	0%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONSTR
		1985	1986	1987	AVG	1988
DAY OF WEEK						
	WEEKEND	23	19	27	23	36
		30%	29%	25%	28%	22%
	WEEKDAY	55	46	80	60	131
		71%	71%	75%	72%	78%
TIME OF DAY	DAYLIGHT	48	41	68	52	96
		8%	63%	64%	45%	57%
	NIGHT	30	24	39	31	71
		39%	37%	36%	37%	43%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	1
		0%	0%	0%	0%	1%
	OVERTURNED	0	1	0	0	1
		0%	2%	0%	1%	1%
	PEDESTRIAN	2	1	0	1	0
		3%	2%	0%	1%	0%
	OTHER MOTOR VEH	71	62	102	78	162
		91%	95%	95%	94%	97%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	1	0	0	0
		0%	2%	0%	1%	0%
	PEDALCYCLIST	2	0	0	1	0
		3%	0%	0%	1%	0%
	ANIMAL	1	0	1	1	0
		1%	0%	1%	1%	0%
	FIXED OBJECT	1	0	4	2	3
		1%	0%	37%	13%	2%
	OTHER OBJECT	1	0	0	0	0
		1%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	67	54	95	72	155
		86%	83%	89%	86%	93%
	WET	11	11	12	11	12
		14%	17%	11%	14%	7%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 1

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONSTR
		1985	1986	1987	AVG	1988
INTERSECTION	INTERSECTION	27	18	29	25	56
		35%	28%	27%	30%	34%
	INTER RELATED	19	19	31	23	32
		24%	29%	29%	28%	19%
	DRIVEWAY ACCESS	22	11	30	21	43
		28%	17%	28%	24%	26%
	NON-INTER	10	17	17	15	36
		13%	26%	16%	18%	22%
MANNER OF COLLISION	ANGLE	24	16	40	27	56
		31%	25%	37%	31%	34%
	REAR-END	23	29	34	29	64
		30%	45%	32%	35%	38%
	SIDESWIPE	3	7	4	5	15
		4%	10%	4%	6%	9%
	OTHER	28	13	29	23	32
		0	20%	27%	28%	19%
FACT1	SIGHT RESTRICTION	0	0	0	0	0
		0%	0%	0%	0%	0%
	IN CONST AREA	0	0	0	0	136
		0%	0%	0%	0%	81%
	CON RELATED	0	0	0	0	17
		0%	0%	0%	0%	10%
	OTHER	78	65	107	83	14
		100%	100%	100%	100%	8%
TOTAL VEHICLES	1	6	2	4	4	4
		8%	3%	4%	5%	2%
	2	57	56	83	65	135
		73%	86%	76%	79%	81%
	3	14	5	19	13	23
		18%	8%	18%	15%	14%
	4	1	2	0	1	5
		1%	3%	0%	1%	3%
	5	0	0	1	0	0
		0%	0%	1%	0%	0%
	6	0	0	0	0	0
		0%	0%	0%	0%	0%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 2

CATEGORY	frequency percent	FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS PRECONSTRUCTION 1985	1986	1987	AVG	CONST 1988
DAY OF WEEK						
	WEEKEND	6	15	9	10	19
		21%	35%	23%	26%	28%
	WEEKDAY	22	28	31	27	50
		79%	65%	1	74%	72%
TIME OF DAY	DAYLIGHT	17	29	23	23	41
		62%	67%	56%	62%	59%
	NIGHT	11	14	17	14	28
		39%	33%	43%	38%	41%
FIRST HARMFUL MOVEMENT	NON-COLLISION	0	0	0	0	0
		0%	0%	0%	0%	0%
	OVERTURNED	0	0	1	0	0
		0%	0%	3%	1%	0%
	PEDESTRIAN	0	1	0	0	0
		0%	2%	0%	1%	0%
	OTHER MOTOR VEH	26	40	35	34	67
		93%	93%	88%	91%	97%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	0	0	0	0	0
		0%	0%	0%	0%	0%
	PEDALCYCLIST	1	2	0	1	0
		4%	5%	0%	3%	0%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	1	0	4	2	2
		4%	0%	10%	5%	3%
	OTHER OBJECT	0	0	0	0	0
		0%	0%	0%	0%	0%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	24	36	36	32	56
		86%	84%	90%	87%	81%
	WET	4	7	4	5	13
		14%	16%	10%	14%	19%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 2

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG	1988
INTERSECTION	INTERSECTION	11	8	6	8	17
		39%	19%	15%	24%	27
	INTER RELATED	3	13	5	7	10
		11%	30%	13%	18%	14
	DRIVEWAY ACCESS	4	14	18	12	26
		14%	33%	45%	31%	38
	NON-INTER	10	8	11	10	16
		36%	19%	28%	27%	23
MANNER OF COLLISION	ANGLE	8	16	11	12	28
		29%	37%	28%	31%	41
	REAR-END	8	15	12	12	24
		29%	35%	30%	32%	35
	SIDESWIPE	2	2	3	2	4
		7%	5%	8%	6%	6
	OTHER	10	10	14	11	13
		36%	23%	35%	31%	19
FACT1	SIGHT RESTRICTION	0	0	0	0	0
		0%	0%	0%	0%	0
	IN CONST AREA	0	0	0	0	46
		0%	0%	0%	0%	67
	CON RELATED	0	0	0	0	20
		0%	0%	0%	0%	29
	OTHER	28	43	40	37	3
		100%	100%	100%	100%	4
TOTAL VEH	1	2	3	4	3	2
		7%	7%	10%	8%	3
	2	24	29	30	28	57
		86%	67%	75%	76%	83
	3	2	10	6	6	7
		7%	23%	15%	15%	10
	4	0	1	0	0	2
		0%	2%	0%	1%	3
	5	0	0	0	0	1
		0%	0%	0%	0%	1
	6	0	0	0	0	0
		0%	0%	0%	0%	0

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 3

CATEGORY	frequency percent	FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS PRECONSTRUCTION 1985	1986	1987	AVG	CONST 1988
DAY OF WEEK						
	WEEKEND	19	21	22	21	63
		26%	26%	28%	27%	29%
	WEEKDAY	53	59	58	57	151
		74%	74%	72%	73%	71%
TIME OF DAY	DAYLIGHT	51	60	54	55	124
		71%	75%	68%	71%	58%
	NIGHT	21	20	26	22	90
		29%	25%	32%	29%	42%
FIRST HARMFUL MOVEMENT	NON-COLLISION	1	0	0	0	1
		1%	0%	0%	0%	0%
	OVERTURNED	0	0	1	0	2
		0%	0%	1%	0%	1%
	PEDESTRIAN	0	0	0	0	1
		0%	0%	0%	0%	0%
	OTHER MOTOR VEH	70	79	73	74	196
		97%	99%	92%	96%	92%
	TRAIN	0	0	0	0	0
		0%	0%	0%	0%	0%
	PARKED CAR	1	0	0	0	0
		1%	0%	0%	0%	0%
	PEDALCYCLIST	0	0	3	1	1
		0%	0%	4%	1%	0%
	ANIMAL	0	0	0	0	0
		0%	0%	0%	0%	0%
	FIXED OBJECT	0	1	3	1	11
		0%	1%	4%	2%	5%
	OTHER OBJECT	0	0	0	0	2
		0%	0%	0%	0%	1%
	MOTOR VEH IN OTHER RD	0	0	0	0	0
		0%	0%	0%	0%	0%
WEATHER	DRY	65	72	62	66	194
		90%	90%	78%	86%	91%
	WET	7	8	18	11	20
		10%	10%	23%	0	9%

STATE HIGHWAY 6 COMPARISON OF PRECONSTRUCTION AND CONSTRUCTION ACCIDENTS DURING PHASE 2 OF SEGMENT 3

CATEGORY		FREQUENCY AND PERCENT OF ACCIDENT CHARACTERISTICS				
		PRECONSTRUCTION				CONST
		1985	1986	1987	AVG	1988
INTERSECTION	INTERSECTION	19	25	13	19	70
		26%	31%	16%	25%	33%
	INTER RELATED	14	14	11	13	24
		19%	18%	14%	17%	11%
	DRIVEWAY ACCESS	27	26	35	29	73
		38%	33%	44%	38%	34%
	NON-INTER	12	15	0	9	47
		17%	19%	0%	12%	22%
MANNER OF COLLISION	ANGLE	30	34	28	31	99
		42%	43%	35%	40%	46%
	REAR-END	25	34	30	30	48
		34%	43%	38%	38%	22%
	SIDESWIPE	2	0	4	2	13
		3%	0%	5%	3%	6%
	OTHER	15	12	18	15	54
		21%	15%	23%	19%	25%
FACT1	SIGHT RESTRICTION	0	1	2	1	1
		0%	1%	3%	1%	0%
	IN CONST AREA	0	0	0	0	155
		0%	0%	0%	0%	72%
	CON RELATED	0	0	0	0	46
		0%	0%	0%	0%	22%
	OTHER	72	79	78	76	12
		100%	99%	98%	99%	6%
TOTAL VEH	1	1	1	7	3	18
		1%	1%	9%	4%	8%
	2	62	71	63	65	162
		86%	89%	79%	84%	76%
	3	8	6	7	7	29
		11%	8%	9%	9%	14%
	4	0	2	3	2	4
		0%	2%	4%	2%	2%
	5	0	0	0	0	1
		0%	0%	0%	0%	0%
	6	1	0	0	0	0
		1%	0%	0%	0%	0%

SECTION IV

MOTORIST SURVEY INSTRUMENTS

The following pages contain the survey instruments used in the Houston and Dallas motorists' surveys. Each survey includes a picture or sign, a question addressing the picture or sign, the multiple choice answers, and the percentage response to each answer.

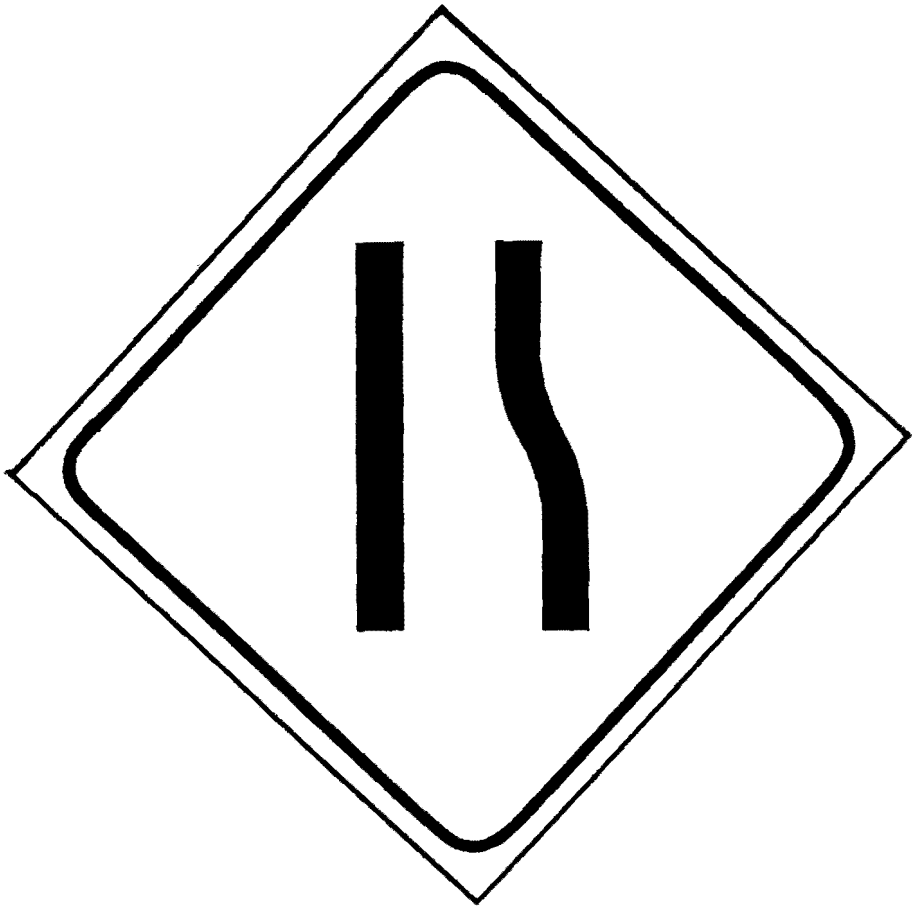
HOUSTON MOTORISTS' SURVEY

1. What does this sign mean?

17.6% A. Road construction ahead
77.5% B. Flagger ahead
2.9% C. Guard for school crossing ahead
2.0% D. Not sure

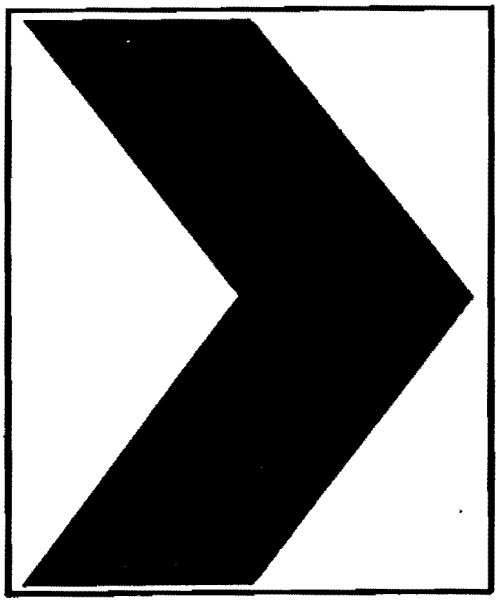
2. What does this sign mean?

6.8% A. There are 500 feet of construction 500 feet ahead
25.2% B. The next 500 feet of road are under construction
66.0% C. You will be driving through a construction area 500 feet ahead
1.9% D. Not sure



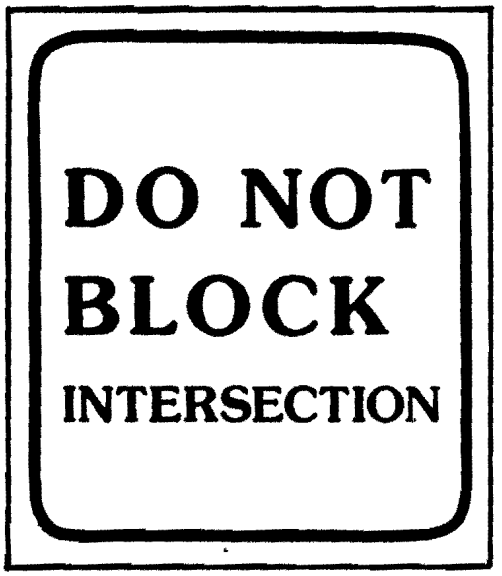
3. What does this sign mean?

15.7% A. Median narrows
78.4% B. Right lane ends
2.9% C. Right turn lane marker
2.9% D. Not sure



4. What does it mean when you see a series of these signs?

58.3% A. Tells you to change lanes
35.9% B. Shows direction of the road
2.9% C. Turn left here
2.9% D. Not sure

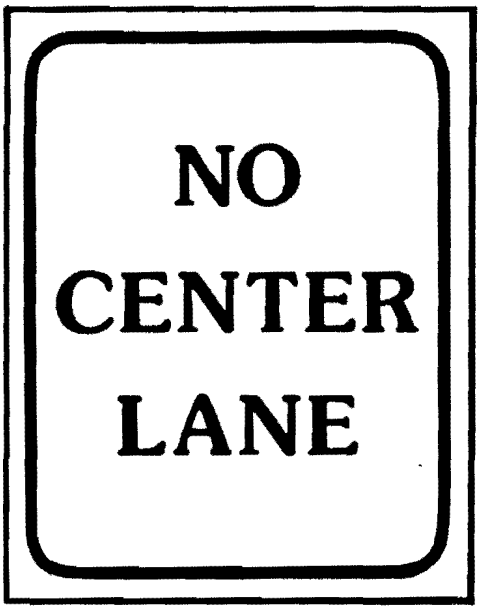


5. What does this sign mean?

73.5% A. Leave room for traffic crossing at intersection
9.8% B. If your car stalls, move it out of the intersection
15.7% C. Move through the intersection quickly
1.0% D. Not sure

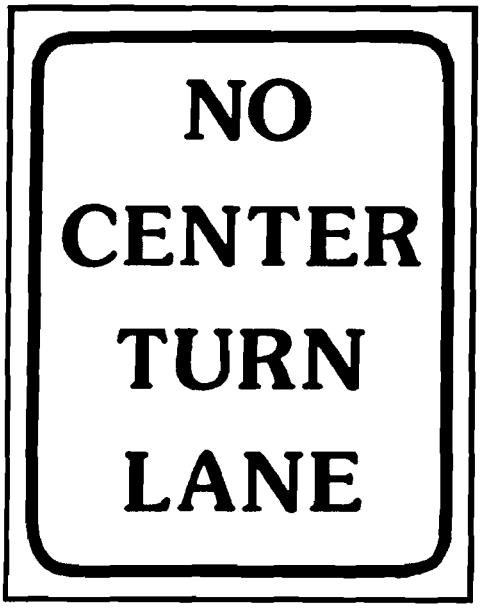
6. What should you do in response to this sign?

4.9% A. Turn left
1.9% B. Stop
93.2% C. Change lanes
0% D. Not sure



7. What does this sign mean?

3.9% A. Drive in the center, the lane is not marked
46.1% B. Drive in the right lane only
46.1% C. Be alert for cars stopping to turn left
3.9% D. Not sure

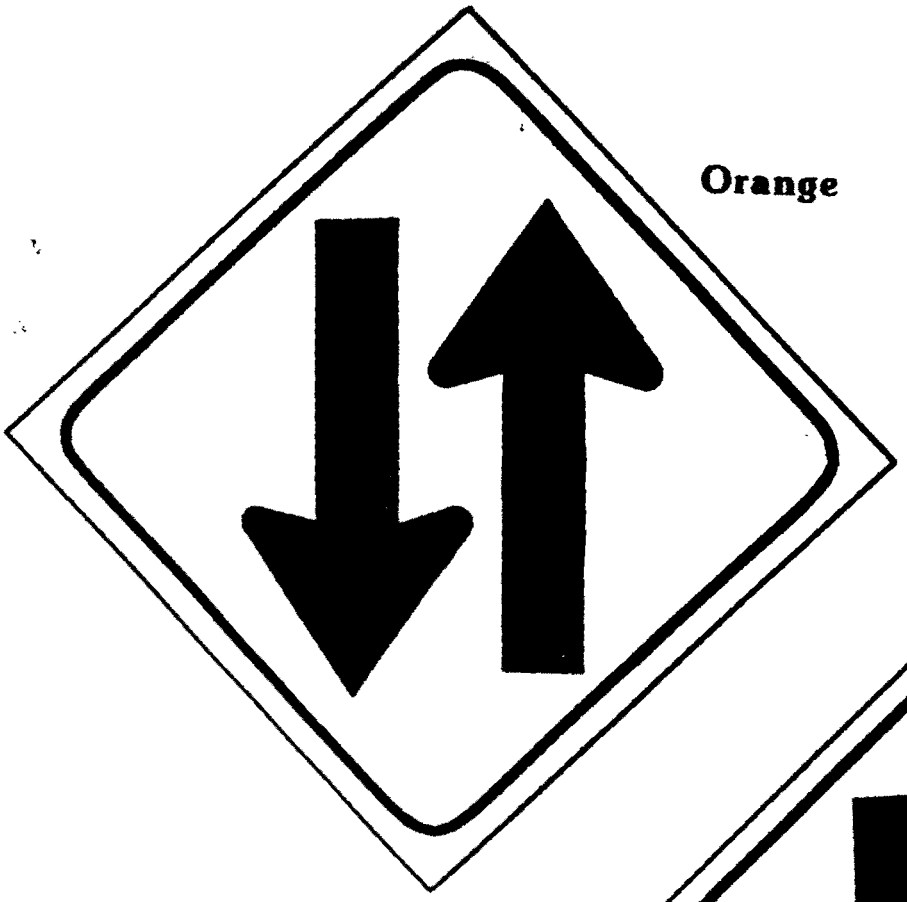


8. What does this sign mean?

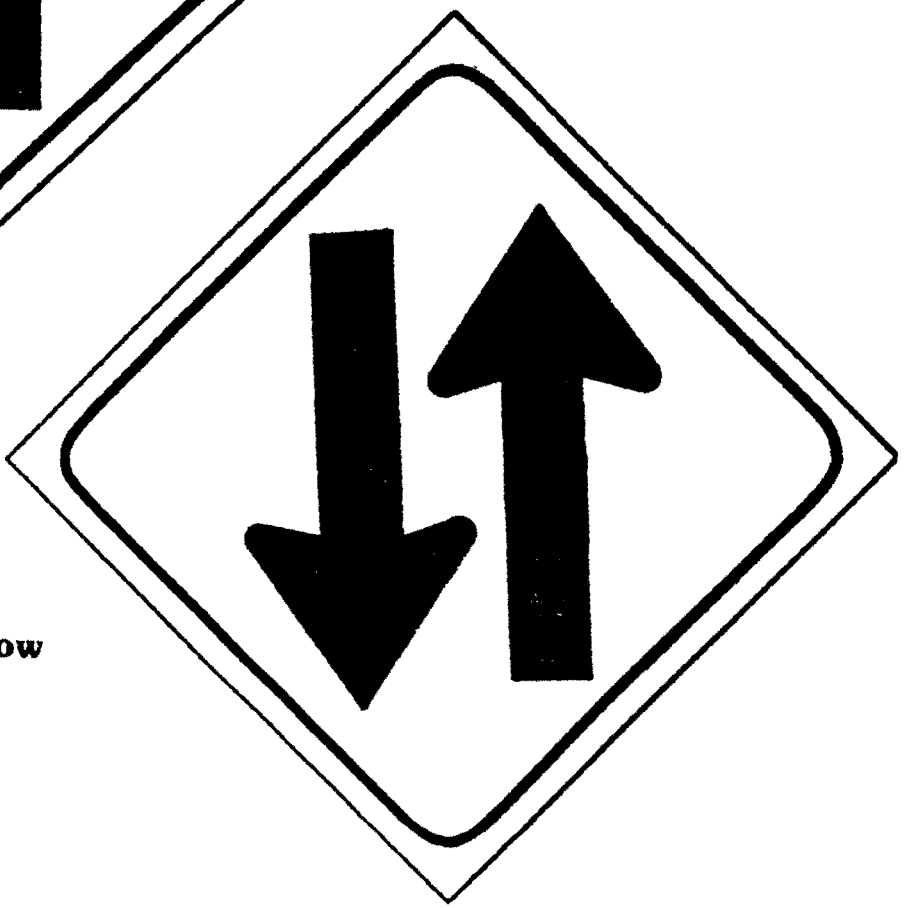
78.6% A. A lane for left turns is not provided
14.6% B. Do not turn from the center lane
4.9% C. Drive in the outside lane only
1.9% D. Not sure

9. What does this sign mean?

88.7% A. Divided road ahead
4.4% B. Obstacles in the road ahead
5.4% C. Merging traffic ahead
1.5% D. Not sure



Orange



Yellow

10. Why are these signs different colors?

44.5% A. Don't know

11. What does this sign mean?

13.2% A. Low shoulder
83.9% B. Uneven pavement
1.0% C. Bumpy road
2.0% D. Not sure

12. What does this sign mean?

85.1% A. Flagger ahead
1.0% B. School crossing guard ahead
13.9% C. Road construction ahead
0% D. Not sure

13. What does this sign mean?

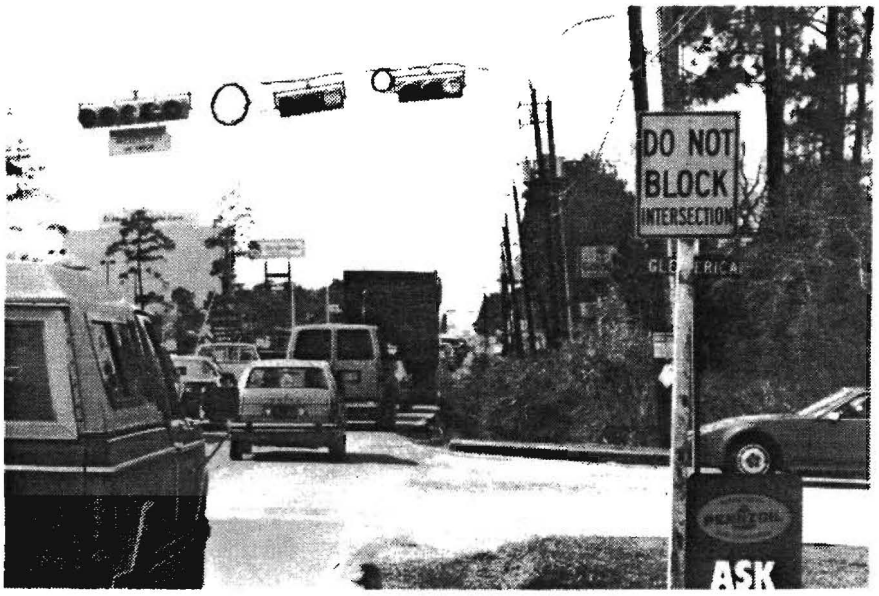
58.3% A. You will be driving through a construction area 500 feet ahead
33.0% B. The next 500 feet of road are under construction
8.7% C. There are 500 feet of construction 500 feet ahead
0% D. Not sure

14. What does this sign mean?

9.9% A. Left turn lane marker
79.2% B. Left lane ends
8.9% C. Median narrows
2.0% D. Not sure

15. What do the orange and black arrow signs mean?

1.0% A. Do not turn left between signs
92.2% B. Shows direction of the road
1.0% C. Sharp turns in the road
5.8% D. Not sure



16. You are driving the pickup, what should you do at this intersection?

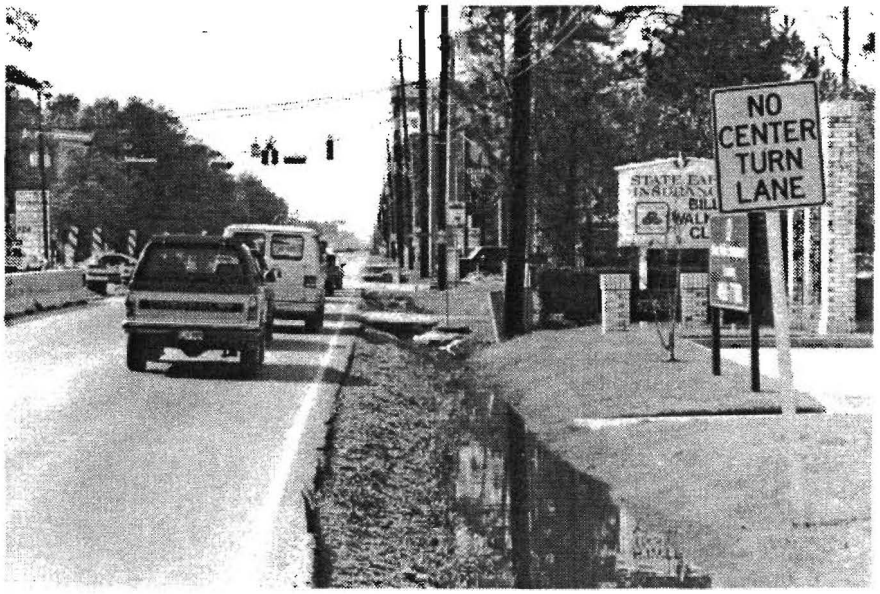
88.1% A. Correct response
10.9% B. Incorrect response
1.0% C. Don't know

17. What can you do in response to the orange sign?

80.6% A. Merge left
2.9% B. Turn right at the next intersection
16.5% C. Either A or B
0% D. Not sure

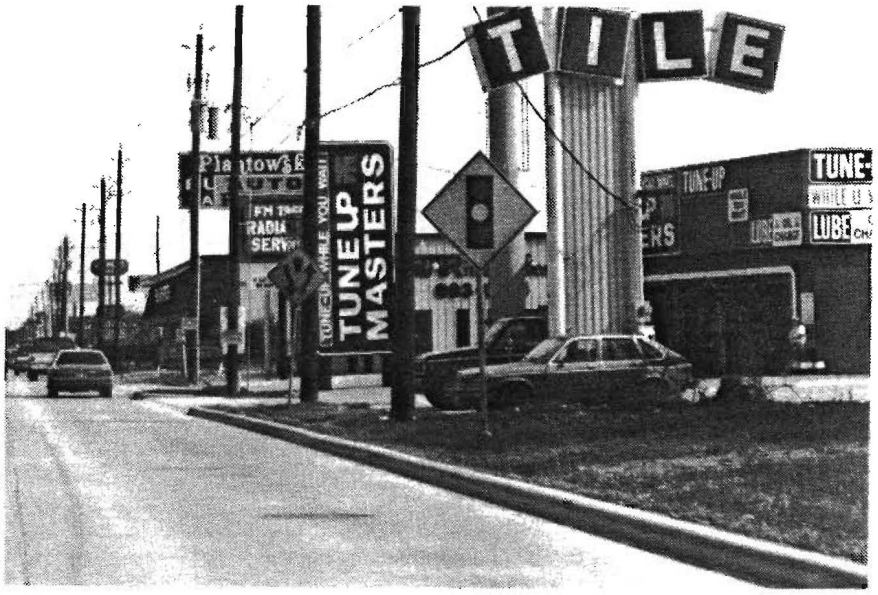
18. What does this sign mean?

29.7% A. Drive in the outside lane only
1.0% B. You cannot go straight at the next light
63.4% C. A lane for left turns is not provided
5.9% D. Not sure



19. What is allowed at the intersection?

12.6% A. A right turn
4.9% B. A left turn
72.8% C. Either turn is allowed
6.8% D. No turn is allowed
2.9% E. Not sure



20. What does the second yellow sign mean?

5.9% A. Obstacles in the road ahead
7.9% B. Merging traffic ahead
85.1% C. Divided road ahead
1.0% D. Not sure

21. What would you do here to get to the jewelry store?

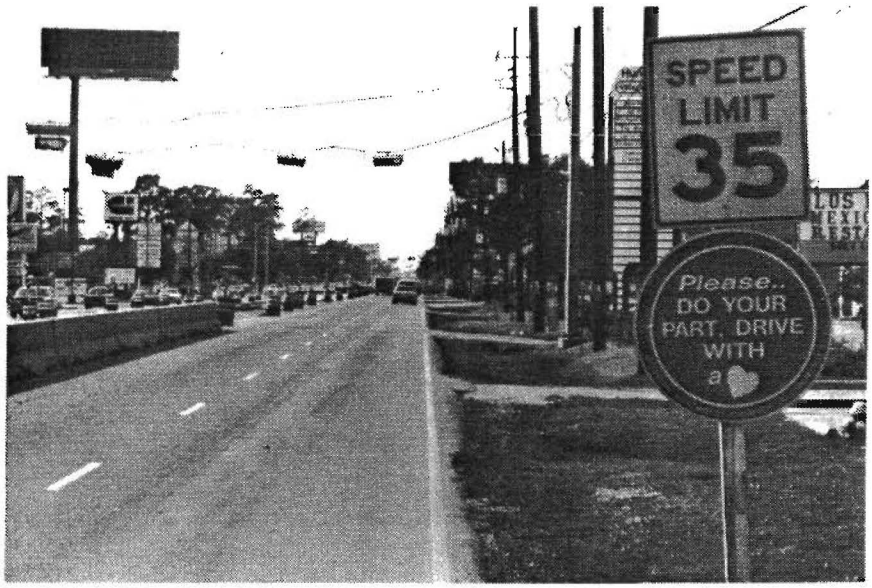
83.5% A. Drive to the right of the barrels, turn into the jewelry store parking lot at the sign
8.7% B. Turn right immediately, enter jewelry store parking lot from the rear
4.9% C. Turn left, crossover at the next signal
2.9% D. Not sure

22. What does the green sign mean?

92.2%	A.	Crossover here
6.9%	B.	Crossover at the next signal
0%	C.	Emergency vehicles cross here
1.0%	D.	Not sure

23. What do the orange and white striped panels mean?

7.8%	A.	Do not turn between these signs
9.8%	B.	Pay special attention to signs on these panels
37.8%	C.	Drive to the right of these signs
28.9%	D.	All of the above
15.7%	E.	Not sure



24. What is your opinion of these red signs?

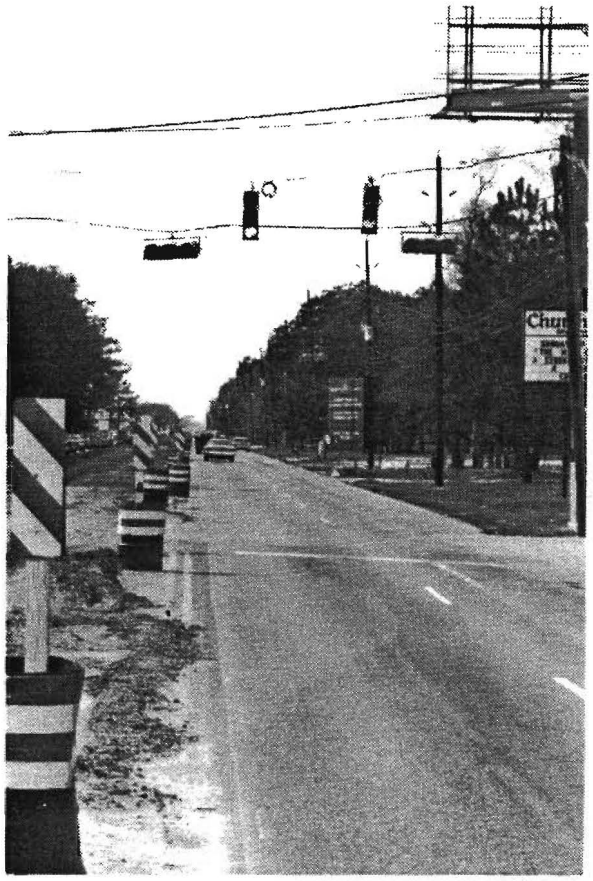
60.3% A. Like
19.6% B. Dislike
10.8% C. Hazard

25. What is your opinion of these red signs?

60.3% A. Like
19.6% B. Dislike
10.8% C. Hazard

26. What does this sign mean?

37.6%	A.	Drive in the right lane only
56.4%	B.	Be alert for cars stopping to turn left
2.0%	C.	Drive in the center, the lane is not marked
4.0%	D.	Not sure



27a. Are you permitted to turn left at this light?

78.6% A. Yes
16.5% B. No
4.9% C. Not sure

27b. Is this a protected left turn?

3.9% A. Yes
93.2% B. No
2.9% C. Not sure

28a. Are you permitted to turn left in front of the barrel with the crossover sign?

55.2% A. Yes
38.4% B. No
4.9% C. Not sure

28b. Are you permitted to turn left behind the barrel with the crossover sign?

42.1% A. Yes
48.5% B. No
7.9% C. Not sure

29. Do you think signs like the Auto Tint Sign should be allowed in the construction area?

53.5% A. Yes
14.4% B. No
14.9% C. If no, why not? (distracting)

30a. Are you permitted to turn left in front of the barrel with the crossover sign?

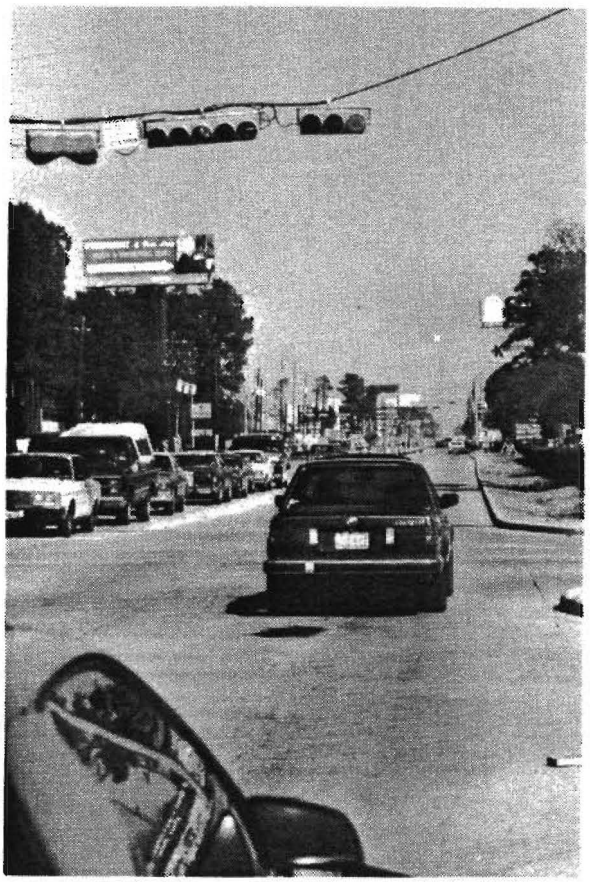
17.2% A. Yes
82.3% B. No

30b. Are you permitted to turn left behind the barrel with the crossover sign?

80.2% A. Yes
19.3% B. No

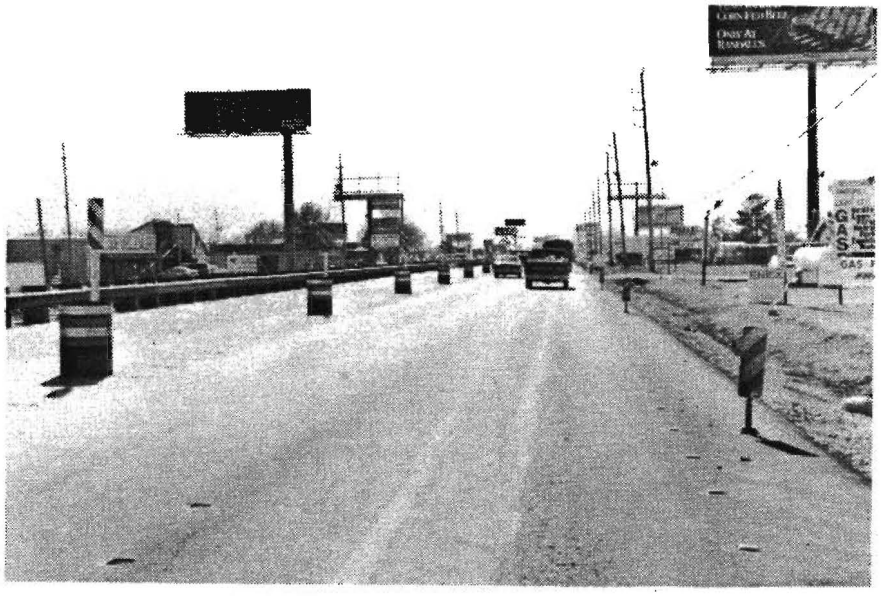
31. Are you permitted to turn right at this intersection?

14.0% A. Yes
85.0% B. No
1.0% C. Not Sure



32. Which of the following statements is true for the drivers at this intersection?

91.3%	A.	They may drive forward or turn left at this light
0%	B.	They may only drive forward because the signal on the left is covered
0%	C.	They may only drive forward because the area to the left is under construction
1.9%	D.	Not Sure



33. What do the orange and white posts on the right tell you?

70.0% A. Hazardous area to the right, drive to the left of the posts
26.0% B. Shows the right edge of the pavement
0% C. Park between these posts
4.0% D. Not sure

34. What do the white posts on the right tell you?

35.9% A. Hazardous area to the right, drive to the left of the posts
58.3% B. Shows the right edge of the pavement
0% C. Park between these posts
5.8% D. Not sure

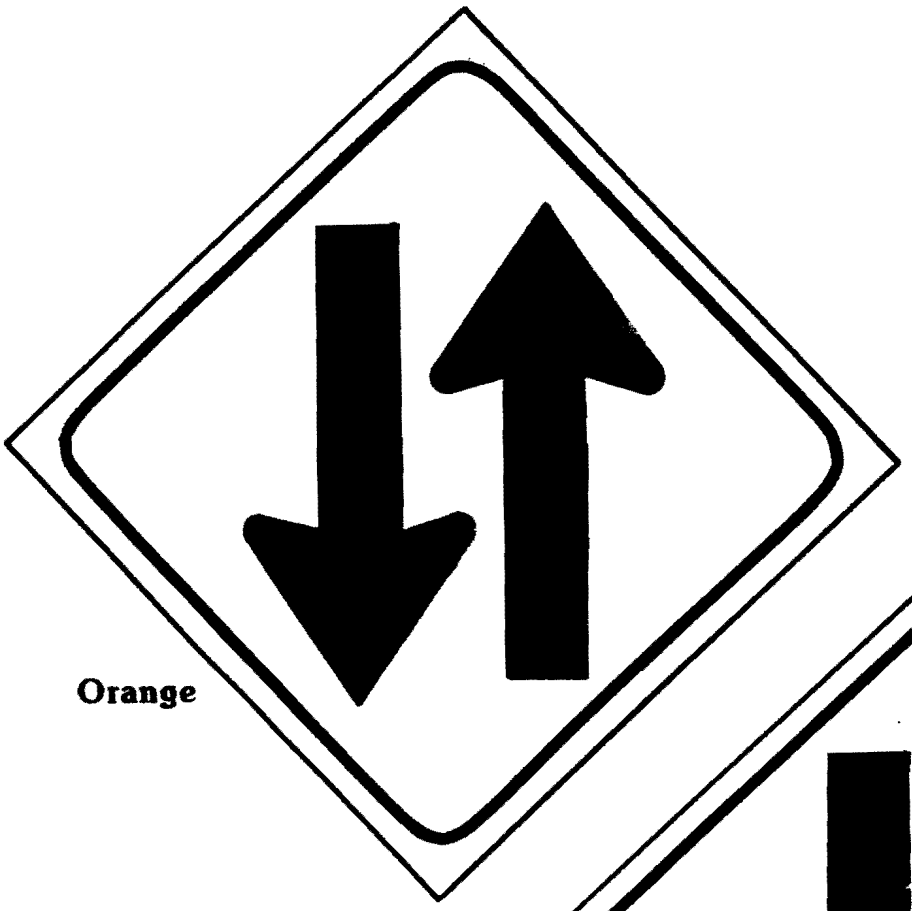
DALLAS MOTORISTS' SURVEY

1. What does this sign tell you?

7%	A.	There are 500 feet of construction 500 feet ahead
22%	B.	The next 500 feet of road are under construction
69%	C.	A construction area is located 500 feet ahead
2%	D.	Not sure

2. How would you respond to this sign?

6%	**A.**	**Turn left**
1%	**B.**	**Stop**
90%	**C.**	**Change lanes**
3%	**D.**	**Not sure**



Orange

Yellow

3. Why are these signs different colors?

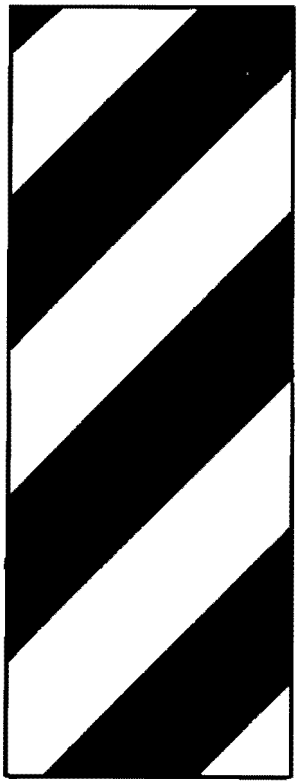
13%	A.	Yellow is for school zones, Orange is the standard color for warning signs
50%	B.	Yellow is the standard color for warning signs, Orange is for construction signs
12%	C.	There is no difference between the two
25%	D.	Not sure

4. What does this sign tell you?

18%	A.	Low shoulder
76%	B.	Uneven pavement
3%	C.	Bumpy road
3%	D.	Not sure

5. What do the orange and black arrows tell you?

3%	A.	Do not turn left between signs
85%	B.	Shows the direction of the roadway
6%	C.	Sharp turns in the road
6%	D.	Not sure



6. On which side of this sign would you drive?

12% **A.** Drive to the right of these signs
16% **B.** Drive to the left of these signs
26% **C.** Drive to either side of these signs
46% **D.** Not sure

7. Where would you turn left?

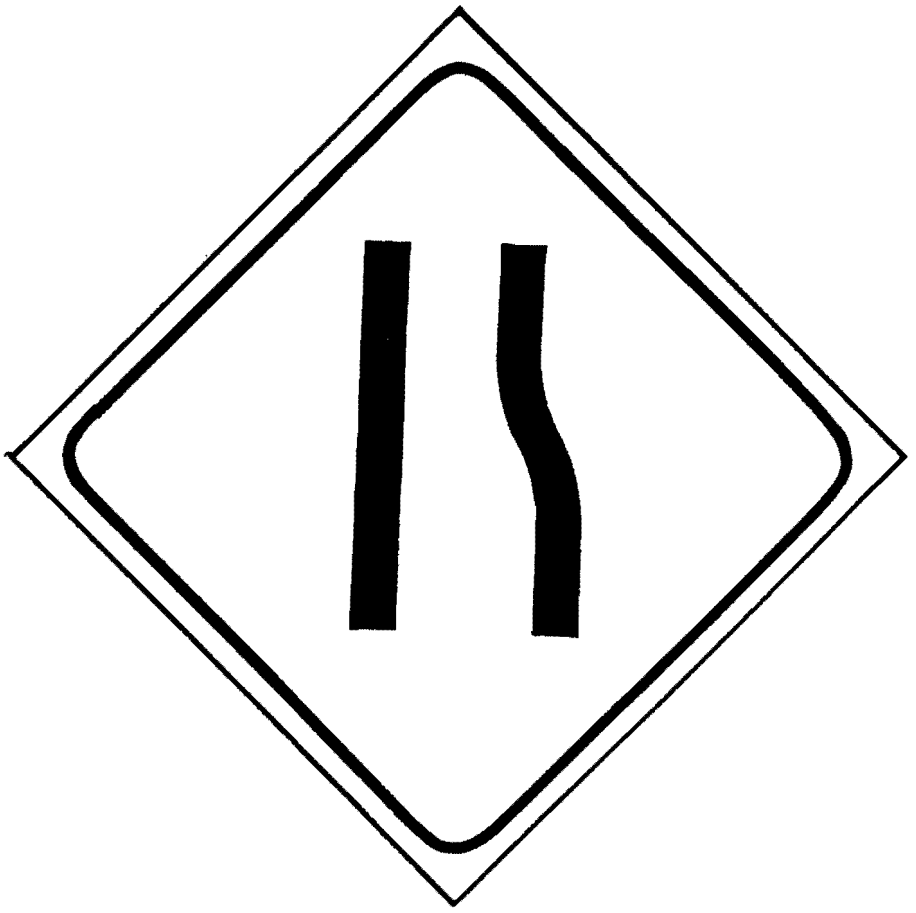
53%	A.	Before the Crossover sign
26%	B.	After the Crossover sign
8%	C.	Either before or after the Crossover sign
13%	D.	Not sure

8. What do the white posts on the right tell you?

5% **A. Shows driveway locations along the roadway**
75% **B. Shows the right edge of the pavement**
4% **C. Park between these posts**
16% **D. Not sure**

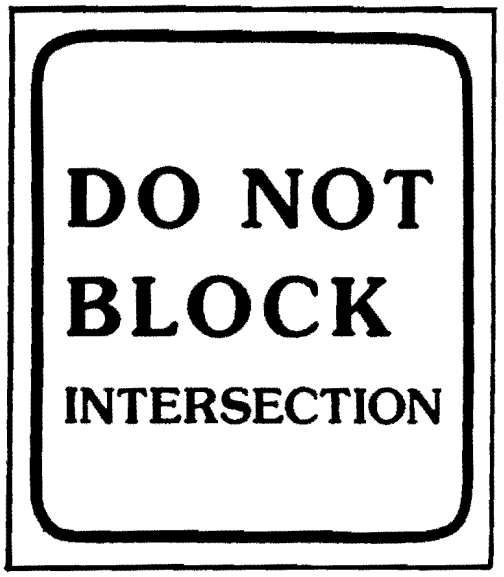
9. What does this sign tell you?

12% **A. Road construction ahead**
79% **B. Flagger ahead**
9% **C. Guard for school crossing ahead**
0% **D. Not sure**



10. What does this sign tell you?

17% **A. Median narrows**
74% **B. Right lane ends**
3% **C. Right turn lane marker**
6% **D. Not sure**

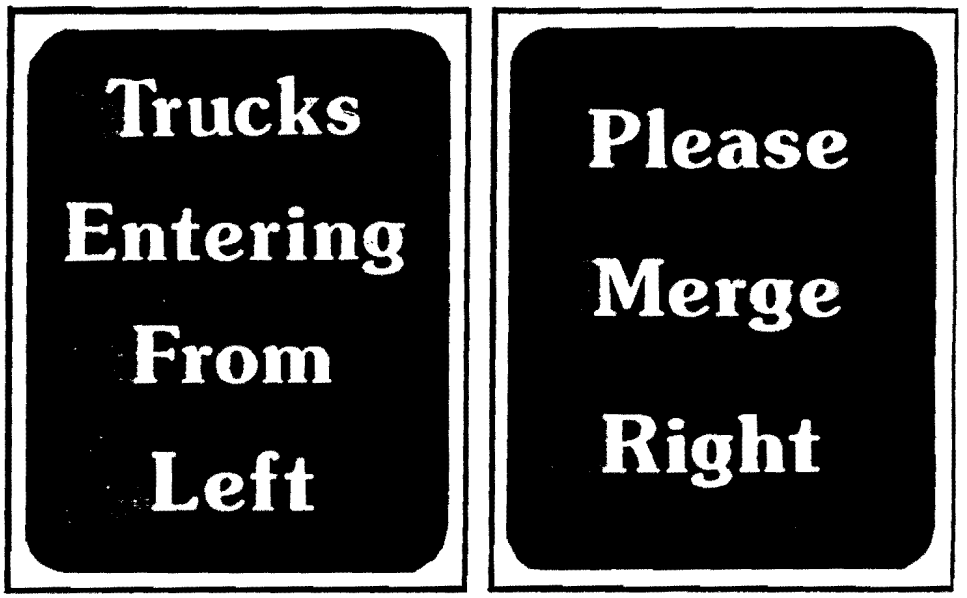


11. What does this sign tell you?

88% **A. Leave room for traffic crossing at intersection**
8% **B. If your car stalls, move it out of the intersection**
3% **C. Avoid driving through the intersection**
1% **D. Not sure**

12. What action would you take upon seeing this sign?

3%	A.	None
83%	B.	Slow down
1%	C.	Speed up
13%	D.	Merge right



13. **Upon seeing these two messages in a construction zone, what percent of the time would you voluntarily attempt to merge into the right lane?**

2%	A.	0
3%	B.	25
12%	C.	50
20%	D.	75
63%	E.	100

SECTION V

TRAFFIC CONTROL CROSS SECTIONS

The following pages contain typical cross-sections for the various construction phases used on F.M. 1960, S.H. 6, and Abrams Road. The dimensions in the cross-sections represent typical dimensions, and may vary from one project to another.

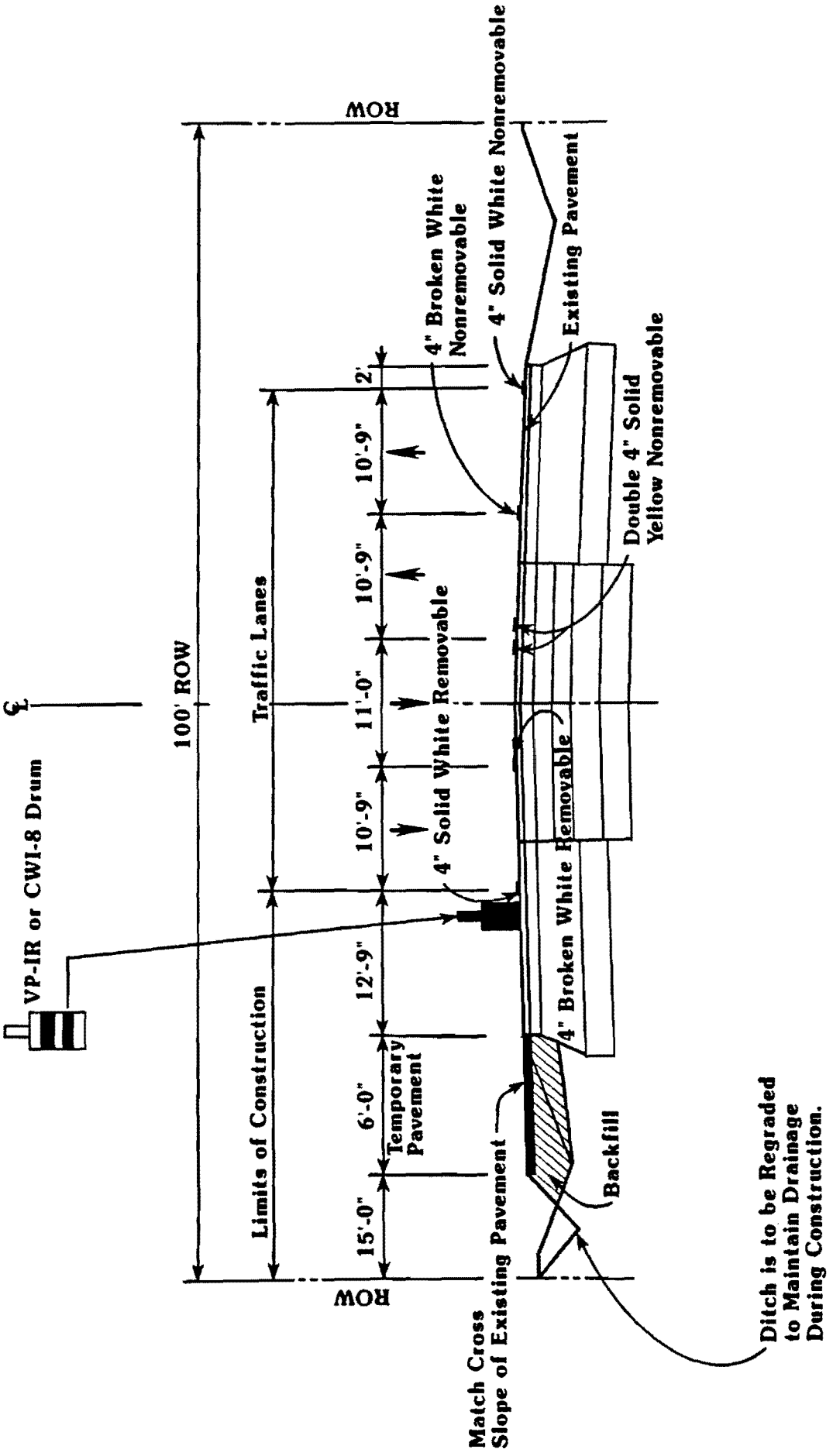


Figure V-1. F.M. 1960, S.H. 6, and Abrams Road: First Phase Construction

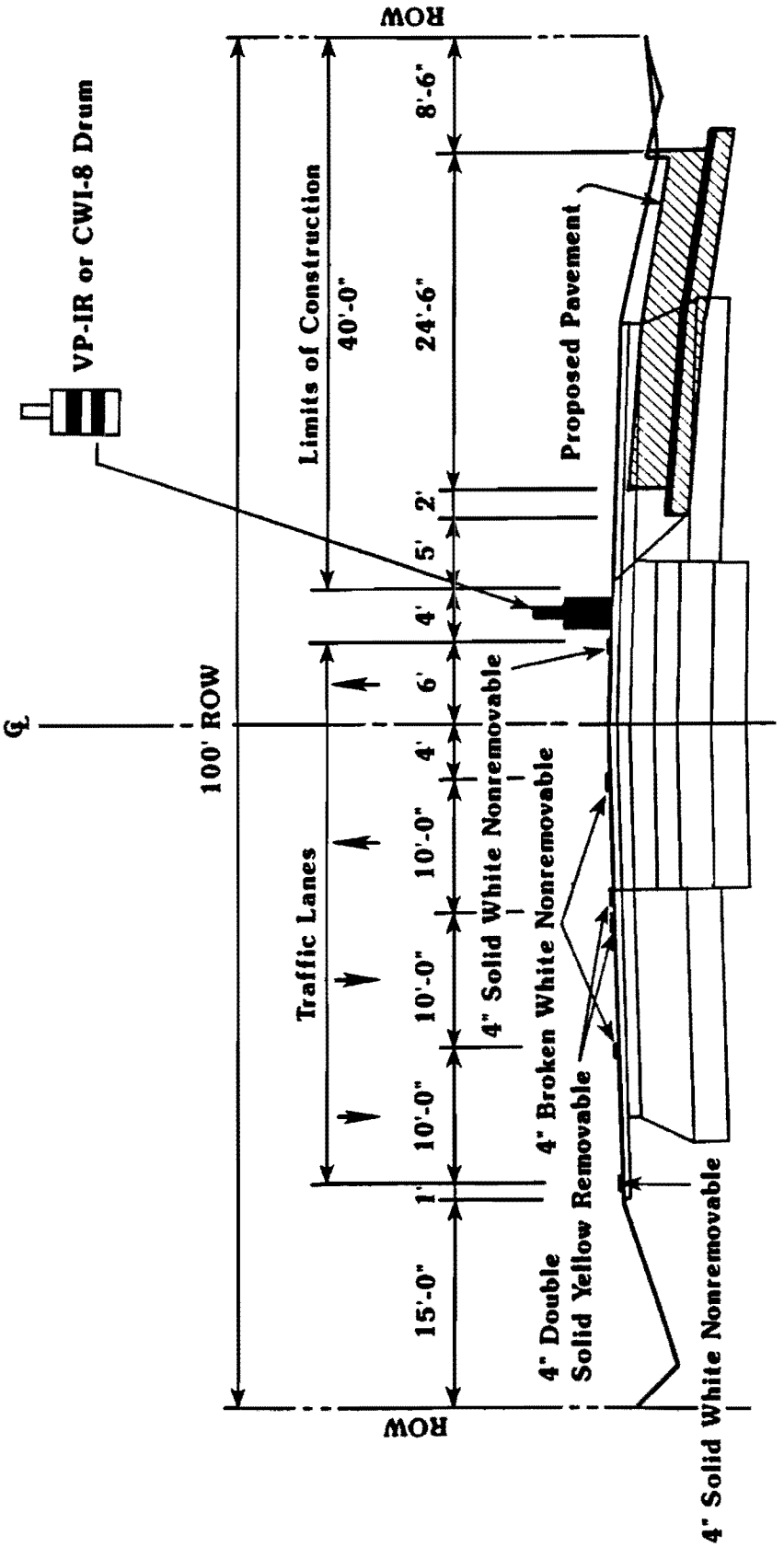
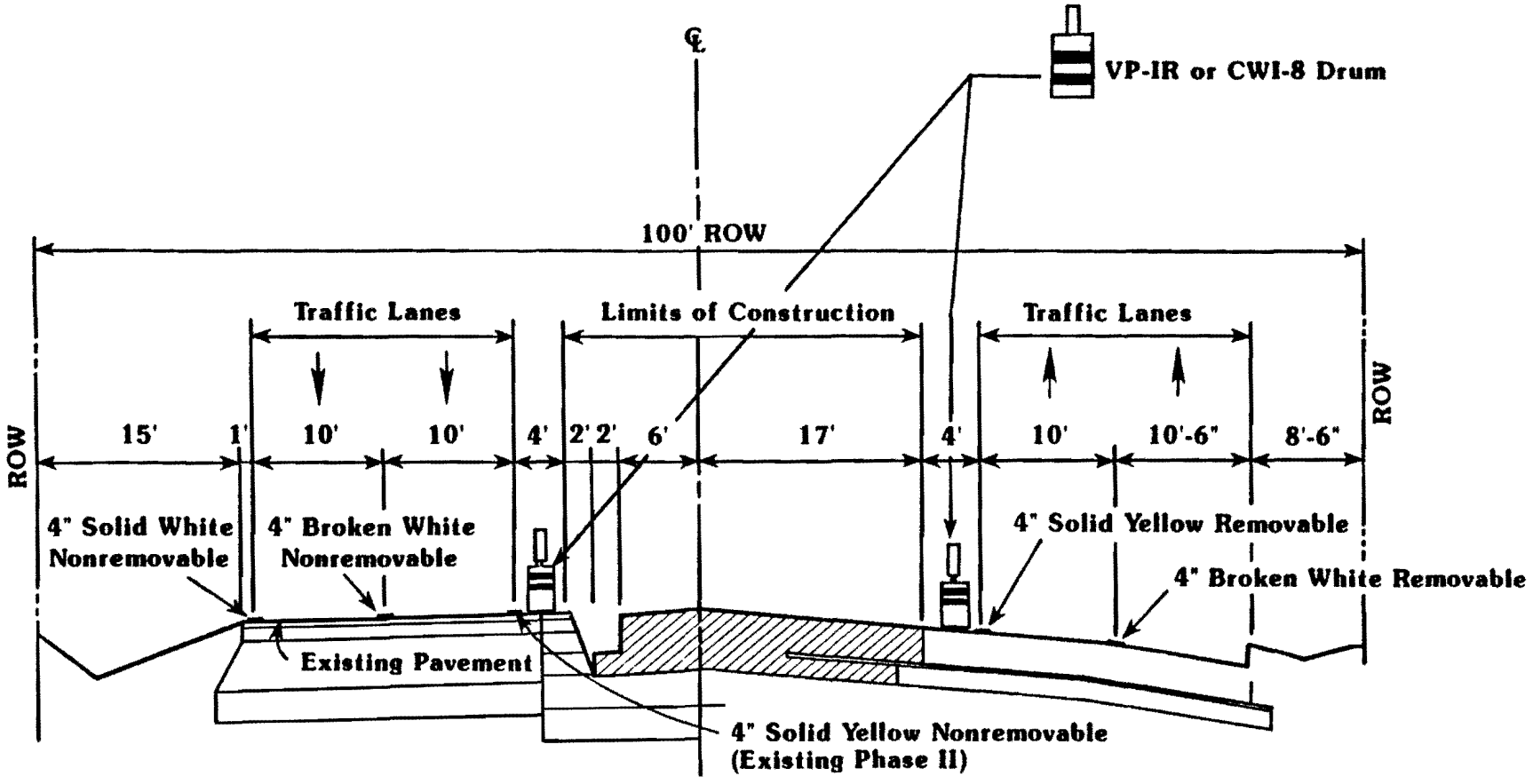


Figure V-2. F.M. 1960, S.H. 6, and Abrams Road: Second Phase Construction



Note: Crossovers are to be provided as needed for left turn traffic.

Figure V-3. F.M. 1960, S.H. 6, and Abrams Road: Third Phase Construction

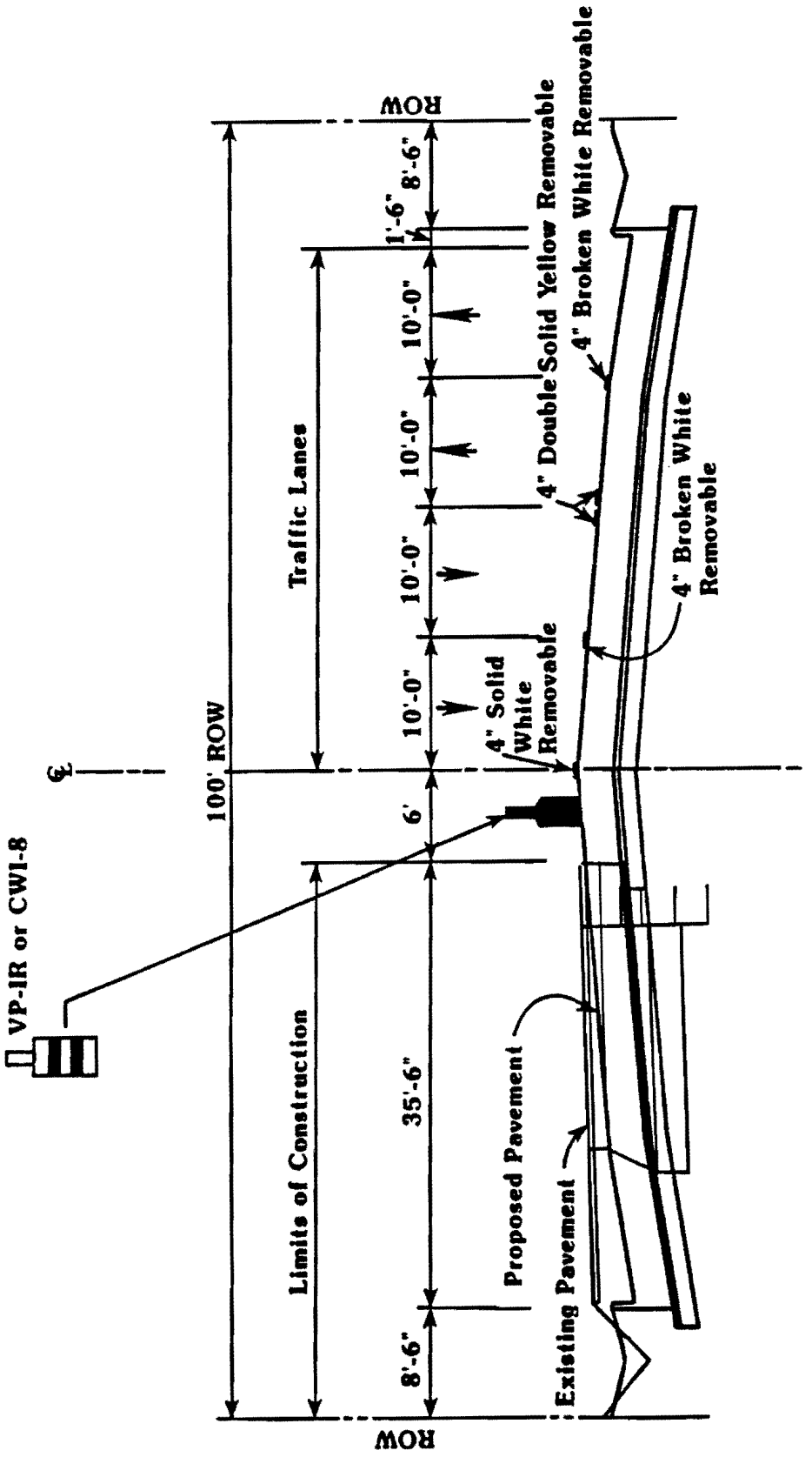


Figure V-4. F.M. 1960, S.H. 6, and Abrams Road: Fourth Phase Construction